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ВВЕДЕНИЕ

Инициативная самостоятельная работа студента есть неотъемлемая составная часть учебы в вузе. В современном формате высшего образования значительно возрастает роль самостоятельной работы студента. Правильно спланированная и организованная самостоятельная работа обеспечивает достижение высоких результатов в учебе.

Самостоятельная работа студента (СРС) - это планируемая учебная, учебно-исследовательская, научно-исследовательская работа студентов, выполняемая во внеаудиторное (аудиторное) время по заданию и при методическом руководстве преподавателя, но без его непосредственного участия, при сохранении ведущей роли студентов.

Целью СРС является овладение фундаментальными знаниями, профессиональными умениями и навыками по профилю будущей специальности, опытом творческой, исследовательской деятельности, развитие самостоятельности. Ответственности и организованности, творческого подхода к решению проблем учебного и профессионального уровней. Самостоятельная работа студента – важнейшая составная часть учебного процесса, обязательная для каждого студента, объем которой определяется учебным планом. Методологическую основу СРС составляет деятельностный подход, при котором цели обучения ориентированы на формирование умений решать типовые и нетиповые задачи, т. е. на реальные ситуации, в которых студентам надо проявить знание конкретной дисциплины. Предметно и содержательно СРС определяется государственным образовательным стандартом, действующими учебными планами и образовательными программами различных форм обучения, рабочими программами учебных дисциплин, средствами обеспечения СРС: учебниками, учебными пособиями и методическими руководствами, учебно-программными комплексами и т.д.

Самостоятельная работа студентов может рассматриваться как организационная форма обучения - система педагогических условий, обеспечивающих управление учебной деятельностью студентов по освоению знаний и умений в области учебной и научной деятельности без посторонней помощи.

Самостоятельная работа студентов проводится с целью:

- систематизации и закрепления полученных теоретических знаний и практических умений студентов;
- углубления и расширения теоретических знаний;
- формирования умений использовать нормативную, правовую, справочную документацию и специальную литературу;
- развития познавательных способностей и активности студентов: творческой инициативы, самостоятельности, ответственности и организованности;
- формирования самостоятельности мышления, способностей к саморазвитию, самосовершенствованию и самореализации;
- формирования практических (общеучебных и профессиональных) умений и навыков;
- развития исследовательских умений;
- получения навыков эффективной самостоятельной профессиональной (практической и научно-теоретической) деятельности.

Самостоятельная работа студента - это особым образом организованная деятельность, включающая в свою структуру такие компоненты, как:

- уяснение цели и поставленной учебной задачи;
- четкое и системное планирование самостоятельной работы;
- поиск необходимой учебной и научной информации;
- освоение информации и ее логическая переработка;
- использование методов исследовательской, научно-исследовательской работы для решения поставленных задач;
- выработка собственной позиции по поводу полученной задачи;

- представление, обоснование и защита полученного решения;
- проведение самоанализа и самоконтроля.

В учебном процессе выделяют два вида самостоятельной работы: аудиторная и внеаудиторная.

Аудиторная самостоятельная работа по дисциплине выполняется на учебных занятиях под непосредственным руководством преподавателя и по его заданию: текущие консультации, коллоквиум, прием и разбор домашних заданий и другие.

Внеаудиторная самостоятельная работа - планируемая учебная, учебно-исследовательская, научно-исследовательская работа студентов, выполняемая во внеаудиторное время по заданию и при методическом руководстве преподавателя, но без его непосредственного участия: подготовка презентаций, составление глоссария, подготовка к практическим занятиям, подготовка рецензий, аннотаций на статью, подготовка к дискуссиям, круглым столам.

СРС может включать следующие формы работ:

- изучение лекционного материала;
- работа с источниками литературы: поиск, подбор и обзор литературы и электронных источников информации по заданной проблеме курса;
- выполнение домашних заданий, выдаваемых на практических занятиях: тестов, докладов, контрольных работ и других форм текущего контроля;
- изучение материала, вынесенного на самостоятельное изучение; подготовка к практическим занятиям;
- подготовка к контрольной работе или коллоквиуму;
- подготовка к зачету, экзамену, другим аттестациям;
- написание реферата, эссе по заданной проблеме;
- выполнение расчетно-графической работы;
- выполнение курсовой работы или проекта;
- анализ научной публикации по определенной преподавателем теме, ее реферирование;
- исследовательская работа и участие в научных студенческих конференциях, семинарах и олимпиадах.

Особенностью организации самостоятельной работы студентов является необходимость не только подготовиться к сдаче экзамена, но и собрать, обобщить, систематизировать, проанализировать информацию по темам дисциплины.

Технология организации самостоятельной работы студентов включает использование информационных и материально-технических ресурсов образовательного учреждения. Для более эффективного выполнения самостоятельной работы по дисциплине преподаватель рекомендует студентам источники и учебно-методические пособия для работы, характеризует наиболее рациональную методику самостоятельной работы.

Самостоятельная работа может осуществляться индивидуально или группами студентов online и на занятиях в зависимости от цели, объема, конкретной тематики самостоятельной работы, уровня сложности, уровня умений студентов.

Подготовка к самостоятельной работе, не предусмотренная образовательной программой, учебным планом и учебно-методическими материалами, раскрывающими и конкретизирующими их содержание, осуществляется студентами инициативно, с целью реализации собственных учебных и научных интересов.

В качестве форм и методов контроля внеаудиторной самостоятельной работы студентов могут быть использованы обмен информационными файлами, семинарские занятия, тестирование, опрос, доклад, реферат, самоотчеты, контрольные работы, защита творческих работ и электронных презентаций и др.

1. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО РАБОТЕ С ТЕКСТОМ ЛЕКЦИЙ

На лекционных занятиях необходимо конспектировать учебный материал. Обращать внимание на формулировки, определения, раскрывающие содержание тех или иных понятий, научные выводы и практические рекомендации, положительный опыт в ораторском мастерстве. Внимательное слушание и конспектирование лекций предполагает интенсивную умственную деятельность студента, и помогает усвоить учебный материал.

Желательно оставлять в рабочих конспектах поля, на которых делать пометки, дополняющие материал прослушанной лекции, а также подчеркивающие особую важность тех или иных теоретических положений, фиксировать вопросы, вызывающие личный интерес, варианты ответов на них, сомнения, проблемы, спорные положения. Рекомендуется вести записи на одной стороне листа, оставляя вторую сторону для размышлений, разборов, вопросов, ответов на них, для фиксирования деталей темы или связанных с ней фактов, которые припоминаются самим студентом в ходе слушания.

Слушание лекций - сложный вид интеллектуальной деятельности, успех которой обусловлен *умением слушать*, и стремлением воспринимать материал, нужное записывая в тетрадь. Запись лекции помогает сосредоточить внимание на главном, в ходе самой лекции продумать и осмыслить услышанное, осознать план и логику изложения материала преподавателем.

Такая работа нередко вызывает трудности у студентов: некоторые стремятся записывать все дословно, другие пишут отрывочно, хаотично. Чтобы избежать этих ошибок, целесообразно придерживаться ряда правил.

1. После записи ориентирующих и направляющих внимание данных (тема, цель, план лекции, рекомендованная литература) важно попытаться проследить, как они раскрываются в содержании, подкрепляются формулировками, доказательствами, а затем и выводами.

2. Записывать следует основные положения и доказывающие их аргументы, наиболее яркие примеры и факты, поставленные преподавателем вопросы для самостоятельной проработки.

3. Стремиться к четкости записи, ее последовательности, выделяя темы, подтемы, вопросы и подвопросы, используя цифровую и буквенную нумерацию (римские и арабские цифры, большие и малые буквы), красные строки, выделение абзацев, подчеркивание главного и т.д.

Форма записи материала может быть различной - в зависимости от специфики изучаемого предмета. Это может быть стиль учебной программы (назывные предложения), уместны и свои краткие пояснения к записям.

Студентам не следует подробно записывать на лекции «все подряд», но обязательно фиксировать то, что преподаватели диктуют – это базовый конспект, содержащий основные положения лекции: определения, выводы, параметры, критерии, аксиомы, постулаты, парадигмы, концепции, ситуации, а также мысли-маяки (ими часто являются афоризмы, цитаты, остроумные изречения). Запись лекции лучше вести в сжатой форме, короткими и четкими фразами. Каждому студенту полезно выработать свою систему сокращений, в которой он мог бы разобраться легко и безошибочно.

Даже отлично записанная лекция предполагает дальнейшую самостоятельную работу над ней (осмысление ее содержания, логической структуры, выводов). С целью доработки конспекта лекции необходимо в первую очередь прочитать записи, восстановить текст в памяти, а также исправить описки, расшифровать не принятые ранее сокращения, заполнить пропущенные места, понять текст, вникнуть в его смысл. Далее прочитать материал по рекомендуемой литературе, разрешая в ходе чтения возникшие ранее затруднения, вопросы, а также дополняя и исправляя свои записи. В ходе доработки конспекта углубляются, расширяются и закрепляются знания, а также дополняется, исправляется и совершенствуется конспект. Доработанный конспект и рекомендуемая литература используется при подготовке к

практическому занятию. Знание лекционного материала при подготовке к практическому занятию обязательно.

Особенно важно в процессе самостоятельной работы над лекцией выделить новый понятийный аппарат, уяснить суть новых понятий, при необходимости обратиться к словарям и другим источникам, заодно устранив неточности в записях. Главное - вести конспект аккуратно и регулярно, только в этом случае он сможет стать подспорьем в изучении дисциплины.

Работа над лекцией стимулирует самостоятельный поиск ответов на самые различные вопросы: над какими понятиями следует поработать, какие обобщения сделать, какой дополнительный материал привлечь.

Важным средством, направляющим самообразование, является выполнение различных заданий по тексту лекции, например, составление ее развернутого плана или тезисов; ответы на вопросы проблемного характера, (скажем, об основных тенденциях развития той или иной проблемы); составление проверочных тестов по проблеме, написание по ней реферата, составление графических схем.

По своим задачам лекции могут быть разных жанров: *установочная лекция* вводит в изучение курса, предмета, проблем (что и как изучать), а *обобщающая лекция* позволяет подвести итог (зачем изучать), выделить главное, усвоить законы развития знания, преемственности, новаторства, чтобы применить обобщенный позитивный опыт к решению современных практических задач. Обобщающая лекция ориентирует в истории и современном состоянии научной проблемы.

В процессе освоения материалов обобщающих лекций студенты могут выполнять задания разного уровня. Например: задания *репродуктивного* уровня (составить развернутый план обобщающей лекции, составить тезисы по материалам лекции); задания *продуктивного* уровня (ответить на вопросы проблемного характера, составить опорный конспект по схеме, выявить основные тенденции развития проблемы); задания *творческого* уровня (составить проверочные тесты по теме, защитить реферат и графические темы по данной проблеме). Обращение к ранее изученному материалу не только помогает восстановить в памяти известные положения, выводы, но и приводит разрозненные знания в систему, углубляет и расширяет их. Каждый возврат к старому материалу позволяет найти в нем что-то новое, переосмыслить его с иных позиций, определить для него наиболее подходящее место в уже имеющейся системе знаний.

2. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ ДОКЛАДА (ПРЕЗЕНТАЦИИ)

Доклад – публичное сообщение по заданной теме, представляющее собой развернутое изложение на определенную тему, вид самостоятельной работы, который используется в учебных и внеаудиторных занятиях и способствует формированию навыков исследовательской работы, освоению методов научного познания, приобретению навыков публичного выступления, расширяет познавательные интересы, приучает критически мыслить.

При подготовке доклада используется дополнительная литература, систематизируется материал. Работа над докладом не только позволяет учащемуся приобрести новые знания, но и способствует формированию важных научно-исследовательских навыков самостоятельной работы с научной литературой, что повышает познавательный интерес к научному познанию.

Приветствуется использование мультимедийных технологий, подготовка докладов-презентаций.

Доклад должен соответствовать следующим требованиям:

- тема доклада должна быть согласована с преподавателем и соответствовать теме занятия;

- иллюстрации (слайды в презентации) должны быть достаточными, но не чрезмерными;

- материалы, которыми пользуется студент при подготовке доклада-презентации, должны соответствовать научно-методическим требованиям ВУЗа и быть указаны в докладе;

- необходимо соблюдать регламент: 7-10 минут выступления.

Преподаватель может дать тему сразу нескольким студентам одной группы, по принципу: докладчик и оппонент. Студенты могут подготовить два выступления с противоположными точками зрения и устроить дискуссию по проблемной теме. Докладчики и содокладчики во многом определяют содержание, стиль, активность данного занятия, для этого необходимо:

- использовать технические средства;
- знать и хорошо ориентироваться в теме всей презентации (семинара);
- уметь дискутировать и быстро отвечать на вопросы;
- четко выполнять установленный регламент: докладчик - 7-10 мин.; содокладчик - 5 мин.; дискуссия - 10 мин;
- иметь представление о композиционной структуре доклада.

После выступления докладчик и содокладчик, должны ответить на вопросы слушателей.

В подготовке доклада выделяют следующие этапы:

1. Определение цели доклада: информировать, объяснить, обсудить что-то (проблему, решение, ситуацию и т. п.)

2. Подбор литературы, иллюстративных примеров.

3. Составление плана доклада, систематизация материала, композиционное оформление доклада в виде печатного /рукописного текста и электронной презентации.

Общая структура доклада

Построение доклада включает три части: вступление, основную часть и заключение.

Вступление.

Вступление должно содержать:

- название презентации (доклада);
- сообщение основной идеи;
- обоснование актуальности обсуждаемого вопроса;
- современную оценку предмета изложения;
- краткое перечисление рассматриваемых вопросов;

- живую интересную форму изложения;
- акцентирование оригинальности подхода.

Основная часть.

Основная часть состоит из нескольких разделов, постепенно раскрывающих тему. Возможно использование иллюстрации (графики, диаграммы, фотографии, карты, рисунки) Если необходимо, для обоснования темы используется ссылка на источники с доказательствами, взятыми из литературы (цитирование авторов, указание цифр, фактов, определений). Изложение материала должно быть связным, последовательным, доказательным.

Задача основной части - представить достаточно данных для того, чтобы слушатели и заинтересовались темой и захотели ознакомиться с материалами. При этом логическая структура теоретического блока не должны даваться без наглядных пособий, аудио-визуальных и визуальных материалов.

Заключение.

Заключение - это ясное четкое обобщение, в котором подводятся итоги, формулируются главные выводы, подчеркивается значение рассмотренной проблемы, предлагаются самые важные практические рекомендации. Требования к оформлению доклада. Объем машинописного текста доклада должен быть рассчитан на произнесение доклада в течение 7 -10 минут (3-5 машинописных листа текста с докладом).

Доклад оценивается по следующим критериям:

| <i>Критерии оценки доклада, сообщения</i> | <i>Количество баллов</i> |
|---|--------------------------|
| Содержательность, информационная насыщенность доклада | 1 |
| Наличие аргументов | 1 |
| Наличие выводов | 1 |
| Наличие презентации доклада | 1 |
| Владение профессиональной лексикой | 1 |
| Итого: | 5 |

Электронные презентации выполняются в программе MS PowerPoint в виде слайдов в следующем порядке:

- титульный лист с заголовком темы и автором исполнения презентации;
- план презентации (5-6 пунктов - это максимум);
- основная часть (не более 10 слайдов);
- заключение (вывод).

Общие требования к стилевому оформлению презентации:

- дизайн должен быть простым и лаконичным;
- основная цель - читаемость, а не субъективная красота; цветовая гамма должна состоять не более чем из двух-трех цветов;
- всегда должно быть два типа слайдов: для титульных и для основного текста;
- размер шрифта должен быть: 24–54 пункта (заголовки), 18–36 пунктов (обычный текст);
- текст должен быть свернут до ключевых слов и фраз. Полные развернутые предложения на слайдах таких презентаций используются только при цитировании; каждый слайд должен иметь заголовки;
- все слайды должны быть выдержаны в одном стиле;
- на каждом слайде должно быть не более трех иллюстраций;
- слайды должны быть пронумерованы с указанием общего количества слайдов

3. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ СЕМИНАРСКИМ ЗАНЯТИЯМ

Семинар представляет собой комплексную форму и завершающее звено в изучении определенных тем, предусмотренных программой учебной дисциплины. Комплексность данной формы занятий определяется тем, что в ходе её проведения сочетаются выступления обучающихся и преподавателя: рассмотрение обсуждаемой проблемы и анализ различных, часто дискуссионных позиций; обсуждение мнений обучающихся и разъяснение (консультация) преподавателя; углубленное изучение теории и приобретение навыков умения ее использовать в практической работе.

По своему назначению семинар, в процессе которого обсуждается та или иная научная проблема, способствует:

- углубленному изучению определенного раздела учебной дисциплины, закреплению знаний;
- отработке методологии и методических приемов познания;
- выработке аналитических способностей, умения обобщения и формулирования выводов;
- приобретению навыков использования научных знаний в практической деятельности;
- выработке умения кратко, аргументированно и ясно излагать обсуждаемые вопросы;
- осуществлению контроля преподавателя за ходом обучения.

Семинары представляет собой *дискуссию* в пределах обсуждаемой темы (проблемы). Дискуссия помогает участникам семинара приобрести более совершенные знания, проникнуть в суть изучаемых проблем. Выработать методологию, овладеть методами анализа социально-экономических процессов. Обсуждение должно носить творческий характер с четкой и убедительной аргументацией.

По своей структуре семинар начинается со вступительного слова преподавателя, в котором кратко излагаются место и значение обсуждаемой темы (проблемы) в данной дисциплине, напоминаются порядок и направления ее обсуждения. Конкретизируется ранее известный обучающимся план проведения занятия. После этого начинается процесс обсуждения вопросов обучающимися. Завершается занятие подведением итогов обсуждения, заключительным словом преподавателя.

Проведение семинарских занятий в рамках учебной группы (20 - 25 человек) позволяет обеспечить активное участие в обсуждении проблемы всех присутствующих.

По ходу обсуждения темы помните, что изучение теории должно быть связано с определением (выработкой) средств, путей применения теоретических положений в практической деятельности, например, при выполнении функций государственного служащего. В то же время важно не свести обсуждение научной проблемы только к пересказу случаев из практики работы, к критике имеющих место недостатков. Дискуссии имеют важное значение: учат дисциплине ума, умению выступать по существу, мыслить логически, выделяя главное, критически оценивать выступления участников семинара.

В процессе проведения семинара обучающиеся могут использовать разнообразные по своей форме и характеру пособия, демонстрируя фактический, в том числе статистический материал, убедительно подтверждающий теоретические выводы и положения. В завершение обсудите результаты работы семинара и сделайте выводы, что хорошо усвоено, а над чем следует дополнительно поработать.

В целях эффективности семинарских занятий необходима обстоятельная подготовка к их проведению. В начале семестра (учебного года) возьмите в библиотеке необходимые методические материалы для своевременной подготовки к семинарам. Готовясь к конкретной теме занятия следует ознакомиться с новыми официальными документами, статьями в периодических журналах, вновь вышедшими монографиями.

4. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ К ДИСКУССИИ

Современная практика предлагает широкий круг типов семинарских занятий. Среди них особое место занимает *семинар-дискуссия*, где в диалоге хорошо усваивается новая информация, видны убеждения студента, обсуждаются противоречия (явные и скрытые) и недостатки. Для обсуждения берутся конкретные актуальные вопросы, с которыми студенты предварительно ознакомлены. Дискуссия является одной из наиболее эффективных технологий группового взаимодействия, обладающей особыми возможностями в обучении, развитии и воспитании будущего специалиста.

Дискуссия (от лат. *discussio* - рассмотрение, исследование) - способ организации совместной деятельности с целью интенсификации процесса принятия решений в группе посредством обсуждения какого-либо вопроса или проблемы.

Дискуссия обеспечивает активное включение студентов в поиск истины; создает условия для открытого выражения ими своих мыслей, позиций, отношений к обсуждаемой теме и обладает особой возможностью воздействия на установки ее участников в процессе группового взаимодействия. Дискуссию можно рассматривать как *метод интерактивного обучения* и как особую технологию, включающую в себя другие методы и приемы обучения: «мозговой штурм», «анализ ситуаций» и т.д.

Обучающий эффект дискуссии определяется предоставляемой участнику возможностью получить разнообразную информацию от собеседников, продемонстрировать и повысить свою компетентность, проверить и уточнить свои представления и взгляды на обсуждаемую проблему, применить имеющиеся знания в процессе совместного решения учебных и профессиональных задач.

Развивающая функция дискуссии связана со стимулированием творчества обучающихся, развитием их способности к анализу информации и аргументированному, логически выстроенному доказательству своих идей и взглядов, с повышением коммуникативной активности студентов, их эмоциональной включенности в учебный процесс.

Влияние дискуссии на личностное становление студента обусловливается ее целостно - ориентирующей направленностью, созданием благоприятных условий для проявления индивидуальности, самоопределения в существующих точках зрения на определенную проблему, выбора своей позиции; для формирования умения взаимодействовать с другими, слушать и слышать окружающих, уважать чужие убеждения, принимать оппонента, находить точки соприкосновения, соотносить и согласовывать свою позицию с позициями других участников обсуждения.

Безусловно, наличие оппонентов, противоположных точек зрения всегда обостряет дискуссию, повышает ее продуктивность, позволяет создавать с их помощью конструктивный конфликт для более эффективного решения обсуждаемых проблем.

Существует несколько видов дискуссий, использование того или иного типа дискуссии зависит от характера обсуждаемой проблемы и целей дискуссии.

Дискуссия- диалог чаще всего применяется для совместного обсуждения учебных и производственных проблем, решение которых может быть достигнуто путем взаимодополнения, группового взаимодействия по принципу «индивидуальных вкладов» или на основе согласования различных точек зрения, достижения консенсуса.

Дискуссия - спор используется для всестороннего рассмотрения сложных проблем, не имеющих однозначного решения даже в науке, социальной, политической жизни, производственной практике и т.д. Она построена на принципе «позиционного противостояния» и ее цель - не столько решить проблему, сколько побудить участников дискуссии задуматься над проблемой, уточнить и определить свою позицию; научить аргументировано отстаивать свою точку зрения и в то же время осознать право других иметь свой взгляд на эту проблему, быть индивидуальностью.

Условия эффективного проведения дискуссии:

- информированность и подготовленность студентов к дискуссии,

- свободное владение материалом, привлечение различных источников для аргументации отстаиваемых положений;
- правильное употребление понятий, используемых в дискуссии, их единообразное понимание;
- корректность поведения, недопустимость высказываний, задевающих личность оппонента;
- установление регламента выступления участников;
- полная включенность группы в дискуссию, участие каждого студента в ней.

Подготовка студентов к дискуссии: если тема объявлена заранее, то следует ознакомиться с указанной литературой, необходимыми справочными материалами, продумать свою позицию, четко сформулировать аргументацию, выписать цитаты, мнения специалистов.

В проведении дискуссии выделяется несколько этапов.

Этап 1-й, введение в дискуссию:

- формулирование проблемы и целей дискуссии;
- определение значимости проблемы, совместная выработка правил дискуссии; выяснение однозначности понимания темы дискуссии, используемых в ней терминов, понятий.

Этап 2-й, обсуждение проблемы: обмен участниками мнениями по каждому вопросу. Цель этапа - собрать максимум мнений, идей, предложений, соотнося их друг с другом.

Этап 3-й, подведение итогов обсуждения: выработка студентами согласованного мнения и принятие группового решения.

Далее подводятся итоги дискуссии, заслушиваются и защищаются проектные задания. После этого проводится "мозговой штурм" по нерешенным проблемам дискуссии, а также выявляются прикладные аспекты, которые можно рекомендовать для включения в курсовые и дипломные работы или в апробацию на практике.

Семинары-дискуссии проводятся с целью выявления мнения студентов по актуальным и проблемным вопросам.

5. МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ К СДАЧЕ ЭКЗАМЕНА

Экзамен - одна из важнейших частей учебного процесса, имеющая огромное значение.

Во-первых, готовясь к экзамену, студент приводит в систему знания, полученные на лекциях, семинарах, практических и лабораторных занятиях, разбирается в том, что осталось непонятным, и тогда изучаемая им дисциплина может быть воспринята в полном объеме с присущей ей строгостью и логичностью, ее практической направленностью. А это чрезвычайно важно для будущего специалиста.

Во-вторых, каждый хочет быть волевым и сообразительным., выдержанным и целеустремленным, иметь хорошую память, научиться быстро находить наиболее рациональное решение в трудных ситуациях. Очевидно, что все эти качества не только украшают человека, но и делают его наиболее действенным членом коллектива. Подготовка и сдача экзамена помогают студенту глубже усвоить изучаемые дисциплины, приобрести навыки и качества, необходимые хорошему специалисту.

Конечно, успех на экзамене во многом обусловлен тем, насколько систематически и глубоко работал студент в течение семестра. Совершенно очевидно, что серьезно продумать и усвоить содержание изучаемых дисциплин за несколько дней подготовки к экзамену просто невозможно даже для очень способного студента. И, кроме того, хорошо известно, что быстро выученные на память разделы учебной дисциплины так же быстро забываются после сдачи экзамена.

При подготовке к экзамену студенты не только повторяют и дорабатывают материал дисциплины, которую они изучали в течение семестра, они обобщают полученные знания, осмысливают методологию предмета, его систему, выделяют в нем основное и главное, воспроизводят общую картину с тем, чтобы яснее понять связь между отдельными элементами дисциплины. Вся эта обобщающая работа проходит в условиях напряжения воли и сознания, при значительном отвлечении от повседневной жизни, т. е. в условиях, благоприятствующих пониманию и запоминанию.

Подготовка к экзаменам состоит в приведении в порядок своих знаний. Даже самые способные студенты не в состоянии в короткий период зачетно-экзаменационной сессии усвоить материал целого семестра, если они над ним не работали в свое время. Для тех, кто мало занимался в семестре, экзамены принесут мало пользы: что быстро пройдено, то быстро и забудется. И хотя в некоторых случаях студент может «проскочить» через экзаменационный барьер, в его подготовке останется серьезный пробел, трудно восполняемый впоследствии.

Определив назначение и роль экзаменов в процессе обучения, попытаемся на этой основе пояснить, как лучше готовиться к ним.

Экзаменам, как правило, предшествует защита курсовых работ (проектов) и сдача зачетов. К экзаменам допускаются только студенты, защитившие все курсовые работы (проекты) и сдавшие все зачеты. В вузе сдача зачетов организована так, что при систематической работе в течение семестра, своевременной и успешной сдаче всех текущих работ, предусмотренных графиком учебного процесса, большая часть зачетов не вызывает повышенной трудности у студента. Студенты, работавшие в семестре по плану, подходят к экзаменационной сессии без напряжения, без излишней затраты сил в последнюю, «зачетную» неделю.

Подготовку к экзамену следует начинать с первого дня изучения дисциплины. Как правило, на лекциях подчеркиваются наиболее важные и трудные вопросы или разделы дисциплины, требующие внимательного изучения и обдумывания. Нужно эти вопросы выделить и обязательно постараться разобраться в них, не дожидаясь экзамена, проработать их, готовясь к семинарам, практическим или лабораторным занятиям, попробовать самостоятельно решить несколько типовых задач. И если, несмотря на это, часть материала

осталась неувоенной, ни в коем случае нельзя успокаиваться, надеясь на то, что это не попадет на экзамене. Факты говорят об обратном; если те или другие вопросы учебной дисциплины не вошли в экзаменационный билет, преподаватель может их задать (и часто задает) в виде дополнительных вопросов.

Точно такое же отношение должно быть выработано к вопросам и задачам, перечисленным в программе учебной дисциплины, выдаваемой студентам в начале семестра. Обычно эти же вопросы и аналогичные задачи содержатся в экзаменационных билетах. Не следует оставлять без внимания ни одного раздела дисциплины: если не удалось в чем-то разобраться самому, нужно обратиться к товарищам; если и это не помогло выяснить какой-либо вопрос до конца, нужно обязательно задать этот вопрос преподавателю на предэкзаменационной консультации. Чрезвычайно важно приучить себя к умению самостоятельно мыслить, учиться думать, понимать суть дела. Очень полезно после проработки каждого раздела восстановить в памяти содержание изученного материала. кратко записав это на листе бумаги. создать карту памяти (умственную карту), изобразить необходимые схемы и чертежи (лого-графические схемы), например, отобразить последовательность вывода теоремы или формулы. Если этого не сделать, то большая часть материала останется не понятой, а лишь формально заученной, и при первом же вопросе экзаменатора студент убедится в том, насколько поверхностно он усвоил материал.

В период экзаменационной сессии происходит резкое изменение режима работы, отсутствует посещение занятий по расписанию. При всяком изменении режима работы очень важно скорее приспособиться к новым условиям. Поэтому нужно сразу выбрать такой режим работы, который сохранился бы в течение всей сессии, т. е. почти на месяц. Необходимо составить для себя новый распорядок дня, чередуя занятия с отдыхом. Для того чтобы сократить потерю времени на включение в работу, рабочие периоды целесообразно делать длительными, разделив день примерно на три части: с утра до обеда, с обеда до ужина и от ужина до сна.

Каждый рабочий период дня надо заканчивать отдыхом. Наилучший отдых в период экзаменационной сессии - прогулка, кратковременная пробежка или какой-либо неутомительный физический труд.

При подготовке к экзаменам основное направление дают программа учебной дисциплины и студенческий конспект, которые указывают, что наиболее важно знать и уметь делать. Основной материал должен прорабатываться по учебнику (если такой имеется) и учебным пособиям, так как конспекта далеко недостаточно для изучения дисциплины. Учебник должен быть изучен в течение семестра, а перед экзаменом сосредоточьте внимание на основных, наиболее сложных разделах. Подготовку по каждому разделу следует заканчивать восстановлением по памяти его краткого содержания в логической последовательности.

За один - два дня до экзамена назначается консультация. Если ее правильно использовать, она принесет большую пользу. Во время консультации студент имеет полную возможность получить ответ на нее ни ясные ему вопросы. А для этого он должен проработать до консультации все темы дисциплины. Кроме того, преподаватель будет отвечать на вопросы других студентов, что будет для вас повторением и закреплением знаний. И еще очень важное обстоятельство: преподаватель на консультации, как правило, обращает внимание на те вопросы, по которым на предыдущих экзаменах ответы были неудовлетворительными, а также фиксирует внимание на наиболее трудных темах дисциплины. Некоторые студенты не приходят на консультации либо потому, что считают, что у них нет вопросов к преподавателю, либо полагают, что у них и так мало времени и лучше самому прочитать материал в конспекте или в учебнике. Это глубокое заблуждение. Никакая другая работа не сможет принести столь значительного эффекта накануне экзамена, как консультация преподавателя.

Но консультация не может возместить отсутствия длительной работы в течение семестра и помочь за несколько часов освоить материал, требующийся к экзамену. На консультации студент получает ответы на трудные или оставшиеся неясными вопросы и, следовательно, дорабатывается материал. Консультации рекомендуется посещать, подготовив к

ним все вопросы, вызывающие сомнения. Если студент придет на консультацию, не проработав всего материала, польза от такой консультации будет невелика.

Итак, *основные советы* для подготовки к сдаче экзамена состоят в следующем:

- лучшая подготовка к зачетам и экзаменам - равномерная работа в течение всего семестра;
- используйте программы учебных дисциплин - это организует вашу подготовку к зачетам и экзаменам;
- учитывайте, что для полноценного изучения учебной дисциплины необходимо время;
- составляйте планы работы во времени;
- работайте равномерно и ритмично;
- курсовые работы (проекты) желательно защищать за одну - две недели до начала зачетно-экзаменационной сессии;
- все зачеты необходимо сдавать до начала экзаменационной сессии;
- помните, что конспект не заменяет учебник и учебные пособия, а помогает выбрать из него основные вопросы и ответы;
- при подготовке наибольшее внимание и время уделяйте трудным и непонятным вопросам учебной дисциплины;
- грамотно используйте консультации;
- соблюдайте правильный режим труда и отдыха во время сессии, это сохранит работоспособность и даст хорошие результаты;
- учитесь владеть собой на зачете и экзамене;
- учитесь точно и кратко передавать свои мысли, поясняя их, если нужно, логико-графическими схемами.

Очень важным условием для правильного режима работы в период экзаменационной сессии является нормальный сон, иначе в день экзамена не будет чувства бодрости и уверенности.

ЗАКЛЮЧЕНИЕ

Методические указания по выполнению самостоятельной работы обучающихся являются неотъемлемой частью процесса обучения в вузе. Правильная организация самостоятельной работы позволяет обучающимся развивать умения и навыки в усвоении и систематизации приобретаемых знаний, обеспечивает высокий уровень успеваемости в период обучения, способствует формированию навыков совершенствования профессионального мастерства. Также внеаудиторное время включает в себя подготовку к аудиторным занятиям и изучение отдельных тем, расширяющих и углубляющих представления обучающихся по разделам изучаемой дисциплины.

Таким образом, обучающийся используя методические указания может в достаточном объеме усвоить и успешно реализовать конкретные знания, умения, навыки и получить опыт при выполнении следующих условий:

- 1) систематическая самостоятельная работа по закреплению полученных знаний и навыков;
- 2) добросовестное выполнение заданий;
- 3) выяснение и уточнение отдельных предпосылок, умозаключений и выводов, содержащихся в учебном курсе;
- 4) сопоставление точек зрения различных авторов по затрагиваемым в учебном курсе проблемам; выявление неточностей и некорректного изложения материала в периодической и специальной литературе;
- 5) периодическое ознакомление с последними теоретическими и практическими достижениями в области управления персоналом;
- 6) проведение собственных научных и практических исследований по одной или нескольким актуальным проблемам для *HR*;
- 7) подготовка научных статей для опубликования в периодической печати, выступление на научно-практических конференциях, участие в работе студенческих научных обществ, круглых столов и диспутах по проблемам управления персоналом.

Контроль результатов внеаудиторной самостоятельной работы студентов осуществляется в пределах времени, отведенного на обязательные учебные занятия по дисциплине

**ПЕРЕЧЕНЬ ОСНОВНОЙ И ДОПОЛНИТЕЛЬНОЙ УЧЕБНОЙ ЛИТЕРАТУРЫ,
НЕОБХОДИМОЙ ДЛЯ ОСВОЕНИЯ ДИСЦИПЛИНЫ**

Основная литература

| № п/п | Наименование | Кол-во экз. |
|-------|---|-------------|
| 1 | Светлов, В. А. Логика : учебное пособие / В. А. Светлов. — Москва : Логос, 2012. — 432 с. — ISBN 978-5-98704-618-0. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/9134.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |
| 2 | Гриценко, В. П. Логика : учебное пособие / В. П. Гриценко. — Краснодар : Южный институт менеджмента, 2008. — 265 с. — ISBN 2227-8397. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/10288.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |
| 3 | Гурова, Л. Л. Психология мышления / Л. Л. Гурова. — 2-е изд. — Москва, Саратов : ПЕР СЭ, Ай Пи Эр Медиа, 2019. — 136 с. — ISBN 978-5-4486-0830-8. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/88202.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |
| 4 | Логика: учебное пособие для студентов направления 38.03.03 / Н. В. Зотеева, Н. М. Кутарева ; Министерство образования и науки РФ, Уральский государственный горный университет. — Екатеринбург : УГГУ, 2016. - 127 с | 50 шт. |

Дополнительная литература

| № п/п | Наименование | Кол-во экз. |
|-------|--|-------------|
| 1 | Холодная, М. А. Психология понятийного мышления. От концептуальных структур к понятийным способностям / М. А. Холодная. — Москва : Институт психологии РАН, 2012. — 288 с. — ISBN 978-5-9270-0240-5. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/15603.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |
| 2 | Кашапов, М. М. Психология творческого мышления профессионала : монография / М. М. Кашапов. — 2-е изд. — Москва, Саратов : ПЕР СЭ, Ай Пи Эр Медиа, 2019. — 688 с. — ISBN 978-5-4486-0851-3. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/88207.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |
| 3 | Белоусова, А. К. Стиль мышления : учебное пособие / А. К. Белоусова, В. И. Пищик. — Ростов-на-Дону : Издательство Южного федерального университета, 2011. — 168 с. — ISBN 978-5-9275-0833-4. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/47142.html — Режим доступа: для авторизир. пользователей | Эл. ресурс |

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФГБОУ ВО «Уральский государственный горный университет»



**САМОСТОЯТЕЛЬНОЙ РАБОТЫ И ЗАДАНИЯ ДЛЯ
ОБУЧАЮЩИХСЯ**

Б1.Б.01 ПРОФЕССИОНАЛЬНЫЙ ИНОСТРАННЫЙ ЯЗЫК

Направление подготовки
09.03.01 Информатика и вычислительная техника

Профиль
Анализ больших данных и машинное обучение

квалификация выпускника: **магистр**

форма обучения: очная, заочная

Автор: Безбородова С. А., к.п.н.

Одобрена на заседании кафедры

иностранных языков
и деловой коммуникации

Зав. кафедрой

Юсупова Л. Г.

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(Дата)

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Инженерно-экономического

Председатель

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Протокол № 7 от 20.03.2021

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ВВЕДЕНИЕ

Самостоятельная работа в высшем учебном заведении - это часть учебного процесса, метод обучения, прием учебно-познавательной деятельности, комплексная целевая стандартизованная учебная деятельность с запланированными видом, типом, формами контроля.

Самостоятельная работа представляет собой плановую деятельность обучающихся по поручению и под методическим руководством преподавателя.

Целью самостоятельной работы студентов является закрепление тех знаний, которые они получили на аудиторных занятиях, а также способствование развитию у студентов творческих навыков, инициативы, умению организовать свое время.

Самостоятельная работа реализует следующие задачи:

- предполагает освоение курса дисциплины;
- помогает освоению навыков учебной и научной работы;
- способствует осознанию ответственности процесса познания;
- способствует углублению и пополнению знаний студентов, освоению ими навыков и умений;
- формирует интерес к познавательным действиям, освоению методов и приемов познавательного процесса,
- создает условия для творческой и научной деятельности обучающихся;
- способствует развитию у студентов таких личных качеств, как целеустремленность, заинтересованность, исследование нового.

Самостоятельная работа обучающегося выполняет следующие функции:

- развивающую (повышение культуры умственного труда, приобщение к творческим видам деятельности, обогащение интеллектуальных способностей студентов);
- информационно-обучающую (учебная деятельность студентов на аудиторных занятиях, неподкрепленная самостоятельной работой, становится мало результативной);
- ориентирующую и стимулирующую (процессу обучения придается ускорение и мотивация);
- воспитательную (формируются и развиваются профессиональные качества бакалавра и гражданина);
- исследовательскую (новый уровень профессионально-творческого мышления).

Организация самостоятельной работы студентов должна опираться на определенные требования, а, именно:

- сложность осваиваемых знаний должна соответствовать уровню развития студентов;
- стандартизация заданий в соответствии с логической системой курса дисциплины;
- объем задания должен соответствовать уровню студента;
- задания должны быть адаптированными к уровню студентов.

Содержание самостоятельной работы студентов представляет собой, с одной стороны, совокупность практических учебных заданий, которые должен выполнить студент в процессе обучения, объект его деятельности; с другой стороны – это способ деятельности студента по выполнению соответствующего практического учебного задания.

Свое внешнее выражение содержание самостоятельной работы студентов находит во всех организационных формах аудиторной и внеаудиторной деятельности, в ходе самостоятельного выполнения различных заданий.

Функциональное предназначение самостоятельной работы студентов в процессе практических занятий по овладению специальными знаниями заключается в самостоятельном прочтении, просмотре, прослушивании, наблюдении, конспектировании, осмыслении, запоминании и воспроизведении определенной информации. Цель и планирование самостоятельной работы студента определяет преподаватель. Вся информация осуществляется на основе ее воспроизведения.

Основные формы организации самостоятельной работы студентов определяются следующими параметрами:

- содержание учебной дисциплины;

- уровень образования и степень подготовленности студентов;
- необходимость упорядочения нагрузки студентов при самостоятельной работе.

Таким образом, самостоятельная работа студентов является важнейшей составной частью процесса обучения.

Методические указания по организации самостоятельной работы и задания для обучающихся по дисциплине «*Профессиональный иностранный язык*» обращают внимание студента на главное, существенное в изучаемой дисциплине, помогают выработать умение анализировать явления и факты, связывать теоретические положения с практикой, а также облегчают подготовку к сдаче экзамена.

Видами самостоятельной работы обучающихся по дисциплине «*Профессиональный иностранный язык*» являются:

- повторение материала аудиторных занятий;
- самостоятельное изучение тем курса (в т.ч. работа с литературой);
- подготовка к практическим занятиям (в т.ч. чтение и перевод учебных текстов, запоминание иноязычной лексики);
- подготовка к экзамену.

В методических указаниях представлены материалы для самостоятельной работы и рекомендации по организации отдельных её видов.

I. Самостоятельная работа, обеспечивающая подготовку к аудиторным занятиям

1.1 Повторение материала практических занятий

Практические занятия направлены на развитие умений иноязычного говорения в рамках заданных РПД тем: Представление и знакомство, Деловая переписка, Наука и образование, Чтение и перевод научной литературы по направлению исследования, Аннотирование научных статей, Основные правила презентации научно-технической информации.

Подготовьте устный рассказ по теме на основе предложенного:

№1

Let me introduce myself. My name is ... Now I work as an economist in a joint-stock company. I graduated from the Ural State Mining University in 2017 and got a qualification of an economist-specialist of Finance and Credit.

I am interested in dealing in securities. I often read such journal as “Money and Credit”, “Money”, “Banks and Banking”.

In order to develop my scientific outlook I have decided to take a master's degree course at the Ural State Mining University. This year is quite difficult; I've had to combine my work and studies, to attend classes in different disciplines, to read a lot of material to get ready for final examinations. I prefer dealing with applied sphere of science. I don't have any articles published yet, but I'm working at.

I have already started collecting and working up the material for my master's thesis. My research deals with the Russian security market and general principles of functioning of similar markets abroad. The subject of my investigation is different kinds of securities and stock exchanges where the given financial instruments circulate. My thesis consists of two chapters. The first chapter is devoted to the analysis of stock price fluctuations, indicators, indices and factors. In the second chapter I am going to develop some new rules and principles to receive legible formulations. The most interesting aspect, I think, is an attempt to formulate some laws of a revolution in the field of securities in the contemporary Russian economic environment. I hope my research will be of great importance and serve as guidance to forecast different situations at the Russian security market. I don't use any special equipment except my notebook. Of course, I'm not satisfied with the result obtained. I have a long way to go. I plan to submit my thesis in two years.

My scientific supervisor is Mr... He is professor, Doctor of Economics.

The English language plays an important role in my life and study. I think of improving my speaking skills, so I'll be able to talk to foreign specialists on my own, to take part in scientific conferences abroad. But now I am reading a lot of specialized and scientific books and journals in English searching the material for my thesis.

№2

We can't imagine business without communication. Business is made through communication. It can be face-to-face conversation organized in the office or at the restaurant or business correspondence. It can be held with the help of regular mail or E-mail.

A business letter is the principal means used by a business firm to keep in touch with its customers. According to the purpose of the letter there may be different kinds, e.g. a letter of request, a memo (memorandum), a letter of advice, an invitation letter, a congratulation letter, a letter of thanks (gratitude), a letter of apology, an enquiry letter, a letter of guarantee, a letter of complaint, a letter of claim, an order letter, etc.

There are special rules to organize a business letter in a right way. The business letter consists of several parts.

First you should write your own name and address (in the right up corner), telephone numbers, and then write down the title, name and address of the recipient.

Always type the date, in the logical order of day, month, year (10th November 20...).

It is important to use the correct title of the person you are addressing to:

Dr. – means doctor (a person, who has Doctor's degree or PhD);

Professor – if you are addressing the professor;

Mr. / Sir – if you are addressing a male, but is not sure in his title;
Mrs. – if you are addressing a female (married);
Miss – if you are addressing a female (single);
Ms – if you are addressing a female (married or unmarried businesswoman);
Madam – addressing a female if you are not sure in her family status.

The salutation is the greeting with which every letter begins. Opening salutation is typed in the left-hand corner. There are several types of opening salutation:

Dear Sirs – to a company;
Dear Sir – to a man if you do not know his name;
Dear Madam – to a woman if you do not know her name;
Dear Sir or Madam – to a person if you know neither the name, nor sex;
Gentlemen – the most common salutation in the United States.

If your correspondent is known to you personally the warmer and more friendly greeting, *Dear Mr ...* is preferred.

The message forms the body of the letter and is the part that really matters. Some letters are very short and may consist of only one paragraph. Many others have three paragraphs: Introduction (why are you writing?), Details (facts, information, instructions), Action (what action will you take?).

Finishing the letter is a polite way of bringing a letter to a close and you should write one of the following phrases:

Yours sincerely; Truly yours, Yours faithfully sign the letter and put your (title), name and surname.

Business letters have to be written (typed) accurately in plain language.

№3

Science is important to world peace in many ways. On one hand, scientists have helped to develop many of the modern tools of war. On the other hand, they have also helped to keep the peace through research which has improved life for people. Scientists have helped us understand the problem of supplying the world with enough energy; they have begun to develop a number of solutions to the energy problem - for example, using energy from the sun and from the atom. Scientists have also analyzed the world's resources. We can begin to learn to share the resources with the knowledge provided to us by science. Science studies the Universe and how to use its possibilities for the benefit of men.

Science is also important to everyone who is affected by modern technology. Many of the things that make our lives easier and better are the results of advances in technology and, if the present patterns continue, technology will affect us even more in the future than it does now. In some cases, such as technology for taking salt out of ocean water, technology may be essential for our lives on Earth.

The study of science also provides people with an understanding of natural world. Scientists are learning to predict earthquakes, are continuing to study many other natural events such as storms. Scientists are also studying various aspects of human biology and the origin and developments of the human race. The study of the natural world may help to improve life for many people all over the world.

A basic knowledge of science is essential for everyone. It helps people find their way in the changing world.

№4

Electromagnetism is everywhere. It is a field that exists throughout space. When particles are electrically charged, the electromagnetic field exerts a force on them. These particles then move and exert a force on the electromagnetic field. By generating these fields when and where we want them and by controlling these forces we have electricity. This gives us the power we use in the modern world. All our TVs, phones, street lights and cars depend on electromagnetism.

So what is electromagnetism? Actually, it is two things, but they are so closely connected that it is convenient for us to think of them as one, as two sides of the same coin. There are two types of field: electric and magnetic. Electrically-charged particles result in an electric field, static electricity. When there is a conductor, a material which will allow electric field to pass through it, then we can create an electric current. In our homes, the conductors are the wires that run through our house to the light bulbs

or the TV. A magnetic field results from the motion of an electric current and is used to generate the electricity we use.

In the 19th century, James Clerk Maxwell, the Scottish physicist, produced the equations that proved the two forces acted as one. One effect of this was for physicists all over the world to hurry back to their libraries and laboratories to rewrite the theories on the motion of objects. Maxwell's equations showed that what physicists had believed for centuries was in fact not correct. It was not until Einstein, in the 20th century, that the theory of motion was put right - at least for now.

How do we know the two things are one? Well, sailors had known for centuries that lightning affected the magnetic compasses on their ships. No one, however, made the connection between lightning and electricity until Benjamin Franklin, the American politician and scientist, flew a kite in a thunderstorm to attract the lightning. In other parts of the world, physicists were experimenting with magnets and electricity. Most passed a current across a magnetic needle and watched it move. The Frenchman, Andre Marie Ampere eventually applied mathematics to electromagnetism. It is from his work that we have our modern understanding of electromagnetism.

One piece of the jigsaw remained. No one had discovered a way of generating electricity. True, there were batteries, Alessandro Volta invented the Voltaic pile in 1800, but it was of limited use. Certainly no battery could provide enough electrical power to operate a machine. For that the world would have to wait for Michael Faraday to find a way of creating an electrical current, when and where it was needed.

№5

When Should You Summarize an Article?

There are a few instances when you might want to summarize an article. These are:

To show how an author's ideas support your argument

To argue against the author's ideas

To condense a lot of information into a small space

To increase your understanding of an article

What Needs to Be Included in a Summary of an Article?

A great summary should include certain important elements that make the reading experience easier on the reader. A good summary will consist of the following elements.

The main idea of the article is conveyed clearly and concisely

The summary is written in the unique style of the writer

The summary is much shorter than the original document

The summary explains all of the important notions and arguments

The summary condenses a lot of information into a small space

How Do You Summarize an Article?

Summarizing an article can be boiled down to three simple steps. By following these steps, you should have a thorough, clear, and concise summary in no time.

Identify the main idea or topic.

Identify the important arguments.

Write your summary.

Continue reading for detailed explanations of each of these steps.

Identify the Main Idea or Topic

The aim of an article is to convey a certain idea or topic through the use of exposition and logic.

In a summary, you want to identify the main idea of the article and put this information into your own words. To do this, you must be willing to read the article several times. On the first reading, try to gain a general notion of what the article is trying to say. Once you've done this write down your initial impression. This is most likely the thesis, or main idea, of the article. Also, be sure to include the author's first and last name and the title of the article in your notation for later reference.

Example: In the article "Why Two Best Friends Doesn't Work," author Cassandra Grimes argues that most teenage girls can't get along in groups of more than two.

When trying to identify the central idea, you should ask yourself, "Why was this essay written

and published?" Clues to help determine this include the following.

How to Identify the Main Idea of an Article

Gather information from the title.

Identify the place it was published, as this can help you determine the intended audience.

Determine the date of publication.

Determine the type of essay. (Is it expository, argumentative, literary, scholarly?)

Take note of the tone of the piece.

Identify certain notions or arguments that seem to be repeated throughout.

Applying these methods of identification, let's take a look at the article "Bypass Cure" by James Johnson. We can assume the subject of the article from the title. Upon further examination, it becomes clear that the author is arguing that new research suggests the best cure for diabetes is the surgical solution of a gastric bypass.

Example: "Bypass Cure" by James Johnson records a recent discovery by researchers that people who have bypass surgery for weight control are also instantly cured of diabetes. Since rising diabetic rates and obesity has become a worldwide concern, the article provides a startling but controversial potential solution.

Now that we have identified the main idea of the article, we can move onto the next step.

Identify Important Arguments

At this point in the preparation process, you should read the article again. This time, read more carefully. Look specifically for the supporting arguments. Some tips on how to identify the important arguments of an article are listed below.

How to Identify Important Arguments in an Article

Read on a paper copy or use a computer program that lets you make annotations.

Underline the topic sentence of each paragraph. (If no one sentence tells the main concept, then write a summary of the main point in the margin.)

Write that sentence in your own words on the side of the page or on another piece of paper.

When you finish the article, read all the topic sentences you marked or wrote down.

In your own words, rewrite those main ideas.

Use complete sentences with good transition words.

Be sure you don't use the same words, phrases, or sentence structure as the original.

You may find you need to leave out some of the unimportant details.

Your summary should be as short and concise as possible.

In short, you want to boil the article down to its main, supporting arguments. Let everything else fall away, and what you are left with is an argument or an opinion, and the arguments that support it.

Write Your Summary

Your summary should start with the author's name and the title of the work. Here are several ways to do this correctly:

Introduction Sentence Examples for an Article Summary

In "Cats Don't Dance," John Wood explains ...

John Wood, in "Cats Don't Dance," explains ...

According to John Wood in "Cats Don't Dance" ...

As John Wood vividly elucidates in his ironic story "Cats Don't Dance" ...

John Wood claims in his ironic story "Cats Don't Dance" that ...

Combine the thesis of the article with the title and author into your first sentence of the summary. Reference the following sentence as an example.

In "Cats Don't Dance," John Wood explains that in spite of the fact that cats are popular pets who seem to like us, felines are not really good at any activities that require cooperation with someone else, whether that is dancing or sharing.

If possible, your first sentence should summarize the article. The rest of your summary should cover some of the central concepts used to support the thesis. Be sure to restate these ideas in your own words, and to make your summary as short and concise as possible. Condense sentences and leave out unimportant details and examples. Stick to the important points.

How to Quote the Author of an Article

When you refer to the author for the first time, you always use their full name. When you refer to the author after that, you always use their last name. The following examples show how to use the author's name in an article summary after you have already introduced them.

Johnson comments ...

According to Wood's perspective ...

As Jones implies in the story about ...

Toller criticizes...

In conclusion, Kessler elaborates about ...

You don't need to use an author's title (Dr., Professor, or Mr. and Mrs.), but it does help to add their credentials to show they are an authoritative source. The sentences below show ways to do this.

In "Global Warming isn't Real," Steven Collins, a professor at the University of Michigan, claims that ...

New York Times critic Johann Bachman argues in "Global Warming is the Next Best Thing for the Earth" that ...

If you are discussing the ideas of the author, you always need to make it clear that you are reciting their ideas, not your own.

How to Introduce the Ideas of the Author in an Article Summary

Use author tags

Use mentions of "the article" or "the text"

Add the page number that the information is found on in parenthesis at the end of the sentence

Using Author Tags

In writing your summary, you need to clearly state the name of the author and the name of the article, essay, book, or other source. The sentence below is a great example of how to do this.

According to Mary Johnson in her essay, "Cats Make Good Pets," the feline domestic companion is far superior to the canine one.

You also need to continue to make it clear to the reader when you are talking about the author's ideas. To do this, use "author tags," which are either the last name of the author or a pronoun (he or she) to show you are still discussing that person's ideas.

Also, try to make use of different verbs and adverbs. Your choice of author tag verbs and adverbs can contribute to the way you analyze the article. Certain words will create a specific tone. See the tables for a selection of different word choices.

How Long Is a Summary of an Article?

The length of an article summary will depend on the length of the article you are writing about.

If the article is long (say, 10-12 pages) then your summary should be about four pages. If the article is shorter, your summary should be about one to two pages. Sometimes, an article summary can be less than one page.

The length of a summary will also depend on the instructions you have been given. If you are writing a summary for yourself, it's up to you how long or short it will be (but remember, a summary is supposed to be a short regurgitation of the information outline in an article). If you are writing a summary for a class assignment, the length should be specified.

How to Edit and Revise Your Summary

Before you are officially done, it is important to edit your work. The steps below explain the process of editing and revision.

Re-read the summary and edit out any obvious mistakes.

Read your summary aloud. If anything sounds off, fix it.

Let one of your peers read your summary. Make changes according to their feedback.

With that, your summary should be complete.

№6

A presentation is the practice of showing and explaining the content of a topic to an audience or learner. In the business world, there are sales presentations, informational and motivational presentations, interviews, status reports, image-building, and training sessions.

Students are often asked to make oral presentations. You might have been asked to research a subject and use a presentation as a means of introducing it to other students for discussion.

Before you prepare for a presentation, it is important that you think about your objectives. There are three basic purposes of giving oral presentations: to inform, to persuade, and to build goodwill.

Decide what you want to achieve:

- inform – to provide information for use in decision making;

- persuade – to reinforce or change a receiver's belief about a topic;

- build relationships – to send some messages which have the simple goal of building good-will between you and the receiver.

Preparation

A successful presentation needs careful background research. Explore as many sources as possible, from press cuttings to the Internet. Once you have completed your research, start writing for speech bearing in mind the difference between spoken and written language. Use simple, direct sentences, active verbs, adjectives and the pronouns "you" and "I".

Structuring a Presentation

A good presentation starts with a brief introduction and ends with a brief conclusion. The introduction is used to welcome your audience, introduce your topic/ subject, outlines the structure of your talk. The introduction may include an icebreaker such as a story, an interesting statement or a fact. Plan an effective opening; use a joke or an anecdote to break the ice. The introduction also needs an objective, that is, the purpose or goal of the presentation. It informs the audience of the purpose of the presentation too.

Next, ***the body*** of the presentation comes. Do not write it out word for word. All you want is an outline. There are several options for structuring the presentation:

1) Timeline: arrangement in a sequential order.

2) Climax: the main points are delivered in order of increasing importance.

3) Problem/ Solution: a problem is presented, a solution is suggested.

4) Classification: the important items are the major points.

5) Simple to complex: ideas are listed from the simplest to the most complex; it can also be done in a reverse order.

After the body, comes ***the closing***. A strong ending to the presentation is as important as an effective beginning. You should summarise the main points. This is where you ask for questions, provide a wrap-up (summary), and thank the participants for attending.

Each successful presentation has three essential objectives: the three Es – to educate, to entertain, to explain.

The main objective of making a presentation is to relay information to your audience and to capture and hold their attention. Adult audience has a limited attention span of about 45 minutes. In that time, they will absorb about a third of what you said, and a maximum of seven concepts. Limit yourself to three or four main points, and emphasise them at the beginning of your speech, in the middle, and again at the end to reiterate your message. You should know your presentation so well that during the actual presentation you should only have to briefly glance at your notes.

People process information in many ways. Some learn visually, others learn by listening, and the kinesthetic types prefer to learn through movement. It's best to provide something for everyone. Visual learners learn from pictures, graphs, and images. Auditory learners learn from listening to a speaker. And, kinesthetic learners like to be involved and participate.

Практические занятия направлены также на формирование грамматического навыка по темам: Система времен английского глагола действительного залога. Формы выражения будущего времени в придаточных предложениях условия и времени. Категория страдательного залога английского глагола. Образование форм. Модальные глаголы can, could, to be able to, must, have to, will, shall, should, ought to, may, might. Сослагательное наклонение. Три типа условных предложений. Синтаксис: Побудительные предложения, восклицательные предложения, вопросительные предложения. Сложные предложения. Прямая и косвенная речь. Согласование времен в английском предложении. Сравнительно-сопоставительные конструкции и обороты в предложении. Типы придаточных предложений и способы их связи.

Повторите материал практических занятий.

Синтаксис: Побудительные предложения, восклицательные предложения, вопросительные предложения.

В побудительном предложении выражаются различные побуждения к действию – приказ, просьба, запрещение, рекомендация, совет и т.д. Повелительные предложения, выражающие приказания, произносятся с понижающейся интонацией, а предложения, выражающие просьбу, - с повышающейся интонацией.

Повелительное предложение может быть как утвердительным, так и отрицательным. Глагол в повелительном предложении употребляется в форме повелительного наклонения. Подлежащее как правило отсутствует, и предложение начинается прямо со сказуемого. Подразумевается, что действие должен выполнять тот, кому адресовано обращение.

- Open the book. *Откройте книгу.*
Translate this article, please. *Переведите, пожалуйста, эту статью.*
Take off your hat! *Снимите шляпу!*
Don't go there. *Не ходите туда.*
Tell me all about it. *Расскажи мне все об этом.*
Put the dictionary on the shelf. *Положите словарь на полку.*
Don't be late, please. *Не опоздайте, пожалуйста.*

Предложение может состоять и из одного сказуемого, выраженного глаголом в повелительном наклонении:

- Write! *Пиши(те)!*
Don't talk! *Не разговаривай(те)!*

Для выражения просьбы в конце повелительного предложения часто употребляется *will you?* или *won't you?*, отделяющиеся запятой:

- Come here, **will you?** *Идите сюда, пожалуйста.*
Close the window, **will you?** *Закройте, пожалуйста, окно.*
Fetch me a chair, **won't you?** *Принесите мне стул, пожалуйста.*
Come and see me, **won't you?** *Заходите ко мне, пожалуйста.*

Просьба может быть выражена также в форме вопросительного предложения, начинающегося с *will* или *would*. В отличие от общего вопроса, предложение, выражающее просьбу, произносится с падающей интонацией:

- Will** you come here? *Идите сюда, пожалуйста.*
Will you give me that book? *Дайте мне эту книгу, пожалуйста.*
Would you mind lending me your dictionary? *Не будете ли вы добры одолжить мне ваш словарь?*
Would you give me some water? *Дайте мне воды, пожалуйста.*
Will you fetch me a chair, please? *Принесите мне стул, пожалуйста.*

Would you be good enough to close the window? *Не будете ли вы добры закрыть окно?*

Для усиления просьбы перед глаголом в повелительном наклонении употребляется вспомогательный глагол **do**:

Do write to me! *Пожалуйста, пишите мне!*
Do listen to me. *Послушайте же меня!*
Do come with me. *Идемте со мной, ну!*

Восклицательные предложения передают различные эмоциональные чувства – радость, удивление, огорчение и т.д. Любое предложение: повествовательное, вопросительное или повелительное может стать восклицательным, если высказываемая мысль сопровождается сильным чувством и интонацией. На письме оно обычно обозначается восклицательным знаком. Восклицательные предложения произносятся с понижающейся интонацией.

At last you have returned! *Наконец вы вернулись!*
Have you ever seen such weather?! *Вы когда-нибудь видели такую погоду?!*
How can you be so lazy! *Ну как можно быть таким ленивым!*
Oh, please, forgive me! *О, пожалуйста, прости меня!*
Hurry up! *Спешите!*
You are so stupid! *Ты так глуп!*

Среди них выделяют восклицательные предложения, начинающиеся с местоимения **what** – *какой, какая, что за* или наречия **how** – *как*. В этих предложениях сохраняется прямой порядок слов, т.е. сказуемое следует за подлежащим. В отличие от русского языка, слова **what** и **how** всегда стоят непосредственно перед определяемым словом. То есть, если по-русски возможна конструкция: "**Какую** я сделал ошибку!", то в английском возможно лишь: "**Какую** ошибку я сделал!"

Местоимение **what** относится обычно к существительному, перед которым могут находиться еще и определяющие его прилагательное или наречие:

What a beautiful house that is! *Какой это красивый дом!*
What beautiful hair she has got! *Какие у нее прекрасные волосы!*
What interesting news I've heard! *Какую интересную новость я узнал!*
What a cold day it is! *Какой холодный день!*
What clever people they are! *Какие они умные люди!*
What a large house that is! *Какой это большой дом!*

А наречие **how** относится к прилагательному или наречию; предложение строится по схеме: **How** + прилагательное (наречие) + подлежащее + сказуемое:

How beautifully she sings! *Как красиво она поет!*
How slowly they run! *Как медленно они бегут!*
How far it is! *Как это далеко!*
How hot it was! *Как жарко было!*
How well she sings! *Как хорошо она поет!*
How quickly you walk! *Как быстро вы ходите! = Как вы быстро ходите!*

Если местоимение **what** определяет исчисляемое существительное в единственном числе, то это существительное употребляется с неопределенным артиклем:

What a foolish mistake I have made! *Какую глупую ошибку я сделал!*
What a beautiful girl she is! *Какая она красивая девушка!*
What a fine building that is! *Какое это красивое здание!*

С исчисляемым существительным во множественном числе и с неисчисляемым существительным артикль не употребляется:

- What** foolish mistakes I have made! *Какие глупые ошибки я сделал!*
What interesting books you have brought! *Какие интересные книги вы принесли!*
What fine weather it is! *Какая хорошая погода!*
What strange ideas he has! *Какие у него странные идеи!*

Чаще всего восклицательные предложения неполные. В них опускаются подлежащее, часть сказуемого, или все сказуемое целиком:

- What** a fine building (that is)! *Какое прекрасное здание!*
What a silly story (it is)! *Что за глупая история!*
What a funny girl (she is)! *До чего смешная девчонка!*
How late (it is)! *Как поздно!*
How wonderful! *Как замечательно!*
How beautiful! *Как красиво!*
What a girl! *Ну и девушка!*
How cold (it is)! *Как холодно!*

Порядок слов в английском предложении

В русском языке, благодаря наличию падежных окончаний, мы можем переставлять члены предложения, не меняя основного смысла высказывания. Например, предложения Студенты изучают эти планы и Эти планы изучают студенты совпадают по своему основному смыслу. Подлежащее в обоих случаях - студенты, хотя в первом предложении это слово стоит на первом месте, а во втором предложении - на последнем.

По-английски такие перестановки невозможны. Возьмём предложение The students study these plans Студенты изучают эти планы. Если подлежащее и дополнение поменяются местами, то получится бессмыслица: These plans study the students Эти планы изучают студентов. Произошло это потому, что слово plans, попав на первое место, стало подлежащим.

Английское предложение имеет твёрдый порядок слов.

Порядок слов в английском предложении показан в этой таблице:

| I | II | III Дополнение | | | IV Обстоятельство |
|------------|------------------|------------------------|---------------------------|-----------------------|---------------------------------|
| | | Косвенное без предлога | Прямое | Косвенное с предлогом | |
| We Мы | study изучаем | | math математику | | |
| He Он | gives дает | us нам | lessons уроки | | in this room. в этой комнате |
| She Она | reads читает | | her notes свои заметки | to Peter Петру | every day. каждый день |

Вопросительное предложение

Общее правило построения вопросов в английском языке таково: Все вопросы (кроме специальных вопросов к подлежащему предложения) строятся путем инверсии. Инверсией называется нарушение обычного порядка слов в английском предложении, когда сказуемое следует за подлежащим.

В тех случаях, когда сказуемое предложения образовано без вспомогательных глаголов (в Present и Past Indefinite) используется вспомогательный глагол to do в требуемой форме - do/does/did.

Общие вопросы

Общий вопрос задается с целью получить подтверждение или отрицание высказанной в вопросе мысли. На общий вопрос обычно дается краткий ответ: "да" или "нет".

Для построения общего вопроса вспомогательный или модальный глагол, входящий в состав сказуемого, ставится в начале предложения перед подлежащим.

а) Примеры сказуемого с одним вспомогательным глаголом: Is he speaking to the teacher?
- Он говорит с учителем?

б) Примеры сказуемого с несколькими вспомогательными глаголами:

You will be writing letters to us. – Ты будешь писать нам письма.

Will you be writing letters to us? – Будешь ли ты писать нам письма?

Примеры с модальными глаголами:

She can drive a car. – Она умеет водить машину.

Can she drive a car? - Она умеет водить машину? (Yes, she can.; No, she cannot)

Когда в составе сказуемого нет вспомогательного глагола (т.е. когда сказуемое выражено глаголом в Present или Past Indefinite), то перед подлежащим ставятся соответственно формы do / does или did; смысловой же глагол ставится в форме инфинитива без to (словарная форма) после подлежащего.

С появлением вспомогательного глагола do на него переходит вся грамматическая нагрузка - время, лицо, число: в Present Indefinite в 3-м лице ед. числа окончание -s, -es смыслового глагола переходит на глагол do, превращая его в does; а в Past Indefinite окончание прошедшего времени -ed переходит на do, превращая его в did.

Do you go to school? – Ходишь ли ты в школу?

Do you speak English well? - Ты хорошо говоришь по-английски?

Ответы на общие вопросы

Общий вопрос требует краткого ответа "да" или "нет", которые в английском языке образуются следующим образом:

а) Положительный состоит из слова Yes за которым (после запятой) идет подлежащее, выраженное личным местоимением в им. падеже (никогда не используется существительное) и тот вспомогательный или модальный глагол, который использовался в вопросе (вспомогательный глагол согласуется с местоимением ответа);

б) Отрицательный ответ состоит из слова No, личного местоимения и вспомогательного (или модального) глагола с последующей частицей not

Например: Are you a student? - Ты студент?

Yes, I am. - Да.; No, I am not. - Нет.

Do you know him? – Ты знаешь его?

Yes, I do. – Да (знаю).; No, I don't. – Нет (не знаю).

Специальные вопросы

Специальный вопрос начинается с вопросительного слова и задается с целью получения более подробной уточняющей информации. Вопросительное слово в специальном вопросе заменяет член предложения, к которому ставится вопрос.

Специальные вопросы могут начинаться словами:

who? – кто? whom? – кого? whose? - чей? what? – что? какой? which? –
который?

when? – когда? where? – где? куда? why? – почему? how? – как?

how much? – сколько? how many? – сколько? how long? – как долго?
сколько времени?

how often? – как часто?

Построение специальных вопросов:

1) Специальные вопросы ко всем членам предложения, кроме подлежащего (и его определения) строятся так же, как и общие вопросы – посредством инверсии, когда вспомогательный или модальный глагол ставится перед подлежащим.

Специальный вопрос (кроме вопроса к подлежащему) начинается с вопросительного слова или группы слов за которым следуют вспомогательный или модальный глагол, подлежащее и смысловой глагол (сохраняется структура общего вопроса).

Вопрос к прямому дополнению:

What are you reading? Что ты читаешь?

What do you want to show us? Что вы хотите показать нам?

Вопрос к обстоятельству

Обстоятельства бывают разного типа: времени, места, причины, условия, образа действия и др.

He will come back tomorrow. – Он вернется завтра.

When will he come back? – Когда он вернется?

What did he do it for? Зачем он это сделал?

Where are you from?

Вопрос к определению

Вопрос к определению начинается с вопросительных слов what какой, which (of) который (из), whose чей, how much сколько (с неисчисляемыми существительными), how many сколько (с исчисляемыми существительными). Они ставятся непосредственно перед определяемым существительным (или перед другим определением к этому существительному), а затем уже идет вспомогательный или модальный глагол.

What books do you like to read? Какие книги вы любите читать?

Which books will you take? Какие книги (из имеющихся) вы возьмете?

Вопрос к сказуемому

Вопрос к сказуемому является типовым ко всем предложениям: "Что он (она, оно, они, это) делает (делал, будет делать)?", например:

What does he do? Что он делает?

Специальные вопросы к подлежащему

Вопрос к подлежащему (как и к определению подлежащего) не требует изменения прямого порядка слов, характерного для повествовательного предложения. Просто подлежащее (со всеми его определениями) заменяется вопросительным местоимением, которое исполняет в вопросе роль подлежащего. Вопросы к подлежащему начинаются с вопросительных местоимений:

who – кто (для одушевленных существительных)

what - что (для неодушевленных существительных)

The teacher read an interesting story to the students yesterday.

Who read an interesting story to the students yesterday?

Сказуемое в таких вопросах (после who, what в роли подлежащего) всегда выражается глаголом в 3-м лице единственного числа (не забудьте про окончание -s в 3-м лице ед. числа в Present Indefinite. Правила образования -s форм см. здесь.):

Who is reading this book? Кто читает эту книгу?

Who goes to school?

Альтернативные вопросы

Альтернативный вопрос задается тогда, когда предлагается сделать выбор, отдать чему-либо предпочтение.

Альтернативный вопрос может начинаться со вспомогательного или модального глагола (как общий вопрос) или с вопросительного слова (как специальный вопрос) и должен обязательно содержать союз or - или. Часть вопроса до союза or произносится с повышающейся интонацией, после союза or - с понижением голоса в конце предложения.

Например вопрос, представляющий собой два общих вопроса, соединенных союзом or: Is he reading or is he writing?

Did he pass the exam or did he fail?

Вторая часть вопроса, как правило, имеет усеченную форму, в которой остается (называется) только та часть, которая обозначает выбор (альтернативу):

Is he reading or writing?

Разделительные вопросы

Основными функциями разделительных вопросов являются: проверка предположения, запрос о согласии собеседника с говорящим, поиски подтверждения своей мысли, выражение сомнения.

Разделительный (или расчлененный) вопрос состоит из двух частей: повествовательной и вопросительной.

Первая часть - повествовательное утвердительное или отрицательное предложение с прямым порядком слов.

Вторая часть, присоединяемая через запятую, представляет собой краткий общий вопрос, состоящий из местоимения, заменяющего подлежащее, и вспомогательного или модального глагола. Повторяется тот вспомогательный или модальный глагол, который входит в состав сказуемого первой части. А в Present и Past Indefinite, где нет вспомогательного глагола, употребляются соответствующие формы do/ does/ did.

В второй части употребляется обратный порядок слов, и она может переводиться на русский язык: не правда ли?, не так ли?, верно ведь?

1. Если первая часть вопроса утвердительная, то глагол во второй части стоит в отрицательной форме, например:

You speak French, don't you? You are looking for something, aren't you? Pete works at a plant, doesn't he?

2. Если первая часть отрицательная, то во второй части употребляется утвердительная форма, например:

It is not very warm today, is it? John doesn't live in London, does he?

Безличные предложения

Поскольку в английском языке подлежащее является обязательным элементом предложения, в безличных предложениях употребляется формальное подлежащее, выраженное местоимением it. Оно не имеет лексического значения и на русский язык не переводится.

Безличные предложения используются для выражения:

1. Явлений природы, состояния погоды: It is/(was) winter. (Была) Зима. It often rains in autumn. Осенью часто идет дождь. It was getting dark. Темнело. It is cold. Холодно. It snows. Идет снег.

2. Времени, расстояния, температуры: It is early morning. Ранее утро. It is five o'clock. Пять часов. It is two miles to the lake. До озера две мили. It is late. Поздно.

3. Оценки ситуации в предложениях с составным именным (иногда глагольным) сказуемым, за которым следует подлежащее предложения, выраженное инфинитивом, герундием или придаточным предложением: It was easy to do this. Было легко сделать это.

It was clear that he would not come. Было ясно, что он не придет.

4. С некоторыми глаголами в страдательном залоге в оборотах, соответствующих русским неопределенно-личным оборотам: It is said he will come. Говорят, он придет.

Система времен английского глагола действительного залога

Present Simple употребляется для выражения:

1. постоянных состояний,

2. повторяющихся и повседневных действий (часто со следующими наречиями: always, never, usually и т.д.). Mr Gibson is a businessman. He lives in New York, (постоянное состояние) He usually starts work at 9 am. (повседневное действие) He often stays at the office until late in the evening, (повседневное действие)

3. непреложных истин и законов природы, The moon moves round the earth.

4. действий, происходящих по программе или по расписанию (движение поездов, автобусов и т.д.). The bus leaves in ten minutes.

Маркерами **present simple** являются: usually, always и т.п., every day / week / month / year и т.д., on Mondays I Tuesdays и т.д., in the morning / afternoon / evening, at night / the weekend и т.д.

Present Continuous употребляется для выражения:

1. действий, происходящих в момент речи He is reading a book right now.
2. временных действий, происходящих в настоящий период времени, но не обязательно в момент речи She is practising for a concert these days. (В данный момент она не играет. Она отдыхает.)
3. действий, происходящих слишком часто и по поводу которых мы хотим высказать раздражение или критику (обычно со словом "always") "You're always interrupting me!"(раздражение)
4. действия, заранее запланированных на будущее. He is flying to Milan in an hour. (Это запланировано.)

Маркерами **present continuous** являются: now, at the moment, these days, at present, always, tonight, still и т.д.

Во временах **группы Continuous** обычно **не употребляются** глаголы:

1. выражающие восприятия, ощущения (see, hear, feel, taste, smell), Например: This cake tastes delicious. (Но не: This cake is tasting delicious)
2. выражающие мыслительную деятельность [know, think, remember, forget, recognize(ze), believe, understand, notice, realise(ze), seem, sound и др.],
Например: I don't know his name.
3. выражающие эмоции, желания (love, prefer, like, hate, dislike, want и др.), Например: Shirley loves jazz music.
4. include, matter, need, belong, cost, mean, own, appear, have (когда выражает принадлежность) и т.д. Например: That jacket costs a tot of money. (Но не: That jacket is costing a lot of money.)

Present perfect употребляется для выражения:

1. действий, которые произошли в прошлом в неопределенное время. Конкретное время действия не важно, важен результат, Kim has bought a new mobile phone. (Когда она его купила? Мы это не уточняем, поскольку это не важно. Важного, что у нее есть новый мобильный телефон.)
2. действий, которые начались в прошлом и все еще продолжаются в настоящем, We has been a car salesman since /990. (Он стал продавцом автомобилей в 1990 году и до сих пор им является.)
3. действий, которые завершились совсем недавно и их результаты все еще ощущаются в настоящем. They have done their shopping. (Мы видим, что они только что сделали покупки, поскольку они выходят из супермаркета с полной тележкой.)
4. Present perfect simple употребляется также со словами "today", "this morning / afternoon" и т.д., когда обозначенное ими время в момент речи еще не истекло. He has made ten photos this morning. (Сейчас утро. Указанное время не истекло.)

К маркерам **present perfect** относятся: for, since, already, just, always, recently, ever, how long, yet, lately, never, so far, today, this morning/ afternoon / week / month / year и т.д.

Present perfect continuous употребляется для выражения:

1. действий, которые начались в прошлом и продолжаются в настоящее время He has been painting the house for three days. (Он начал красить дом три дня назад и красит его до сих пор.)
2. действий, которые завершились недавно и их результаты заметны (очевидны) сейчас. They're tired. They have been painting the garage door all morning. (Они только что закончили красить. Результат их действий очевиден. Краска на дверях еще не высохла, люди выглядят усталыми.)

Примечание.

1. С глаголами, не имеющими форм группы Continuous, вместо present perfect continuous употребляется present perfect simple. Например: I've known Sharon since we were at school together. (А не: I've been knowing Sharon since we were at school together.)

2. С глаголами live, feel и work можно употреблять как present perfect continuous, так и present perfect simple, при этом смысл предложения почти не изменяется.

Например: He has been living/has lived here since 1994.

К маркерам present perfect continuous относятся: for. since. all morning/afternoon/week/day и т.д., how long (в вопросах).

Past simple употребляется для выражения:

1. действий, произошедших в прошлом в определенное указанное время, то есть нам известно, когда эти действия произошли, They graduated four years ago. (Когда они закончили университет? Четыре года назад. Мы знаем время.)

2. повторяющихся в прошлом действий, которые более не происходят. В этом случае могут использоваться наречия частоты (always, often, usually и т.д.), He often played football with his dad when he was five. (Но теперь он уже не играет в футбол со своим отцом.) Then they ate with their friends.

3. действий, следовавших непосредственно одно за другим в прошлом.

They cooked the meal first.

4. Past simple употребляется также, когда речь идет о людях, которых уже нет в живых. Princess Diana visited a lot of schools.

Маркерами past simple являются: yesterday, last night / week / month / year I Monday и т.д., two days I weeks I months I years ago, then, when, in 1992 и т.д.

People used to dress differently in the past. Women used to wear long dresses. Did they use to carry parasols with them? Yes, they did. They didn't use to go out alone at night.

• **Used to** (+ основная форма глагола) употребляется для выражения привычных, повторяющихся в прошлом действий, которые сейчас уже не происходят. Эта конструкция не изменяется по лицам и числам. Например: Peter used to eat a lot of sweets. (= Peter doesn't eat many sweets any more.) Вопросы и отрицания строятся с помощью did / did not (didn't), подлежащего и глагола "use" без -d.

Например: Did Peter use to eat many sweets? Mary didn't use to stay out late.

Вместо "used to" можно употреблять past simple, при этом смысл высказывания не изменяется. Например: She used to live in the countryside. = She lived in the countryside.

Отрицательные и вопросительные формы употребляются редко.

Past continuous употребляется для выражения:

1. временного действия, продолжавшегося в прошлом в момент, о котором мы говорим. Мы не знаем, когда началось и когда закончилось это действие, At three o'clock yesterday afternoon Mike and his son were washing the dog. (Мы не знаем, когда они начали и когда закончили мыть собаку.)

2. временного действия, продолжавшегося в прошлом (longer action) в момент, когда произошло другое действие (shorter action). Для выражения второго действия (shorter action) мы употребляем past simple, He was reading a newspaper when his wife came, (was reading = longer action: came = shorter action)

3. двух и более временных действий, одновременно продолжавшихся в прошлом. The people were watching while the cowboy was riding the bull.

4. Past continuous употребляется также для описания обстановки, на фоне которой происходили события рассказа (повествования). The sun was shining and the birds were singing. Tom was driving his old truck through the forest.

Маркерами past continuous являются: while, when, as, all day / night / morning и т.д. when/while/as + past continuous (longer action) when + past simple (shorter action)

Past perfect употребляется:

1. для того, чтобы показать, что одно действие произошло раньше другого в прошлом. При этом то действие, которое произошло раньше, выражается past perfect simple, а случившееся позже - past simple,

They had done their homework before they went out to play yesterday afternoon. (=They did their homework first and then they went out to play.)

2. для выражения действий, которые произошли до указанного момента в прошлом,
She had watered all the flowers by five o'clock in the afternoon.
(=She had finished watering the flowers before five o'clock.)

3. как эквивалент **present perfect simple** в прошлом. То есть, **past perfect simple** употребляется для выражения действия, которое началось и закончилось в прошлом, а **present perfect simple** - для действия, которое началось в прошлом и продолжается (или только что закончилось) в настоящем. Например: Jill wasn't at home. She had gone out. (Тогда ее не было дома.) Лили isn't at home. She has gone out. (Сейчас ее нет дома.)

К маркерам **past perfect simple** относятся: before, after, already, just, till/until, when, by, by the time и т.д.

Future simple употребляется:

1. для обозначения будущих действий, которые, возможно, произойдут, а возможно, и нет,
We'll visit Disney World one day.

2. для предсказаний будущих событий (predictions), Life will be better fifty years from now.

3. для выражения угроз или предупреждений (threats / warnings), Stop or I'll shoot.

4. для выражения обещаний (promises) и решений, принятых в момент речи (on-the-spot decisions), I'll help you with your homework.

5. с глаголами hope, think, believe, expect и т.п., с выражениями I'm sure, I'm afraid и т.п., а также с наречиями probably, perhaps и т.п. / think he will support me. He will probably go to work.

К маркерам **future simple** относятся: tomorrow, the day after tomorrow, next week I month / year, tonight, soon, in a week / month year и т.д.

ПРИМЕЧАНИЕ

Future simple не употребляется после слов while, before, until, as soon as, after, if и when в придаточных предложениях условия и времени. В таких случаях используется **present simple**. Например: I'll make a phone call while I wait for you. (А не:... while I will wait for you.) Please phone me when you finish work.

В дополнительных придаточных предложениях после "when" и "if" возможно употребление **future simple**. Например: I don't know when I if Helen will be back.

He is going to throw the ball.

Be going to употребляется для:

1. выражения заранее принятых планов и намерений на будущее,
Например: Bob is going to drive to Manchester tomorrow morning.

2. предсказаний, когда уже есть доказательства того, что они сбываются в близком будущем.
Например: Look at that tree. It is going to fall down.

We use the **future continuous**:

a) for an action which will be in progress at a stated for an action which will be future time.
This time next week, we'll be cruising round the islands.

b) for an action which will definitely happen in the future as the result of a routine or arrangement. *Don't call Julie. I'll be seeing her later, so I'll pass the message on.*

c) when we ask politely about someone's plans for the near future (what we want to know is if our wishes fit in with their plans.) *Will you be using the photocopier for long?*
No. Why?

I need to make some photocopies.

We use the **future perfect**:

1. For an action which will be finished before a stated future time. *She will have delivered all the newspapers by 8 o'clock.*

2. The future perfect is used with the following time expressions: before, by, by then, by the time, until/till.

We use the **future perfect continuous**:

1. to emphasize the duration of an action up to a certain time in the future. *By the end of next month, she will have been teaching for twenty years.*

The future perfect continuous is used with: by... for.

Формы выражения будущего времени в придаточных предложениях условия и времени

В придаточных времени с союзами when (когда), after (после), before (перед тем как), as soon as (как только), until (до тех пор пока не), относящихся к будущему времени, а также в придаточных условия, вводимых союзами if (если) и unless (если не), будущее время заменяется формой настоящего времени, но на русский язык переводится будущим, например:

If you help me, I shall do this work on time. - Если ты поможешь мне, я сделаю эту работу вовремя.

As soon as I get free, I shall give you a call. - Как только я освобожусь, я вам позвоню.

We shall not sit to dinner until you come. - Мы не сядем обедать, пока ты не придешь.

Иногда в сложносочиненном предложении словами when и if вводится придаточное дополнительное, а не придаточное времени или условия. В этом случае использование настоящего времени в придаточном будет ошибкой. Чтобы определить, какую форму глагола необходимо использовать, достаточно поставить вопрос к придаточному предложению - «при каком условии?» и «когда?» к придаточным условия и времени и «что?» - к придаточному дополнительному.

We shall sit to dinner (Когда?) when he comes. - Мы сядем обедать, когда он придет.

We will go to the movies if he comes. - Мы пойдем в кино, если он придет.

I want to know (что?) when you will come. - Я хочу знать, когда ты придешь.

I want to know (что?) if you will come. - Я хочу знать, придешь ли ты.

Модальные глаголы

| <u>Глаголы</u> | <u>Значение</u> | <u>Примеры</u> |
|----------------|--|---|
| CAN | физическая или умственная возможность/умение | I can swim very well. – Я очень хорошо умею плавать. |
| | возможность | You can go now. — Ты можешь идти сейчас. You cannot play football in the street. – На улице нельзя играть в футбол. |
| | вероятность | They can arrive any time. – Они могут приехать в любой момент. |
| | удивление | Can he have said that? – Неужели он это сказал? |
| | сомнение, недоверчивость | She can't be waiting for us now. – Не может быть, чтобы она сейчас нас ждала. |
| | разрешение | Can we go home? — Нам можно пойти домой? |
| | вежливая просьба | Could you tell me what time it is now? – Не могли бы вы подсказать, который сейчас час? |
| MAY | разрешение | May I borrow your book? – Я могу одолжить у тебя книгу? |
| | предположение | She may not come. – Она, возможно, не придет. |
| | возможность | In the museum you may see many interesting things. – В музее вы можете увидеть много интересных вещей. |
| | упрек – только MIGHT (+ perfect infinitive) | You might have told me that. – Ты мог бы мне это сказать. |
| MUST | обязательство, необходимость | He must work. He must earn money. – Он должен работать. Он должен зарабатывать деньги. |
| | вероятность (сильная степень) | He must be sick. — Он, должно быть, заболел. |
| | запрет | Tourists must not feed animals in the zoo. — Туристы не должны кормить животных в зоопарке. |
| SHOULD | моральное долженствование | You ought to be polite. – Вы должны быть любезными. |

| | | |
|-----------------|----------------------------------|--|
| OUGHT TO | совет | You should see a doctor. – Вам следует сходить к врачу. |
| | упрек, запрет | You should have taken the umbrella. – Тебе следовало взять с собой <u>зонт</u> . |
| SHALL | указ, обязанность | These rules shall apply in all circumstances. – Эти правила будут действовать при любых обстоятельствах. |
| | угроза | You shall suffer. — Ты будешь страдать. |
| | просьба об указании | Shall I open the window? – Мне открыть окно? |
| WILL | готовность, нежелание/отказ | The door won't open. — Дверь не открывается. |
| | вежливая просьба | Will you go with me? – Ты сможешь пойти со мной? |
| WOULD | готовность, нежелание/отказ | He would not answer this question. – Он не будет отвечать на этот вопрос. |
| | вежливая просьба | Would you please come with me? — Не могли бы вы пройти со мной. |
| | повторяющееся/привычное действие | We would talk for hours. – Мы беседовали часами. |
| NEED | необходимость | Do you need to work so hard? – Тебе надо столько работать? |
| NEEDN'T | отсутствие необходимости | She needn't go there. — Ей не нужно туда идти. |
| DARE | Посметь | How dare you say that? – Как ты смеешь такое говорить? |

| Модальные единицы эквивалентного типа | | |
|---|--|---|
| to be able (to) = can | Возможность соверш-я конкрет-го дей-ия в опред. момент | She was able to change the situation then. (Она тогда была в состоянии (могла) изменить ситуацию). |
| to be allowed (to) = may | Возмож-ть совер-ия дей-ия в наст.-м, прош-ом или буд-ем + оттенок разрешения | My sister is allowed to play outdoors. (Моей сестре разрешается играть на улице). |
| to have (to) = ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом или буд-ем при опред-х об-вах | They will have to set up in business soon. (Им вскоре придется открыть свое дело). |
| to be (to) = ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом при наличии опред. планов, распис-ий и т.д. | We are to send Nick about his business. (Мы должны (= планируем) выпроводить Ника) |

Категория страдательного залога английского глагола. Образование форм. Passive Voice

образуется при помощи вспомогательного глагола to be в соответствующем времени, лице и числе и причастия прошедшего времени смысл. глагола – Participle II (III –я форма или ed-форма).

В страдательном залоге не употребляются:

1) Непереходные глаголы, т.к. при них нет объекта, который испытывал бы воздействие, то есть нет прямых дополнений которые могли бы стать подлежащими при глаголе в форме Passive.

Переходными в англ. языке называются глаголы, после которых в действительном залоге следует прямое дополнение; в русском языке это дополнение, отвечающее на вопросы винительного падежа – кого? что?: to build строить, to see видеть, to take брать, to open открывать и т.п.

Непереходными глаголами называются такие глаголы, которые не требуют после себя прямого дополнения: to live жить, to come приходиться, to fly летать, to cry плакать и др.

2) Глаголы-связки: be – быть, become – становиться/стать.

3) Модальные глаголы.

4) Некоторые переходные глаголы не могут использоваться в страдательном залоге. В большинстве случаев это глаголы состояния, такие как:

to fit годиться, быть впору to have иметь to lack не хватать, недоставать to like нравиться
to resemble напоминать, быть похожим to suit годиться, подходить и др.

При изменении глагола из действительного в страдательный залог меняется вся конструкция предложения:

- дополнение предложения в Active становится подлежащим предложения в Passive;
- подлежащее предложения в Active становится предложным дополнением, которое вводится предлогом by или вовсе опускается;
- сказуемое в форме Active становится сказуемым в форме Passive.

Особенности употребления форм Passive:

1. Форма Future Continuous не употребляется в Passive, вместо нее употребляется Future Indefinite:

At ten o'clock this morning Nick will be writing the letter. – At ten o'clock this morning the letter will be written by Nick.

2. В Passive нет форм Perfect Continuous, поэтому в тех случаях, когда нужно передать в Passive действие, начавшееся до какого-то момента и продолжающееся вплоть до этого момента, употребляются формы Perfect:

He has been writing the story for three months. The story has been written by him for three months.

3. Для краткости, во избежание сложных форм, формы Indefinite (Present, Past, Future) часто употребляются вместо форм Perfect и Continuous, как в повседневной речи так и в художественной литературе. Формы Perfect и Continuous чаще употребляются в научной литературе и технических инструкциях.

This letter has been written by Bill. (Present Perfect)

This letter is written by Bill. (Present Indefinite – более употребительно)

Apples are being sold in this shop. (Present Continuous)

Apples are sold in this shop. (Present Indefinite – более употребительно)

4. Если несколько однотипных действий относятся к одному подлежащему, то вспомогательные глаголы обычно употребляются только перед первым действием, например: The new course will be sold in shops and ordered by post.

Прямой пассив (The Direct Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует прямому дополнению предложения в Active. Прямой пассив образуется от большинства переходных глаголов.

I gave him a book. Я дал ему книгу. A book was given to him. Ему дали книгу. (или Книга была дана ему)

The thief stole my watch yesterday. Вор украл мои часы вчера.

My watch was stolen yesterday. Мои часы были украдены вчера.

В английском языке имеется ряд переходных глаголов, которые соответствуют непереходным глаголам в русском языке. В английском они могут употребляться в прямом пассиве, а в русском – нет. Это: to answer отвечать кому-л.

to believe верить кому-л. to enter входить (в) to follow следовать (за) to help помогать кому-л.

to influence влиять (на) to join присоединяться to need нуждаться to watch наблюдать (за)

Так как соответствующие русские глаголы, являясь непереходными, не могут употребляться в страдательном залоге, то они переводятся на русский язык глаголами в действительном залоге:

Winter is followed by spring.

А при отсутствии дополнения с предлогом by переводятся неопределенно-личными предложениями: Your help is needed.

Косвенный пассив (The Indirect Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует косвенному дополнению предложения в Active. Она возможна только с глаголами, которые могут иметь и

прямое и косвенное дополнения в действительном залоге. Прямое дополнение обычно означает предмет (что?), а косвенное – лицо (кому?).

С такими глаголами в действительном залоге можно образовать две конструкции:

а) глагол + косвенное дополнение + прямое дополнение;

б) глагол + прямое дополнение + предлог + косвенное дополнение:

а) They sent Ann an invitation.- Они послали Анне приглашение.

б) They sent an invitation to Ann. - Они послали приглашение Анне.

В страдательном залоге с ними также можно образовать две конструкции – прямой и косвенный пассив, в зависимости от того, какое дополнение становится подлежащим предложения в Passive. К этим глаголам относятся: to bring приносить

to buy покупать to give давать to invite приглашать to leave
оставлять

to lend одалживать to offer предлагать to order приказывать to pay платить

to promise обещать to sell продавать to send посылать to show показывать

to teach учить to tell сказать и др.

Например: Tom gave Mary a book. Том дал Мэри книгу.

Mary was given a book. Мэри дали книгу. (косвенный пассив – более употребителен)

A book was given to Mary. Книгу дали Мэри. (прямой пассив – менее употребителен)

Выбор между прямым или косвенным пассивом зависит от смыслового акцента, вкладываемого в последние, наиболее значимые, слова фразы:

John was offered a good job. (косвенный пассив) Джону предложили хорошую работу.

The job was offered to John. (прямой пассив) Работу предложили Джону.

Глагол to ask спрашивать образует только одну пассивную конструкцию – ту, в которой подлежащим является дополнение, обозначающее лицо (косвенный пассив):

He was asked a lot of questions. Ему задали много вопросов.

Косвенный пассив невозможен с некоторыми глаголами, требующими косвенного дополнения (кому?) с предлогом to. Такое косвенное дополнение не может быть подлежащим в Passive, поэтому в страдательном залоге возможна только одна конструкция – прямой пассив, то есть вариант: Что? объяснили, предложили, повторили...Кому? Это глаголы: to address адресовать

to describe описывать to dictate диктовать to explain объяснять to mention
упоминать

to propose предлагать to repeat повторять to suggest предлагать to write
писать и др.

Например: The teacher explained the rule to the pupils. – Учитель объяснил правило ученикам. The rule was explained to the pupils. – Правило объяснили ученикам. (Not: The pupils was explained...)

Употребление Страдательного залога

В английском языке, как и в русском, страдательный залог употр. для того чтобы:

1. Обойтись без упоминания исполнителя действия (70% случаев употребления Passive) в тех случаях когда:

а) Исполнитель неизвестен или его не хотят упоминать:

He was killed in the war. Он был убит на войне.

б) Исполнитель не важен, а интерес представляет лишь объект воздействия и сопутствующие обстоятельства:

The window was broken last night. Окно было разбито прошлой ночью.

в) Исполнитель действия не называется, поскольку он ясен из ситуации или контекста:

The boy was operated on the next day. Мальчика оперировали на следующий день.

г) Безличные пассивные конструкции постоянно используются в научной и учебной литературе, в различных руководствах: The contents of the container should be kept in a cool dry place. Содержимое упаковки следует хранить в сухом прохладном месте.

2. Для того, чтобы специально привлечь внимание к тому, кем или чем осуществлялось действие. В этом случае существительное (одушевленное или неодушевленное.) или местоимение (в объектном падеже) вводится предлогом *by* после сказуемого в *Passive*.

В английском языке, как и в русском, смысловой акцент приходится на последнюю часть фразы. *He quickly dressed.* Он быстро оделся.

Поэтому, если нужно подчеркнуть исполнителя действия, то о нем следует сказать в конце предложения. Из-за строгого порядка слов английского предложения это можно осуществить лишь прибегнув к страдательному залогу. Сравните:

The flood broke the dam. (Active) Наводнение разрушило плотину. (Наводнение разрушило что? – плотину)

The dam was broken by the flood. (Passive) Плотина была разрушена наводнением. (Плотина разрушена чем? – наводнением)

Чаще всего используется, когда речь идет об авторстве:

The letter was written by my brother. Это письмо было написано моим братом.

И когда исполнитель действия является причиной последующего состояния:

The house was damaged by a storm. Дом был поврежден грозой.

Примечание: Если действие совершается с помощью какого-то предмета, то употребляется предлог *with*, например:

He was shot with a revolver. Он был убит из револьвера.

Перевод глаголов в форме *Passive*

В русском языке есть три способа выражения страдательного залога:

1. При помощи глагола "быть" и краткой формы страдательного причастия, причем в настоящем времени "быть" опускается:

I am invited to a party.

Я приглашён на вечеринку.

Иногда при переводе используется обратный порядок слов, когда русское предложение начинается со сказуемого: *New technique has been developed.* Была разработана новая методика.

2. Глагол в страдательном залоге переводится русским глаголом, оканчивающимся на –ся(-сь):

Bread is made from flour. Хлеб делается из муки.

Answers are given in the written form. Ответы даются в письменном виде.

3. Неопределенно-личным предложением (подлежащее в переводе отсутствует; сказуемое стоит в 3-м лице множественного числа действительного залога). Этот способ перевода возможен только при отсутствии дополнения с предлогом *by* (производитель действия не упомянут):

The book is much spoken about. Об этой книге много говорят.

I was told that you're ill. Мне сказали, что ты болен.

4. Если в предложении указан субъект действия, то его можно перевести личным предложением с глаголом в действительном залоге (дополнение с *by* при переводе становится подлежащим). Выбор того или иного способа перевода зависит от значения глагола и всего предложения в целом (от контекста):

They were invited by my friend. Их пригласил мой друг. (или Они были приглашены моим другом.)

Примечание 1: Иногда страдательный оборот можно перевести двумя или даже тремя способами, в зависимости от соответствующего русского глагола и контекста:

The experiments were made last year.

1) Опыты были проведены в прошлом году.

2) Опыты проводились в прошлом году.

3) Опыты проводили в прошлом году.

Примечание 2: При переводе нужно учитывать, что в английском языке, в отличие от русского, при изменении залога не происходит изменение падежа слова, стоящего перед глаголом (например в английском *she* и *she*, а переводим на русский - она и ей):

Примечание 3: Обороты, состоящие из местоимения *it* с глаголом в страдательном залоге переводятся неопределенно-личными оборотами:

It is said... Говорят... It was said... Говорили...
 It is known... Известно... It was thought... Думали, полагали...
 It is reported... Сообщают... It was reported... Сообщали... и т.п.

В таких оборотах it играет роль формального подлежащего и не имеет самостоятельного значения: It was expected that he would return soon. Ожидали, что он скоро вернется.

Согласование времен в английском предложении (Sequence of Tenses)

Если в главном предложении сказуемое выражено глаголом в одной из форм прошедшего времени, то в придаточном предложении употребление времен ограничено. Правило, которому в этом случае подчиняется употребление времен в придаточном предложении, называется согласованием времен.

Правило 1: Если глагол главного предложения имеет форму настоящего или будущего времени, то глагол придаточного предложения будет иметь любую форму, которая требуется смыслом предложения. То есть никаких изменений не произойдет, согласование времен здесь в силу не вступает.

Правило 2: Если глагол главного предложения имеет форму прошедшего времени (обычно Past Simple), то глагол придаточного предложения должен быть в форме одного из прошедших времен. То есть в данном случае время придаточного предложения изменится. Все эти изменения отражены в нижеследующей таблице:

| Переход из одного времени в другое | Примеры | |
|--|---|---|
| Present Simple » Past Simple | He can speak French – Он говорит по-французски. | Boris said that he could speak French – Борис сказал, что он говорит по-французски. |
| Present Continuous » Past Continuous | They are listening to him – Они слушают его | I thought they were listening to him – Я думал, они слушают его. |
| Present Perfect » Past Perfect | Our teacher has asked my parents to help him – Наш учитель попросил моих родителей помочь ему. | Mary told me that our teacher had asked my parents to help him – Мария сказала мне, что наш учитель попросил моих родителей помочь ему. |
| Past Simple » Past Perfect | I invited her – Я пригласил ее. | Peter didn't know that I had invited her – Петр не знал, что я пригласил ее. |
| Past Continuous » Past Perfect Continuous | She was crying – Она плакала | John said that she had been crying – Джон сказал, что она плакала. |
| Present Perfect Continuous » Past Perfect Continuous | It has been raining for an hour – Дождь идет уже час. | He said that it had been raining for an hour – Он сказал, что уже час шел дождь. |
| Future Simple » Future in the Past | She will show us the map – Она покажет нам карту. | I didn't expect she would show us the map – Я не ожидал, что она покажет нам карту. |

Изменение обстоятельств времени и места при согласовании времен.

Следует запомнить, что при согласовании времен изменяются также некоторые слова (обстоятельства времени и места).

this » that
 these » those
 here » there
 now » then
 yesterday » the day before
 today » that day

tomorrow » the next (following) day
last week (year) » the previous week (year)
ago » before
next week (year) » the following week (year)

Прямая и косвенная речь

Перевод прямой речи в косвенную в английском языке

Для того чтобы перевести прямую речь в косвенную, нужно сделать определенные действия. Итак, чтобы передать чьи-то слова в английском языке (то есть перевести прямую речь в косвенную), мы:

1. Убираем кавычки и ставим слово *that*

Например, у нас есть предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы передать кому-то эти слова, так же как и в русском, мы убираем кавычки и ставим слово *that* – «что».

She said that Она сказала, что.....

2. Меняем действующее лицо

В прямой речи обычно человек говорит от своего лица. Но в косвенной речи мы не можем говорить от лица этого человека. Поэтому мы меняем «я» на другое действующее лицо. Вернемся к нашему предложению:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Так как мы передаем слова девушки, вместо «я» ставим «она»:

She said that she Она сказала, что она....

3. Согласовываем время

В английском языке мы не можем использовать в одном предложении прошедшее время с настоящим или будущим. Поэтому, если мы говорим «сказал» (то есть используем прошедшее время), то следующую часть предложения нужно согласовать с этим прошедшем временем. Возьмем наше предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы согласовать первую и вторую части предложения, меняем *will* на *would*. см. таблицу выше.

She said that she would buy a dress. Она сказала, что она купит платье.

4. Меняем некоторые слова

В некоторых случаях мы должны согласовать не только времена, но и отдельные слова. Что это за слова? Давайте рассмотрим небольшой пример.

She said, "I am driving now". Она сказала: «Я за рулем сейчас».

То есть она в данный момент за рулем. Однако, когда мы будем передавать ее слова, мы будем говорить не про данный момент (тот, когда мы говорим сейчас), а про момент времени в прошлом (тот, когда она была за рулем). Поэтому мы меняем *now* (сейчас) на *then* (тогда) см. таблицу выше.

She said that she was driving then. Она сказала, что она была за рулем тогда.

Вопросы в косвенной речи в английском языке

Вопросы в косвенной речи, по сути, не являются вопросами, так как порядок слов в них такой же, как в утвердительном предложении. Мы не используем вспомогательные глаголы (*do, does, did*) в таких предложениях.

He asked, "Do you like this cafe?" Он спросил: «Тебе нравится это кафе?»

Чтобы задать вопрос в косвенной речи, мы убираем кавычки и ставим *if*, которые переводятся как «ли». Согласование времен происходит так же, как и в обычных предложениях. Наше предложение будет выглядеть так:

He asked if I liked that cafe. Он спросил, нравится ли мне то кафе.

Давайте рассмотрим еще один пример:

She said, "Will he call back?" Она сказала: «Он перезвонит?»

She said if he would call back. Она сказала, перезвонит ли он.

Специальные вопросы в косвенной речи

Специальные вопросы задаются со следующими вопросительными словами: what – что when – когда how – как why - почему where – где which – который

При переводе таких вопросов в косвенную речь мы оставляем прямой порядок слов (как в утвердительных предложениях), а на место if ставим вопросительное слово.

Например, у нас есть вопрос в прямой речи:

She said, "When will you come?". Она сказала: «Когда ты придешь?»

В косвенной речи такой вопрос будет выглядеть так:

She said when I would come. Она сказала, когда я приду.

He asked, "Where does she work?" Он спросил: «Где она работает?»

He asked where she worked. Он спросил, где она работает.

Сослагательное наклонение. Три типа условных предложений

Conditionals are clauses introduced with if. There are three types of conditional clause: Type 1, Type 2 and Type 3. There is also another common type, Type 0.

Type 0 Conditionals: They are used to express something which is always true. We can use when (whenever) instead of it. *If/When the sun shines, snow melts.*

Type 1 Conditionals: They are used to express real or very probable situations in the present or future. *If he doesn't study hard, he won't pass his exam.*

Type 2 Conditionals: They are used to express imaginary situations which are contrary to facts in the present and, therefore, are unlikely to happen in the present or future. *Bob is daydreaming. If I won the lottery, I would buy an expensive car and I would go on holiday to a tropical island next summer.*

Type 3 Conditionals: They are used to express imaginary situations which are contrary to facts in the past. They are also used to express regrets or criticism. *John got up late, so he missed the bus. If John hadn't got up late, he wouldn't have missed the bus.*

| | If-clause (hypothesis) | Main clause (result) | Use |
|--------------------------|--|--|--|
| Type 0 general truth | if + present simple | present simple | something which is always true |
| | If the temperature falls below 0 °C, water turns into ice. | | |
| Type 1 real present | if + present simple, present continuous, present perfect or present perfect continuous | future/imperative can/may/might/must/should/ could + bare infinitive | real - likely to happen in the present or future |
| | If he doesn't pay the fine, he will go to prison. If you need help, come and see me. If you have finished your work, we can have a break. If you're ever in the area, you should come and visit us. | | |
| Type 2 unreal present | if + past simple or past continuous | would/could/might + bare infinitive | imaginary situation contrary to facts in the present; also used to give advice |
| | If I had time, I would take up a sport. (but I don't have time - untrue in the present) If I were you, I would talk to my parents about it. (giving advice) | | |
| Type 3 unreal past | if + past perfect or past perfect continuous | would/could/might + have + past participle | imaginary situation contrary to facts in the past; also used to express regrets or criticism |
| | If she had studied harder, she would have passed the test. If he hadn't been acting so foolishly, he wouldn't have been punished. | | |

Conditional clauses consist of two parts: the if -clause (hypothesis) and the main clause (result). When the if - clause comes before the main clause, the two clauses are separated with a comma. When the main clause comes before the if - clause, then no comma is necessary.

e.g. a) *If I see Tim, I'll give him his book.*

b) *I'll give Tim his book if I see him.*

We do not normally use will, would or should in an if - clause. However, we can use will or would after if to make a polite request or express insistence or uncertainty (usually with expressions such as / don't know, I doubt, I wonder, etc.).

We can use should after if to talk about something which is possible, but not very likely to happen.

e.g. a) *If the weather is fine tomorrow, will go camping. (NOT: If the weather will be fine...)*

b) *If you will fill in this form, I'll process your application. (Will you please fill in... - polite request)*

c) *If you will not stop shouting, you'll have to leave. (If you insist on shouting... - insistence)*

d) *I don't know if he will pass his exams, (uncertainty)*

e) *If Tom should call, tell him I'll be late. (We do not think that Tom is very likely to call.)*

We can use unless instead of if... not in the if -clause of Type 1 conditionals. The verb is always in the affirmative after unless.

e.g. *Unless you leave now, you'll miss the bus. (If you don't leave now, you'll miss the bus.)*

(NOT: Unless you don't leave now, ...)

We can use were instead of was for all persons in the if - clause of Type 2 conditionals.

e.g. *If Rick was/were here, we could have a party.*

We use If I were you ... when we want to give advice.

e.g. *If I were you, I wouldn't complain about it.*

The following expressions can be used instead of if: provided/providing that, as long as, suppose/supposing, etc.

e.g. a) *You can see Mr. Carter provided you have an appointment. (If you have an appointment...)*

b) *We will all have dinner together providing Mary comes on time. (... if Mary comes ...)*

c) *Suppose/Supposing the boss came now, ...*

We can omit if in the if - clause. When if is omitted, should (Type 1), were (Type 2), had (Type 3) and the subject are inverted.

e.g. a) *Should Peter come, tell him to wait. (If Peter should come,...)*

b) *Were I you, I wouldn't trust him. (If I were you, ...)*

c) *Had he known, he would have called. (If he had known, ...)*

Сравнительно-сопоставительные конструкции и обороты в предложении

Все три формы прилагательных – основная (или положительная), сравнительная и превосходная используются в сравнительных конструкциях.

Положительная степень

(или основная форма прилагательного)

1 Одинаковое качество двух предметов (лиц, явлений) выражается прилагательными в положительной степени (основная форма) в конструкции с союзами **as...as** в значении *такой же ...как, так же...как*:

He is **as tall as** his brother.

This text is **as difficult as** that one.

Он *такой же высокий, как и* его брат.

Этот текст *такой же трудный, как и тот.*

Иногда употребляется конструкция с прилагательным **same** *тот же самый, одинаковый*: **the same...as** – *такой же, тот же самый*:

Mary is **the same age as** Jane.

Мэри того же возраста, что и Джейн.

2 Разное качество предметов выражается конструкцией **not so/as...as** в значении *не так...как, не такой...как*:

He is **not so (as) tall as** his brother.

Он не такой высокий, как его брат.

The problem is **not so simple as** it seems. *Эта проблема не такая простая, как кажется.*

Если после второго **as** следует личное местоимение в третьем лице, то обычно глагол повторяется:

I am **not as strong as** he is.

Я не такой сильный, как он.

Her sister is **not so pretty as** she is.

Ее сестра не такая хорошенькая, как она.

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

She is **not so beautiful as** you (are).

Она не такая красивая, как ты.

3 Если один из сравниваемых объектов превосходит другой вдвое (**twice** [twɑɪs]) или в несколько раз (... **times**) по степени проявления какого-либо качества, то употребляется следующая конструкция:

Your room is **twice as large as** mine.

Ваша комната в два раза больше моей.

This box is **three times as heavy as** that.

Этот ящик в три раза тяжелее того.

Когда второй объект сравнения не упомянут, то **as** после прилагательного не употребляется:

This grade is **twice as expensive**.

Этот сорт в два раза дороже.

He is **twice as old**.

Он в два раза старше.

А если один из объектов уступает по качеству в два раза, то употребляется **half** *половина, наполовину, в два раза меньше*. Обратите внимание на то, что стоящее за ним прилагательное в конструкции **as... as** имеет противоположное значение тому, что принято в русском языке:

Your flat is **half as large as** mine.

Ваша квартира вдвое меньше моей.

Moscow is **half as big as** New York.

Москва наполовину меньше Нью-Йорка.

В подобных сравнительных конструкциях союз **as...as** и последующее прилагательное могут вообще опускаться, что должно компенсироваться наличием соответствующего существительного:

Your flat is **three times the size** of mine.

Ваша квартира в три раза больше моей.

He is **half my age**.

Он в два раза моложе меня.

Сравнительная степень

1 При сравнении степени качества одного предмета с другим после прилагательного в сравнительной степени употребляется союз **than** [Dxn] - *чем*, который при переводе на русский язык часто опускается:

He is **older than** I am.

Он старше, чем я. (меня)

This book is **more interesting than** that one.

Эта книга интереснее, чем та (книга).

Эта конструкция может содержать и количественный компонент сравнения:

My mother is **ten years younger than** my father.

Моя мама на 10 лет моложе отца.

Уменьшение качества выражается с помощью **less... than**:

I am **less musical than** my sister.

Я менее музыкален, чем моя сестра.

Если после **than** следует личное местоимение в третьем лице, то глагол обычно повторяется:

She has **more good marks than** he has.

У нее больше хороших отметок, чем у него.

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

He is **stronger than** you. *Он сильнее, чем ты.*

В этом случае, если нет второго сказуемого, после **than** обычно употребляется личное местоимение в объектном падеже **me/ him/ her/ them/ us**, а не в именительном:

You are taller **than I am**. или You are taller **than me**. *Ты выше, чем я (меня).*

I got up earlier **than she did**. или I got up earlier **than her**. *Я встал раньше ее (чем она).*

She runs quicker **than him**. *Она бежит быстрее (чем он).*

2 Для усиления сравнительной степени часто употребляются слова **much** [mʌʃ] или **far** [fɑː] со значением - *значительно, гораздо, намного*, а также **still** *еще*, **even** ['iːvən] *даже*, **by far** *намного, безусловно*. Причем **much more** [mʌʃ mɔː] и **far more** употребляется перед неисчисляемыми существительными, а **many more** перед исчисляемыми существительными :

My boyfriend is **much older than** me.

Мой друг гораздо старше меня.

This book is **far better than** that one.

Эта книга значительно лучше той.

It is **still colder** today.

Сегодня еще холоднее.

He has **much more free time than** I have.

У него гораздо больше свободного времени, чем у меня.

I have **many more books than** he (has).

У меня гораздо больше книг, чем у него.

3 При передаче зависимости одного качества от другого (обычно их параллельное возрастание или убывание) используется конструкция **the... the**, например:

The more you have, **the more** you want.

Чем больше ты имеешь, тем больше ты хочешь.

The longer I stay here **the better** I like it.

Чем дольше я нахожусь здесь, тем больше мне нравится.

Превосходная степень

Если один предмет или лицо превосходят остальные в каком-либо качестве, то употребляется прилагательное в превосходной степени с артиклем **the**. Речь обычно идет не о сравнении двух предметов (лиц, явлений), а трех или более.

"Why did you stay at that hotel?" – "It

"Почему вы остановились в той гостинице?" –

was **the cheapest** (that) we could find."

"Она была самая дешевая, которую мы могли найти".

Обычно при сравнении употребляется конструкция **the прилагательное... in**, если речь идет о местоположении, например:

Tom is **the cleverest** (boy) **in** the class.

Том – самый умный (парень) в классе.

What's **the longest** river **in** the world?

Какая самая длинная река в мире?

Или конструкция **the прилагательное... of**, например:

the happiest day **of** my life

счастливейший день моей жизни

He is **the best** **of** my friends.

Он лучший из моих друзей.

Pete is **the best** student **of** us all.

Пит лучший студент из всех нас.

She is **the prettiest** **of** them all.

Она самая хорошенькая из них.

После превосходной степени часто употребляется определительное придаточное предложение со сказуемым в **Present Perfect** (как вы помните, здесь речь идет о свершившемся факте в прошлом, значение которого продолжается до настоящего момента). Это предложение может вводиться относительным местоимением **that** *который*, но оно обычно опускается.

This is **the most interesting** book (that)

Это самая интересная книга, которую я когда-

I have ever read.

либо читал.

Типы придаточных предложений и способы их связи

TIME CLAUSES

They had booked tickets before they went to the cinema. They will go home when the film is over.

◆ We use the following time conjunctions to introduce time clauses.

when - as - while - before - after - since - until/till - whenever - as long as - by the time- as soon as -the moment that - no sooner ...than - hardly... when - once - immediately - the first/last/next time etc.

◆ When the time clause precedes the main clause, a comma is used.

e.g. *Whenever he is in town, he visits us.*

He visits us whenever he is in town.

Sequence of Tenses

◆ Time clauses follow the rule of the sequence of tenses. That is, when the verb of the main clause is in a present or future form, the verb of the time clause is in a present form. When the verb of the main clause is in a past form, the verb of the time clause is in a past form too.

Main clause

Time clause

present / future / imperative → present simple or present perfect

She takes off her shoes the moment that she gets home.

I'll call you as soon as I get to my hotel.

Turn off the lights before you leave.

past simple/ past perfect → past simple or past perfect

He took a shower after he had finished painting the room.

They had reserved a table before they went to the restaurant.

TIME CONJUNCTIONS

◆ **ago - before**

ago = before now

e.g. *My parents got married twenty years ago. (= twenty years before now)*

before = before a past time

e.g. *Helen and Mike got married last month.*

They had met six months before. (= six months before last month)

◆ **until/till - by the time**

until/till = up to the time when

e.g. *You must stay in the office until/till you finish/have finished the report.*

(= up to the time when you finish the report) They'll be at their summer house until/till Sunday.

(= up to Sunday)

by the time + clause = not later than the moment something happens

e.g. *I will have set the table by the time you come home. (= before, not later than the moment you come home)*

by = not later than

e.g. *I'll let you know my decision by Friday. (= not later than Friday)*

Note: a) **not... until/till**

e.g. *I won't have finished my work until/till/ before Thursday.*

b) Both until/till and before can be used to say how far away a future event is.

e.g. *There's only one week until/till/before my summer holidays.*

◆ **during - while/as**

during + noun = in the time period

e.g. *We learnt several interesting facts during the lecture.*

while/as + clause = in the time period

e.g. *We learnt several interesting facts while/as we were listening to the lecture.*

◆ **when = (time conjunction) + present tense**

e.g. *We'll order some pizzas when our friends get here.*

when = (question word) + will/would

e.g. *I'm not sure when his next book will be published.*

CLAUSES OF RESULT

Dolphins are so appealing (that) it is hard not to like them.

They are such intelligent creatures (that) they can communicate with each other.

Clauses of result are used to express the result of something. They are introduced with the following words/expressions:

as a result - therefore - consequently/as a consequence - so - so/such ... that etc.

◆ **as a result/therefore/consequently**

e.g. *The president was taken ill and, as a result/ therefore/consequently the summit meeting was cancelled.*

The president was taken ill. As a result/therefore/ consequently, the summit meeting was cancelled.

◆ **so** e.g. *It was hot, so I turned on the air-conditioning.*

◆ **such a/an + adjective + singular countable noun**

e.g. *It was such an interesting book (that) I couldn't put it down.*

◆ **such + adjective + plural/uncountable noun**

e.g. *They are such good friends (that) they've never had an argument.*

It was such expensive jewellery (that) it was kept in a safe.

◆ **such a lot of + plural/uncountable noun**

e.g. *She invited such a lot of guests to her party that there wasn't enough room for all of them.*

He has such a lot of money (that) he doesn't know what to do with it.

◆ **so + adjective/adverb**

e.g. *He is so devoted that he deserves praise.*

He speaks so quickly that I can't understand him.

◆ **so much/little + uncountable noun**

so many/few + plural noun

e.g. *There is so much traffic that we won't be on time. He pays so little attention to what I say that it makes me angry.*

He made so many mistakes that he failed. There are so few wolves left that we have to protect them.

CLAUSES OF REASON

Traffic is getting worse because/as more people are buying cars. Traffic is getting worse on account of the fact that more people are buying cars.

Causes of reason are used to express the reason for something. They are introduced with the following words/expressions:

because - as/since - the reason for/why - because of/on account of/due to - now that - for etc.

◆ **because** e.g. *I took a taxi because it was raining.*

Because it was raining, I took a taxi.

◆ **as/since (=because)** e.g. *They bought him a gift as/since it was his birthday. As/Since it was his birthday, they bought him a gift.*

◆ **the reason for + noun/-ing form**

the reason why + clause

e.g. *The reason for his resignation was (the fact) that he had been offered a better job. The fact that he had been offered a better job was the reason for his resigning. The reason why he resigned was (the fact) that he had been offered a better job.*

◆ **because of/on account of/due to + noun**

because of/on account of/due to the fact that + clause

e.g. *All flights were cancelled because of/on account of the thick fog.*

All flights were cancelled due to the thick fog. He asked for a few days off because of/on account of the fact that he was exhausted. He asked for a few days off due to the fact that he was exhausted.

◆ **now (that) + clause** e.g. *Now (that) they have children, they have less free time.*

◆ **for = because (in formal written style)**

A clause of reason introduced with for always comes after the main clause.

e.g. *The citizens of Harbridge were upset, for a new factory was to be built near their town.*

CLAUSES OF PURPOSE

They met in a café to discuss their holiday.

They met in a café so that they could discuss their holiday.

Clauses of purpose are used to express the purpose of an action. That is, they explain why someone does something. They are introduced with the following words/expressions:

to - in order to/so as to-so that/in order that - in case-for etc.

◆ **to - infinitive**

e.g. *She went shopping to look for some new clothes.*

◆ **in order to/so as to + infinitive (formal)**

e.g. *He did a postgraduate course in order to/so as to widen his knowledge of international politics.*

In negative sentences we use in order not to or so as not to. We never use not to alone.

e.g. *He wrote the number down in order not to/so as not to forget it.*

◆ **so that + can/will (present or future reference)**

e.g. *Emma has booked a first-class ticket so that she can travel in comfort.*

so that + could/would (past reference)

e.g. *He recorded the match so that he could watch it later.*

Note: In order that has the same structure as so that. However, it is not used very often as it is formal.

e.g. *We will send you the forms in order that you can make your application.*

◆ **in case + present tense (present or future reference)**

in case + past tense (past reference)

In case is never used with will or would.

e.g. *Take your credit card in case you run out of cash. He took a jumper in case it got cold.*

◆ **for + noun** (when we want to express the purpose of an action)

e.g. *He went to the doctor's for a check-up.*

for + -ing form (when we want to express the purpose or function of something)

e.g. *We use a spade for digging.*

Clauses of purpose follow the rule of the sequence of tenses, like time clauses.

e.g. *He borrowed some money so that he could pay his phone bill.*

Note: We can express negative purpose by using:

a) **prevent + noun/pronoun + (from) + -ing form**

e.g. *She covered the sofa with a sheet to prevent it (from) getting dirty.*

b) **avoid + -ing form**

e.g. *They set off early in the morning to avoid getting stuck in traffic.*

EXCLAMATIONS

Exclamations are words or sentences used to express admiration, surprise, etc.

To form exclamatory sentences we can use what (a/an), how, such, so or a negative question.

◆ **so + adjective/adverb**

e.g. *This cake is so tasty! He works so hard!*

◆ **such + a/an (+ adjective) + singular countable noun**

e.g. *This is such an original design!*

◆ **such (+ adjective) + uncountable/plural noun**

e.g. *You gave me such valuable information!*

She's wearing such elegant clothes!

◆ **what + a/an (+ adjective) + singular countable noun**

e.g. *What a lovely view!*

What an unusual pattern! What a day!

◆ **what (+ adjective) + uncountable/plural noun**

e.g. *What expensive furniture!*

What comfortable shoes!

◆ **how + adjective/adverb**

e.g. *How clever he is! How well she behaved!*

◆ **negative question (+ exclamation mark)**

e.g. *Isn't she a graceful dancer!*

CLAUSES OF CONTRAST

He prefers to make things by hand although/even though he could use a machine.

Clauses of contrast are used to express a contrast. They are introduced with the following words/phrases:

but - although/even though/though - in spite of/despite - however - while/whereas - yet - nevertheless - on the other hand

◆ **but** e.g. *It was cold, but she wasn't wearing a coat.*

◆ **although/even though/though + clause**

Even though is more emphatic than although. Though is informal and is often used in everyday speech. It can also be put at the end of a sentence.

e.g. *Although/Even though/Though it was summer, it was chilly.*

It was chilly although/even though/though it was summer.

It was summer. It was chilly, though.

◆ **in spite of/despite + noun/-ing form**

e.g. *In spite of/Despite his qualifications, he couldn't get a job.*

He couldn't get a job in spite of/despite (his) being qualified.

in spite of/despite the fact that + clause

e.g. *In spite of/Despite the fact that he was qualified, he couldn't get a job.*

◆ **however/nevertheless** A comma is always used after however/nevertheless.

e.g. *The man fell off the ladder. However/Nevertheless, he wasn't hurt.*

◆ **while/whereas**

e.g. *She is tall, while/whereas her brother is rather short.*

◆ **yet (formal)/still**

e.g. *The fire was widespread, yet no property was damaged. My car is old. Still, it is in very good condition.*

◆ **on the other hand**

e.g. *Cars aren't environmentally friendly.*

On the other hand, bicycles are. / Bicycles, on the other hand, are.

CLAUSES OF MANNER

They look as if/as though they are in a hurry.

Clauses of manner are introduced with as if/as though and are used to express the way in which something is done/said, etc.

◆ We use **as if /as though** after verbs such as act, appear, be, behave, feel, look, seem, smell, sound, taste to say how somebody or something looks, behaves, etc.

e.g. *He is acting as if/as though he's had bad news.*

We also use **as if /as though** with other verbs to say how somebody does something.

e.g. *She talks as if/as though she knows everything.*

◆ We use **as if /as though + past tense** when we are talking about an unreal present situation. Were can be used instead of was in all persons.

e.g. *He spends his money as if/as though he was I were a millionaire. (But he isn't.) He behaves as if/as though he owned the place. (But he doesn't.)*

Note: We can use like instead of as if/as though in spoken English.

e.g. *She looks like she's going to faint, (informal spoken English).*

RELATIVE CLAUSES

A camel is an animal which/that lives in hot countries.

A computer is something which/ that we use for storing information.

A firefighter is someone who/that puts out fires and whose job is very risky.

Relative clauses are introduced with a) relative pronouns (who(m), which, whose, that) and b) relative adverbs (when, where, why).

We use:

◆ **who/that to refer to people.**

◆ **which/that to refer to objects or animals.**

Who/which/that can be omitted when it is the object of the relative clause; that is, when there is a noun or subject pronoun between the relative pronoun and the verb. It cannot be omitted when it is the subject of the relative clause. We can use whom instead of who when it is the object of the relative clause. Whom is not often used in everyday English.

e.g. a) *I saw a friend. I hadn't seen him for years.*

I saw a friend (who/whom/that) I hadn't seen for years. (Who/whom/that is the object, therefore it can be omitted.)

b) *I met a woman. She was from Japan.*

I met a woman who/that was from Japan. (Who/that is the subject, therefore it cannot be omitted.)

◆ **whose instead of possessive adjectives** (my, your, his, etc.) with people, objects and animals in order to show possession.

e.g. a) *That's the boy — his bicycle was stolen yesterday.*

That's the boy whose bicycle was stolen yesterday.

b) *That's the building —its windows were smashed.*

That's the building whose windows were smashed.

◆ We usually avoid using prepositions before relative pronouns.

e.g. a) *The person to whom the money will be entrusted must be reliable, (formal English — unusual structure)*

b) *The chair that you are sitting on is an antique. (usual structure)*

c) *The chair you are sitting on is an antique. (everyday English)*

◆ Which can refer back to a whole clause.

e.g. *He helped me do the washing-up. That was kind of him. He helped me do the washing-up, which was kind of him. (Which refers back to the whole clause. That is, it refers to the fact that he helped the speaker do the washing-up.)*

◆ We can use the structure all/most/some/a few/half/none/two, etc. + of + whom/which.

e.g. a) *He invited a lot of people. All of them were his friends.*

He invited a lot of people, all of whom were his friends.

b) *He has a number of watches. Three of them are solid gold.*

He has a number of watches, three of which are solid gold.

◆ That is never used after a comma or preposition.

e.g. a) *The Chinese vase, which is on the coffee table, is very expensive. (NOT: ...that is on the coffee table ...)*

b) *The bank in which the money was deposited is across the street. (NOT: The bank in that the money...)*

◆ We use that with words such as all, everything, something, anything, no(thing), none, few, little, much, only and with the superlative form.

e.g. *Is this all that you can do for me? (more natural than ...all which you can do ...)* *The only thing that is important to me is my family. It's the best song that I've ever heard.*

who/that (people)

subject — cannot be omitted

who/whom/that(people)

object — can be omitted

which/that (objects, animals) subject — cannot be omitted
object — can be omitted
whose (people, objects, animals) possession — cannot be omitted

RELATIVE ADVERBS

We use:

◆ **where** to refer to place, usually after nouns such as place, house, street, town, country, etc. It can be replaced by **which/that + preposition** and, in this case, which/that can be omitted.

e.g. *The house where he was born has been demolished.*

The house (which/that) he was born in has been demolished.

◆ **when** to refer to time, usually after nouns such as **time, period, moment, day, year, summer**, etc. It can either be replaced by **that** or can be omitted.

e.g. *That was the year when she graduated.*

That was the year (that) she graduated.

◆ **why** to give reason, usually after the word **reason**. It can either be replaced by **that** or can be omitted.

e.g. *The reason why she left her job was that she didn't get on with her boss.*

The reason (that) she left her job was that she didn't get on with her boss.

IDENTIFYING/NON-IDENTIFYING CLAUSES

There are two types of relative clause: identifying relative clauses and non-identifying relative clauses. An identifying relative clause gives necessary information and is essential to the meaning of the main sentence. It is not put in commas. A non-identifying relative clause gives extra information and is not essential to the meaning of the main sentence. It is put in commas.

Identifying relative clauses are introduced with:

◆ **who, which, that**. They can be omitted if they are the object of the relative clause.

e.g. a) *People are prosecuted. (Which people? We don't know. The meaning of the sentence is not clear.)*

People who/that lie in court are prosecuted. (Which people? Those who lie in court. The meaning of the sentence is clear.)

b) *The papers are missing. (Which papers? We don't know. The meaning of the sentence is not clear.)*

The papers (which/that) you gave me to check are missing. (Which papers? The ones you gave me to check. The meaning of the sentence is clear.)

◆ **whose, where, when, (the reason) why**. Whose cannot be omitted. Where can be omitted when there is a preposition. When and why can either be replaced by **that** or can be omitted.

e.g. a) *The man was angry. (Which man? We don't know. The meaning of the sentence is not clear.)*

The man whose car was damaged was angry. (Which man? The one whose car was damaged. The meaning of the sentence is clear.)

b) *The shop is near my house. (Which shop? We don't know.)*

The shop where I bought this shirt is near my house. OR The shop I bought this shirt from is near my house. (Which shop? The one I bought this shirt from.)

c) *The day was the happiest day of my life. (Which day? We don't know.)*

The day (when/that) I got married was the happiest day of my life. (Which day? The day I got married.)

d) *I was upset. This is the reason. (The reason for what? We don't know.)*

I was upset. This is the reason (why/that) I didn't call you. (The reason I didn't call you.)

Non-identifying relative clauses are introduced with:

◆ **who, whom, which**. They cannot be omitted or replaced by **that**.

e.g. a) *Jenny Ladd is my favourite author. (The meaning of the sentence is clear.) Jenny Ladd, who has written a lot of successful books, is my favourite author. (The relative clause gives extra information.)*

b) *My cousin Peter is a doctor. (The meaning of the sentence is clear.)*

My cousin Peter, who(m) you have just met, is a doctor. (The relative clause gives extra information.)

c) *His flat is modern and spacious.*

His flat, which he bought two years ago, is modern and spacious.

◆ **whose, where, when.** They cannot be omitted.

e.g. a) *The bride looked stunning. (The meaning of the sentence is clear.)*

The bride, whose wedding dress was designed by Valentino, looked stunning. (The relative clause gives extra information.)

b) *Stratford-upon-Avon is visited by thousands of tourists every year.*

Stratford-upon-Avon, where Shakespeare was born, is visited by thousands of tourists every year.

c) *The best time to visit the island is in May. The best time to visit the island is in May, when it isn't too crowded.*

LINKING WORDS

Linking words show the logical relationship between sentences or parts of a sentence.

Positive Addition

and, both ... and, too, besides (this/that), moreover, what is more, in addition (to), also, as well as (this/that) furthermore etc.

She is both intelligent and beautiful.

Negative Addition

neither... nor, nor, neither, either

Neither John nor David goes to university.

Contrast

but, although, in spite of, despite, while, whereas, ever though, on the other hand, however, yet, still etc.

Sarah is kind but not very reliable.

Giving Examples

such as, like, for example, for instance, especially, in particular etc.

All the food was delicious, but the steak in particular was excellent.

Cause/Reason

as, because, because of, since, for this reason, due to, so, as a result (of) etc.

I stayed in bed because I felt ill.

Condition

if, whether, only if, in case of, in case, provided (that providing (that), unless, as/so long as, otherwise, or (else on condition (that) etc.

We took an umbrella with us in case it rained.

Purpose

to, so that, so as (not) to, in order (not) to, in order that, in case etc.

I took some paper and a pen so that I could make notes.

Effect/Result

such/so ... that, so, consequently, as a result, therefore, for this reason etc.

It was so cold that we decided to light a fire.

Time

when, whenever, as, as soon as, while, before, until/till after, since etc.

We did not leave until/till the babysitter arrived.

Place

where, wherever

We can't decide where to go on holiday this year.

Exception

except (for), apart from

The party was good fun, apart from the problem with the stereo.

Relatives

who, whom, whose, which, what, that

That's the horse which/that won the Grand National.

Listing Points/Events

To begin: initially, first, at first, firstly, to start/begin with, first of all etc.

First of all, we greeted the guests.

To continue: secondly, after this/that, second, afterwards, then, next etc.

Then, we offered them drinks.

To conclude: finally, lastly, in the end, at last, eventually etc.

Finally, we served them the meal.

Summarising

in conclusion, in summary, to sum up, on the whole, all in all, altogether, in short etc.

To sum up, I firmly believe that animals have the right to a happy life.

1.2 Чтение и перевод учебных текстов

№1

YOUR FIRST INTERVIEW

With unemployment so high, and often scores of applicants chasing every job, you have to count yourself lucky to be called for an interview. If it's your first, you're bound to be nervous. (In fact if you're not nervous maybe your attitude is wrong!) But don't let the jitters side-track you from the main issue - which is getting this job. The only way you can do that is by creating a good impression on the person who is interviewing you. Here's how:

DO: † Find out as much as you can about the job beforehand. Ask the job centre or employment agency for as much information as possible; † Jot down your qualifications and experience and think about how they relate to the job. Why should the employer employ you and not somebody else? † Choose your interview clothing with care; no one is going to employ you if you look as though you've wandered out of a disco. Whether you like it or not, appearance counts. † Make sure you know where the interview office is and how to get there. Be on time, or better, a few minutes early. † Bring a pen; you will probably be asked to fill in an application form. Answer all the questions as best you can. And write neatly. The interviewer will be looking at the application during the interview; he or she must be able to read it. † Have a light meal to eat, and go to the toilet. If you don't, you may well be thinking about your inside during the interview.

DON'T: † Ever walk into the interview chewing gum, sucking on a sweet or smoking. † Forget to bring with you any school certificates, samples of your work or letters of recommendation from your teachers or anyone else you might have worked part-time for. † Have a drink beforehand to give you courage. † The interview is designed to find out more about you and to see if you are suitable for the job. The interviewer will do this by asking you questions. The way you answer will show what kind of person you are and if your education, skills and experience match what they're looking for.

DO: † Make a real effort to answer every question the interviewer asks. Be clear and concise. Never answer 'Yes' or 'No' or shrug. † Admit it if you do not know something about the more technical aspects of the job. Stress that you are willing to learn. † Show some enthusiasm when the job is explained to you. Concentrate on what the interviewer is saying, and if he or she asks if you have any questions, have at least one ready to show that you're interested and have done your homework. † Sell yourself. This doesn't mean exaggerating (you'll just get caught out) or making your experience or interests seem unimportant (if you sell yourself short no one will employ you). † Ask questions at the close of the interview. For instance, about the pay, hours, holidays, or if there is a training programme.

DON'T: † Forget to shake hands with the interviewer. † Smoke or sit down until you are invited to. † Give the interviewer a hard time by giggling, yawning, rambling on unnecessarily or appearing cocky or argumentative. † Ever stress poor aspects of yourself, like your problem of getting up in the morning. Always show your best side: especially your keenness to work and your sense of responsibility.

After the interview:

Think about how you presented yourself: could you have done better? If so, and you do not get the job, you can be better prepared when you are next called for an interview. Good luck!

READING: According to the text below, are the following statements true or false?

1. Good-looking people are often more successful than others.
2. British Airways does not allow its pilots to work if they are 20 per cent overweight.
3. Attractive women have problems reaching managerial positions.
4. Morphopsychology is sometimes used as the only criterion when selecting candidates.
5. Employers' attitudes to 'unfair' recruitment practices have not changed.

No 2

Structure of the Business Letter

We can't imagine business without communication. Business is made through communication. It can be face-to-face conversation organized in the office or at the restaurant or business correspondence. It can be held with the help of regular mail or E-mail.

A business letter is the principal means used by a business firm to keep in touch with its customers. According to the purpose of the letter there may be different kinds, e.g. a letter of request, a memo (memorandum), a letter of advice, an invitation letter, a congratulation letter, a letter of thanks (gratitude), a letter of apology, an enquiry letter, a letter of guarantee, a letter of complaint, a letter of claim, an order letter, etc.

There are special rules to organize a business letter in a right way. The business letter consists of several parts.

First you should write your own name and address (in the right up corner), telephone numbers, and then write down the title, name and address of the recipient. Always type the date, in the logical order of day, month, year (*10th November 20...*).

It is important to use the correct title of the person you are addressing to:

Dr. – means doctor (a person, who has Doctor's degree or PhD);

Professor – if you are addressing the professor;

Mr. / Sir – if you are addressing a male, but is not sure in his title;

Mrs. – if you are addressing a female (married);

Miss – if you are addressing a female (single);

Ms – if you are addressing a female (married or unmarried businesswoman);

Madam – addressing a female if you are not sure in her family status.

The salutation is the greeting with which every letter begins. **Opening salutation** is typed in the left-hand corner. There are several types of opening salutation:

Dear Sirs – to a company;

Dear Sir – to a man if you do not know his name;

Dear Madam – to a woman if you do not know her name;

Dear Sir or Madam – to a person if you know neither the name, nor sex;

Gentlemen – the most common salutation in the United States.

If your correspondent is known to you personally the warmer and more friendly greeting, *Dear Mr ...* is preferred.

The message forms the body of the letter and is the part that really matters.

Some letters are very short and may consist of only one paragraph. Many others have three paragraphs: *Introduction* (why are you writing?), *Details* (facts, information, instructions), *Action* (what action will you take?).

Finishing the letter is a polite way of bringing a letter to a close and you should write one of the following phrases:

Yours sincerely; Truly yours, Yours faithfully sign the letter and put your (title), name and surname.

Business letters have to be written (typed) accurately in plain language.

Post-Reading

1. Explain the following.

- 1) face-to-face conversation
- 2) the principal means
- 3) the salutation
- 4) the message
- 5) plain language

2. Match the following attributes on the left with a suitable noun on the right.

- | | |
|--------------|-------------|
| 1. logical | a. address |
| 2. capital | b. sirs |
| 3. mailing | c. order |
| 4. dear | d. greeting |
| 5. customary | e. letter |

3. Match the English word combinations with the Russian equivalents.

- | | |
|--------------------------|---------------------------------|
| 1. to sign a letter | a. поддерживать контакт |
| 2. to refer to a letter | b. иметь значение для кого-либо |
| 3. to enclose documents | c. подписать письмо |
| 4. to keep in touch with | d. расположить адрес |
| 5. to match a style | e. прилагать документы |
| 6. to matter to somebody | f. соответствовать стилю |
| 7. to set out an address | g. ссылаться на письмо |

4. Complete the sentences with the words: *to mean* (значить; подразумевать); *meaning* (значение; смысл); *means* (средство; способ); *by means of* (посредством)

1. Business letters may be defined as a _____ through which information is communicated in writing in the process of business activities.

2. One word can have several _____ (s).

3. Doing business _____(s) working out agreements with other people.

4. Students are selected for scholarships _____ an open competition.

5. What does business _____?

5. Answer the questions below.

- What is a business letter?
- What types of business letters do you know?
- What parts does a business letter consist of?
- Why is the language style very important for business letter writing?

6. Find in the text the information about the parts of a business letter and describe them:

- a) the date;
- b) the name and address;
- c) the salutation;
- d) the message;
- e) the complimentary closure;
- f) the signature.

№3

An Academic Conference

The best way to exchange ideas, learn new things and expand your network is to become involved in groups relevant to your craft. This can be through user groups for a particular software environment you work with, or professional associations.

There are plenty of websites and forums that enable professionals to engage with one another online, but nothing seals a bond like face-to-face activities.

The ability to communicate your ideas to audiences will raise your profile to new levels.

The Academic Conference presents a challenge to interaction with other scientists. They regularly take part in conferences and discussions around the world.

A researcher receives an email about the opportunity to submit a proposal to be a presenter at the conference.

An academic conference or symposium is a conference for scholars and scientists to present and discuss their work. Together with academic or scientific journals, conferences provide an important channel for exchange of information among researchers.

Conferences are usually composed of various presentations. They tend to be short and concise, with a time span of about 10 to 30 minutes. The work may be bundled in written form as academic papers and published as the conference proceedings. They are published to inform a wider audience of the material presented at the conference.

A conference usually includes a keynote speaker (основной докладчик). The keynote lecture is longer, lasting up to an hour and a half. Conferences also feature panel discussions, round tables on various issues and workshops.

Prospective presenters are usually asked to submit a short abstract of their presentation. Nowadays, presenters usually base their talk around a visual presentation that displays key figures and research results.

At some conferences, social or entertainment activities such as tours and receptions can be part of the programme. Business meetings for learned societies (научное общество) or interest groups can also be part of the conference activities.

Academic publishing houses may set up displays at large conferences. Academic conferences fall into three categories:

- a) the themed conference, a small conference organised around a particular topic;
- b) the general conference, a conference with sessions on a wide variety of topics, often organised by regional, national, or international learned societies, and held annually or on some other regular basis;
- c) the professional conference, large conferences not limited to academics (научные работники) but with academically related issues.

Traditional conferences mean participants have to travel and stay in a particular place. This takes time. And an online conference uses the Internet, and participants can access the conference from anywhere in the world and can do this at any time, using browser software. Participants are given a password to access the conference and seminar groups.

The conference is announced by way of a Call for Abstracts, which lists the topics of the meeting and tells prospective presenters how to submit their abstracts.

Submissions take place online. An abstract is a brief summary of a research article, and is often used to help the reader quickly ascertain the purpose of the paper.

An academic abstract typically outlines four elements of the work:

- a) the research focus (statement of the problem) – an opening sentence placing the work in context, and one or two sentences giving the purpose of the work ;
- b) the research methods used – one or two sentences explaining what was (or will) be done;
- c) the results of the research – one or two sentences indicating the main findings;
- d) the main conclusions – one sentence giving the most important consequence of the work.

The typical abstract length ranges from 100 to 500 words.

Post-Reading

1. Explain the following.

- 1) to submit a proposal
- 2) scholars and scientists
- 3) tend to be short and concise
- 4) a time span
- 5) the conference proceedings

6) submissions

2. Match the pairs of synonyms from A and B and translate them.

A

1. brief
2. scientist
3. paper
4. because of
5. summary
6. have a tendency

B

- a. article
- b. due to
- c. abstract
- d. scholar
- e. tend
- f. concise

3. Match the verb on the left with a suitable item on the right. Use each item once.

1. run
2. participate
3. announce
4. introduce
5. publish
6. come
7. display

- a. to a conclusion
- b. a deadline for papers
- c. a keynote speaker
- d. in a panel discussion
- e. on the screen
- f. conference proceedings
- g. a workshop

4. Translate the words in brackets.

1. Our university hosted an (научная конференция) last week.
2. Write your (аннотация) after the rest of the (статья) is completed.
3. (Статьи) accepted for the conferences were published in the (материалы конференции).
4. This (научное общество) offers its membership to those who have an interest in civil engineering.

5 The conference committee decided to postpone the (крайний срок) for submitting (тезисы) by one week.

5. Answer the questions below.

- What types of academic conferences are there?
- What are presenters usually asked to do?
- What is a call for abstracts?
- What does an academic abstract outline?

6. Find in the text the information about the organisation of academic conference and describe it:

- a) a keynote lecture;
- b) the submission of abstracts;
- c) social and entertainment activities at conferences;
- d) types of academic conferences;
- e) a call for abstracts.

№ 4

INNOVATION

The term innovation derives from the Latin word *innovatus* (to renew or change). Although the term is broadly used, innovation generally refers to the creation of better or more effective products, processes, technologies, or ideas that are accepted by markets, governments, and society. Innovation differs from invention or renovation in that innovation generally signifies a substantial positive change compared to incremental changes.

Inter-Disciplinary Views. Due to its widespread effect, innovation is an important topic in the study of economics, business, entrepreneurship, design, technology, sociology, and engineering. In society, innovation aids in comfort, convenience, and efficiency in everyday life. For instance, the benchmarks in railroad equipment and infrastructure added to greater safety, maintenance, speed, and weight capacity for passenger services. These innovations included changing from wood to steel cars, from iron to steel rails, stove-heated to steam-heated cars, gas lighting to electric lighting, diesel-powered to electric-diesel locomotives. By mid-20th century, trains were making longer, more

comfortable, and faster trips at lower costs for passengers. Other areas that add to everyday quality of life include: the innovations to the light bulb from incandescent to compact fluorescent and LEDs which offer longer-lasting, less energy-intensive, brighter technology; adoption of modems to cellular phones, paving the way to smart phones which meets anyone's internet needs at any time or place; cathode-ray tube to flat-screen LCD televisions and others.

Business and Economics. In business and economics, innovation is the catalyst to growth. With rapid advancements in transportation and communications over the past few decades, the old world concepts of factor endowments and comparative advantage which focused on an area's unique inputs are outmoded for today's global economy. Now, as Harvard economist Michael Porter points out competitive advantage, or the productive use of any inputs, which requires continual innovation, is paramount for any specialized firm to succeed. Economist Joseph Schumpeter, who contributed greatly to the study of innovation, argued that industries must incessantly revolutionize the economic structure from within, that is innovate with better or more effective processes and products, such as the shift from the craft shop to factory. In addition, entrepreneurs continuously look for better ways to satisfy their consumer base with improved quality, durability, service, and price which come to fruition in innovation with advanced technologies and organizational strategies.

One prime example is the explosive boom of Silicon startups out of the Stanford Industrial Park. In 1957, dissatisfied employees of Shockley Semiconductor, the company of Nobel laureate and co-inventor of the transistor William Shockley, left to form an independent firm, Fairchild Semiconductor. After several years, Fairchild developed into a formidable presence in the sector.

Eventually, these founders left to start their own companies based on their own, unique, latest ideas, and then leading employees started their own firms. Over the next 20 years, this snowball process launched the momentous startup company explosion of information technology firms. Essentially, Silicon Valley began as 65 new enterprises born out of Shockley's eight former employees.

Organizations. In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share, and others. All organizations can innovate, including for example hospitals, universities, and local governments. For instance, former Mayor Martin O'Malley pushed the City of Baltimore to use CitiStat, a performance-measurement data and management system that allows city officials to maintain statistics on crime trends to condition of potholes. This system aids in better evaluation of policies and procedures with accountability and efficiency in terms of time and money. In its first year, CitiStat saved the city \$13.2 million. Even mass transit systems have innovated with hybrid bus fleets to real-time tracking at bus stands. In addition, the growing use of mobile data terminals in vehicles that serves as communication hubs between vehicles and control center automatically send data on location, passenger counts, engine performance, mileage and other information. This tool helps to deliver and manage transportation systems.

Sources of Innovation. There are several sources of innovation. General sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc. These also include internet research, developing of people skills, language development, cultural background, Skype, Facebook, etc. In the simplest linear model of innovation the traditionally recognized source is manufacturer innovation. This is where an agent (person or business) innovates in order to sell the innovation. Another source of innovation, only now becoming widely recognized, is end-user innovation. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. End-user innovation is, by far, the most important and critical source of innovation. In addition, the famous robotics engineer Joseph F. Engelberger asserts that innovations require only three things: 1) a recognized need; 2) competent people with relevant technology; and 3) financial support.

Innovation by businesses is achieved in many ways, with much attention now given to formal research and development (R&D) for "breakthrough innovations." R&D help spur on patents and other scientific innovations that leads to productive growth in such areas as industry, medicine, engineering, and government. Yet, innovations can be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes.

The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice – but there are many exceptions to each of these trends.

An important innovation factor includes customers buying products or using services. As a result, firms may incorporate users in focus groups (user centred approach), work closely with so called lead users (lead user approach) or users might adapt their products themselves. Regarding this user innovation, a great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities. In most of the times user innovators have some personal record motivating them. Sometimes user-innovators may become entrepreneurs, selling their product, they may choose to trade their innovation in exchange for other innovations, or they may be adopted by their suppliers.

Nowadays, they may also choose to freely reveal their innovations, using methods like open source. In such networks of innovation the users or communities of users can further develop technologies and reinvent their social meaning.

Notes:

1. Renovation – 1) восстановление, реконструкция; 2) обновление, освежение.
2. Incremental – поэтапный (напр. о внедрении технических средств).
3. Benchmark – эталон, стандарт.
4. LED – (light-emitting diode) светодиод, СИД.
5. Cathode-ray tube – электронно-лучевая трубка, ЭЛТ.
6. Flat-screen LCD television – ЖК-телевидение.
7. Comparative advantage – сравнительное преимущество/отличие.
8. Inputs – вложения, затраты, инвестиции.
9. Start(-)up – "стартап" (недавно созданная фирма, обычно интернеткомпания).
10. Performance-measurement – измерение производительности.
11. Mass transit – общественный транспорт.
12. Data terminal – терминал данных.
13. End-user – конечный пользователь.
14. Research and development (R&D) – научно-исследовательские и опытноконструкторские работы; НИР и ОКР.

№5

АННОТАЦИЯ НАУЧНОЙ СТАТЬИ (Abstract)

Аннотацией называется краткое и вместе с тем исчерпывающее изложение содержания научной статьи, помещаемое непосредственно после заглавия и понятное возможно более широкому кругу читателей. Как правило, аннотация не содержит каких-либо формул или цифровых данных, имеет объем, не превышающий 1200-1600 печатных знаков, и является законченной логической единицей, дающей читателю возможность обоснованно решить, следует ему читать данную научную статью или нет. По сравнению с остальным текстом научной статьи аннотация набирается более мелким жирным шрифтом (bold face, lower case print) и по объему вводимой информации занимает промежуточное положение между заглавием (Title) и введением (Introduction).

В аннотации помещаются сведения об общем направлении, задачах и целях исследования, приводится более конкретное описание тематики работ, выполненных данным автором, поясняется метод исследования, кратко излагаются полученные теоретические и экспериментальные результаты и формулируются общие выводы, которые можно сделать на основании этих результатов. По своему содержанию и методам исследования аннотации научных статей подразделяются на три основных типа:

(а) Аннотации научных статей, излагающих результаты оригинальных теоретических и (или) экспериментальных исследований, выполненных авторами;

(б) Аннотации обобщающих научных статей, посвященных распространению полученных результатов на другие области и занимающих промежуточное положение между оригинальными исследованиями и обзорами литературы;

(в) Аннотации обзорных научных статей.

Примером аннотации научной статьи, в которой излагаются результаты выполненной автором оригинальной исследовательской работы, может являться следующий текст:

ТЕХТ 1

Supersonic Aerodynamic Characteristics of a Tail-Control Cruciform Maneuverable Missile With and Without Wings

The aerodynamic characteristics for a winged and a wingless cruciform missile are examined. The body was an ogive-cylinder with a forebody and had cruciform tails that were trapezoidal in planform. Tests were made both with and without cruciform delta wings for different Mach numbers, roll attitudes, angles of attack, and tail control deflections. The obtained experimental results indicate that the winged missile with its more linear aerodynamic characteristics and higher lift-curve slope, should provide the highest maneuverability over a large operational range. The wingless missile, with a lower lift-curve slope and more nonlinear characteristics but with lower minimum drag, might be more suitable for missions where acceleration time is important and where lift can be generated from high dynamic pressure incurred at low altitudes or at higher Mach numbers.

Примером аннотации обобщающей научной статьи, посвященной распространению уже известных результатов на близкие или соседние области исследований, может служить следующий текст

ТЕХТ 2

Prospects for Advanced Rocket-Powered Launch Vehicles

The potential for advanced rocket-powered launch vehicles to meet the challenging cost operational, and performance demands of space transportation in the early 21st century is examined. Space transportation requirements from recent studies underscoring the need for growth in capacity in support of an increasing diversity of space activities and the need for significant reductions in operational and life-cycle costs are reviewed. Fully reusable rocket powered concepts based on moderate levels of evolutionary advanced technology are described. These vehicles provide a broad range of attractive concept alternatives with the potential to meet demanding operational and cost goals and the flexibility to satisfy a variety of vehicle architecture, mission, vehicle concept, and technology options.

Приводимый ниже текст может служить примером аннотации обзорной научной статьи:

ТЕХТ 3

An Overview of Ejector Theory

A summary/overview of ejector augmentor theory is presented. The results of the study are presented first in a description of the fundamental considerations relevant to ejector augmentor design and performance and second in a discussion of the physical Phenomena associated with the various components comprising an ejector augmentor: primary nozzles, secondary inlet, mixing section and diffuser. In the theoretical discussion a limit value of static augmentation ratio which depends only on the ratio of Primary to secondary stagnation pressure is formulated, and is shown that the best published experimental results approach 90% of that limit value. Conclusions regarding theoretical ejector technology based on this study are made and recommendations for needed theoretical ejector technology research and development programs are presented.

В результате ознакомления с содержанием аннотаций (и, при необходимости, обращения к соответствующей шорной литературе переводчик выясняет, что в первом случае (Текст 1) речь идет об оригинальном исследовании, посвященном определению сверхзвуковых аэрокосмических характеристик для крылатого и бескрылого вариантов высокоманевренной управляемой ракеты нормальной крестообразной схемы с хвостовыми рулями. Во втором случае (Текст 2) исследование носит обобщающий характер и в основном посвящено сопоставительному анализу наиболее перспективных для начала XXI века схем полностью спасаемых ракет-носителей. В третьем случае (Текст 3) исследование носит обзорный характер и посвящено рассмотрению современного состояния теоретических и экспериментальных

исследований в области газовых эжекторов. В результате обращения к соответствующей опорной литературе переводчик может выяснить, то в данном случае речь идет об устройствах увеличения тяги, работающих по принципу струйного насоса, т.е. подсоса внешнего воздуха газовой струей воздушно-реактивного двигателя.

Исходя из приведенных выше примеров, а также из результатов анализа достаточно большого массива аннотаций современных научных статей по аэрокосмической тематике, можно прийти к заключению, что основной лексико-стилистической особенностью аннотации является наличие большого количества так называемых конечных парольных форм типа:

...is/are arrived at, developed, inferred, discussed introduced, formulated, outlined, made, considered summarised и т.д.

Для аннотаций оригинальных научных статей, содержащих результаты научных исследований, выполненных непосредственно автором, характерны следующие типовые структурные формы и обороты:

(1) The results of the theoretical (experimental) study of... are presented / Приводятся результаты теоретического (экспериментального) исследования...

(2) It is shown that .../Показано, что...

(3) A theoretical (experimental) dependence of... vs... is formulated / Формулируется теоретическая (полученная экспериментально) зависимость... от...

(4) Recommendations for ... are presented/Приводятся рекомендации по...

(5) Conclusions regarding ... are made (arrived at/Делаются выводы о том, что...

Аннотации обобщающих научных статей по своим лексико-стилистическим особенностям занимают промежуточное положение между аннотациями оригинальных и обзорных научных статей и, помимо характерных для этих двух категорий типовых структурных форм, могут также содержать специфические для данной категории типовые структурные формы, такие как:

(1) In this general paper the role of... in... is discussed/В данной обобщающей научной статье рассматривается роль... в...

(2) The extension of... and possibility of its practical application to ... are considered / Рассматриваются распространение ... на ... и возможность его практического приложения к...

(3) A generalized version of... for ... is introduced/Вводится обобщенный вариант... для...

(4) Subject matter related to ... as well as to ... is considered/Обсуждаются вопросы, относящиеся как к ..., так и к...

Для аннотаций обзорных научных статей, содержащих обзор (или сопоставительный анализ) результатов, полученных другими исследователями, характерны следующие типовые структурные формы и обороты:

(1) A review of... essential for ... is presented/Приводится обзор..., представляющих интерес для ...

(2) Present status and theoretical (experimental, test) results of ... are summarised/Рассматривается современное состояние и приводятся результаты теоретических исследований (экспериментальной проверки, натурных испытаний)...

(3) The current research programs for... are outlined/Приводится обзор проводимых в настоящее время исследований по...

(4) The factors (parameters) considered include .../Рассмотрено влияние таких факторов (параметров), как...

(5) Special attention is given to ... methods (techniques, solutions) used by... for .../Особое внимание уделяется ...методам (способам решения), применяемым... для...

(6) A bibliography of ... references is included/Библиография включает... наименований

Из рассмотренных примеров следует, что при передаче характерных для аннотаций типовых структурных форм а русский язык сказуемое, как правило, переходит с последнего места на первое. Приведенные 15 типовых структурных форм являются наиболее частотными для рассмотренных трех категорий аннотаций научных статей, публикуемых AIAA, IEEE, ACM и NASA.

При составлении каталогов, библиографий, тематических подборок литературы, выполнении работ по информационному обеспечению научных исследований часто возникает необходимость в определении категории и примерного содержания научной статьи по ее внешним признакам, без вникания в сущность вопросов, излагаемых в и аннотации и других разделах статьи.

Внешними признаками оригинальной научной статьи могут являться: наличие снабженного сквозной нумерацией развитого математического аппарата; большой объем иллюстративно-графических материалов; сравнительно небольшая библиография, в состав которой входят предыдущие публикации автора и объем которой не превышает 8-10 наименований. Авторами оригинальных научных статей обычно оказываются работники низших и средних иерархических уровней (Design Engineer, Research Engineer, Analytical Engineer, Structural Engineer, System Engineer, Member of the Technical Staff).

Внешними признаками обобщающей научной статьи являются: отсутствие сквозной нумерации у имеющегося математического аппарата, который обычно имеет иллюстративный характер; большой объем текстового и сравнительно небольшой объем иллюстративно-графического материала; развитая библиография, включающая до 25-30 наименований, в том числе одну - две работы автора. Авторами обобщающих научных статей обычно являются работники среднего иерархического уровня (Senior Engineer, Lead Engineer, Technical Coordinator, Group Leader, Company Officer, Technical Manager, Research Manager).

Внешними признаками обзорной научной статьи являются: отсутствие раздела принятых обозначений, отсутствие математического аппарата; большой объем текстового и сравнительно небольшой объем иллюстративно-графического материала, очень развитая библиография, включающая до 150-200 наименований. Авторами обзорных научных статей большей частью являются руководители среднего и высшего иерархических уровней (Chief Engineer, Chief Scientist, Project Manager, Program Manager, Technical Director, Research Director, Deputy Director, Associate Director, Director-General).

РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ АННОТАЦИИ К СТАТЬЕ НА АНГЛИЙСКОМ ЯЗЫКЕ

Аннотация — это независимый от статьи источник информации. Ее пишут после завершения работы над основным текстом статьи. Она включает характеристику основной темы, проблемы, объекта, цели работы и ее результаты. В ней указывают, что нового несет в себе данный документ в сравнении с другими, родственными по тематике и целевому назначению. Рекомендуемый объем — 150-200 слов.

Аннотация выполняет следующие функции:

- позволяет определить основное содержание статьи, его релевантность и решить, следует ли обращаться к полному тексту публикации;
- предоставляет информацию о статье и устраняет необходимость чтения ее полного текста в случае, если статья представляет для читателя второстепенный интерес;
- используется в информационных, в том числе автоматизированных, системах для поиска документов и информации.

Аннотации должны быть оформлены по международным стандартам и включать следующие моменты:

- вступительное слово о теме исследования;
- цель научного исследования;
- описание научной и практической значимости работы;
- описание методологии исследования;
- основные результаты, выводы исследовательской работы.
- ценность проведенного исследования (какой вклад данная работа внесла в соответствующую область знаний);
- практическое значение итогов работы.

В аннотации не должен повторяться текст самой статьи (нельзя брать предложения из статьи и переносить их в аннотацию), а также ее название.

В аннотации должны излагаться существенные факты работы, и не должна содержать материал, который отсутствует в самой статье.

В тексте аннотации следует употреблять синтаксические конструкции, свойственные языку научных и технических документов, избегать сложных грамматических конструкций. Он должен быть лаконичен и четок, без лишних вводных слов, общих формулировок.

Чтобы перевести аннотацию, лучше воспользоваться онлайн переводчиком (мы рекомендуем translate.google.ru), после чего исправить полученный текст вручную. Но, ни в коем случае не стоит представлять непроверенный перевод.

Обратите внимание, если полученный в результате автоматического перевода текст очень сложно понять, возможно, это знак того, что аннотация написана очень сложным языком. Избегайте слишком длинных предложений и старайтесь составлять предложения по стилю ближе к нормальной разговорной речи.

Заглавие на английском языке

В переводе заглавия статьи на английский язык не должно быть никаких транслитераций с русского языка, кроме непереводаемых названий собственных имен, приборов и других объектов, имеющих собственные названия; также не используется непереводаемый сленг, известный только русскоговорящим специалистам. Это также касается авторских резюме (аннотаций) и ключевых слов.

Необходимо указать:

- фамилию и инициалы автора;
- ученую степень, звание, должность;
- полное наименование организации которой автора статьи работает или учится;

Фамилия – дается в транслитерации

| Русская буква | Английская(ие) буква(ы) | Русская буква | Английская(ие) буква(ы) |
|---------------|-------------------------|---------------|-------------------------|
| А | A | Р | R |
| Б | B | С | S |
| В | V | Т | T |
| Г | G | У | U |
| Д | D | Ф | F |
| Е | E | Х | KH |
| Ё | E | Ц | TS |
| Ж | ZH | Ч | CH |
| З | Z | Ш | SH |
| И | I | Щ | SCH |
| Й | Y | Ъ | опускается |
| К | K | Ы | Y |
| Л | L | Ь | опускается |
| М | M | Э | E |
| Н | N | Ю | YU |
| О | O | Я | YA |
| П | P | | |

Перевод ученых степеней и званий на английский язык

| <i>Научные отрасли</i> | <i>Branches of science</i> |
|-------------------------------|-----------------------------------|
| кандидат биологических наук | Candidate of biological sciences |
| кандидат исторических наук | Candidate of historical sciences |
| кандидат культурологии | Candidate of culturology |

| | |
|-------------------------------------|--|
| кандидат педагогических наук | Candidate of pedagogic sciences |
| кандидат психологических наук | Candidate of psychological sciences |
| кандидат социологических наук | Candidate of sociological sciences |
| кандидат технических наук | Candidate of technical sciences |
| кандидат физико-математических наук | Candidate of physico-mathematical sciences |
| кандидат филологических наук | Candidate of philological sciences |
| кандидат философских наук | Candidate of philosophical sciences |
| кандидат химических наук | Candidate of chemical sciences |
| кандидат экономических наук | Candidate of economic sciences |
| кандидат юридических наук | Candidate of juridical sciences |
| кандидат политических наук | Candidate of political sciences |
| соискатель | Degree-seeking student |
| аспирант | Post-graduate student |

При переводе степени доктора наук заменяем слово **Candidate** на слово **Doctor**.

| | |
|------------------------------|---|
| академик | Academician |
| профессор | Professor |
| доцент | Assistant Professor |
| старший преподаватель | Senior lecturer |
| ассистент | Lecturer |
| любой научный сотрудник | Researcher |
| председатель | Chair (of...) |
| директор | Director (of...) |
| заместитель директора | Deputy Director |
| член РАН | Member of Russian Academy of Sciences |
| член-корреспондент РАН | Corresponding Member of Russian Academy of Sciences |
| ответственный секретарь | Assistant Editor |
| заведующий лабораторией | Head of (the) laboratory (of...) |
| заведующий отделом, кафедрой | Head of (the) chair (of...) |
| старший научный сотрудник | Senior Researcher |
| ведущий научный сотрудник | Leading Researcher |

Для перевода специализированных материалов и терминов рекомендуем объемный, оснащенный примерами и богатым с точки зрения словарного состава и лексической сочетаемости словарь АБВУ Lingvo <http://www.abbyy.ru/business/lingvo-windows/>

№6

Making a Presentation

A presentation is the practice of showing and explaining the content of a topic to an audience or learner. In the business world, there are sales presentations, informational and motivational presentations, interviews, status reports, image-building, and training sessions.

Students are often asked to make oral presentations. You might have been asked to research a subject and use a presentation as a means of introducing it to other students for discussion.

Before you prepare for a presentation, it is important that you think about your objectives.

There are three basic purposes of giving oral presentations: to inform, to persuade, and to build goodwill.

Decide what you want to achieve:

inform – to provide information for use in decision making;

persuade – to reinforce or change a receiver's belief about a topic;

build relationships – to send some messages which have the simple goal of building good-will between you and the receiver.

Preparation

A successful presentation needs careful background research. Explore as many sources as possible, from press cuttings to the Internet. Once you have completed your research, start writing for speech bearing in mind the difference between spoken and written language. Use simple, direct sentences, active verbs, adjectives and the pronouns “you” and “I”.

Structuring a Presentation

A good presentation starts with a brief **introduction** and ends with a brief conclusion. The introduction is used to welcome your audience, introduce your topic/ subject, outlines the structure of your talk. The introduction may include an icebreaker such as a story, an interesting statement or a fact. Plan an effective opening; use a joke or an anecdote to break the ice. The introduction also needs an objective, that is, the purpose or goal of the presentation. It informs the audience of the purpose of the presentation too.

Next, **the body** of the presentation comes. Do not write it out word for word. All you want is an outline. There are several options for structuring the presentation:

- 1) Timeline: arrangement in a sequential order.
- 2) Climax: the main points are delivered in order of increasing importance.
- 3) Problem/ Solution: a problem is presented, a solution is suggested.
- 4) Classification: the important items are the major points.
- 5) Simple to complex: ideas are listed from the simplest to the most complex; it can also be done in a reverse order.

After the body, comes **the closing**. A strong ending to the presentation is as important as an effective beginning. You should summarise the main points. This is where you ask for questions, provide a wrap-up (summary), and thank the participants for attending.

Each successful presentation has three essential objectives: the three Es – to educate, to entertain, to explain.

The main objective of making a presentation is to relay information to your audience and to capture and hold their attention. Adult audience has a limited attention span of about 45 minutes. In that time, they will absorb about a third of what you said, and a maximum of seven concepts. Limit yourself to three or four main points, and emphasise them at the beginning of your speech, in the middle, and again at the end to reiterate your message. You should know your presentation so well that during the actual presentation you should only have to briefly glance at your notes.

People process information in many ways. Some learn visually, others learn by listening, and the kinesthetic types prefer to learn through movement. It’s best to provide something for everyone. Visual learners learn from pictures, graphs, and images. Auditory learners learn from listening to a speaker. And, kinesthetic learners like to be involved and participate.

Post-Reading

1. Explain the following.

- 1) to build goodwill
- 2) to persuade
- 3) background research
- 4) outlines the structure
- 5) to break the ice
- 6) attention span
- 7) to briefly glance

2. Match the pairs of synonyms from A and B and translate them.

A

1. objective
2. inform
3. point
4. conclusion
5. reiterate

B

- a. item
- b. repeat
- c. purpose; aim; goal
- d. provide information
- e. opening; beginning

6. wrap-up f. closing; ending

7. introduction g. summary

3. Match the noun on the left with a suitable item on the right. Use each item once.

1. The solutions a. was in written form.
2. Goodwill b. often glanced at his notes.
3. The content c. was built with my colleagues.
4. The speaker d. were suggested to do it better.

4. Read the text and find the English for:

пояснить цель выступления

растопить лед; установить доверительные отношения

от простого к сложному

завладеть вниманием аудитории и удерживать его

повторять основную мысль

5. Translate the words in brackets.

- 1) The information in your presentation is (важна) to the audience.
- 2) His (задача) is to get a university education.
- 3) The (содержание) of his speech is new.
- 4) He is trying to (убедить) local business to invest in the project.
- 5) That was a chance to create (доброжелательные отношения) within your company.
- 6) This is the (основное содержание) of your presentation.
- 7) The buying process is a series of (последовательных) steps.

6. Answer the questions below.

- Have you ever made any presentations?
- What is the purpose of giving oral presentations?
- Do you know how to structure a presentation?
- Do you sometimes have to speak in public? On what occasions?
- What ends do presentations usually serve?

1.3 Подготовка к практическим занятиям (запоминание иноязычных лексических единиц и грамматических конструкций)

Грамматические конструкции представлены на стр. 11 – 38.

Запомните слова и выражения, необходимые для освоения тем курса:

Представление и знакомство

1.

| | |
|---|--|
| - Hi, Sarah! What's up? - I just got a new job! - Really? What's the job? - A brand-manager at Global Fashion. - That's great! Good luck with your new job! | / Привет, Сара! Как дела? / Я только что нашла новую работу! / Правда? И что за работа? / Бренд-менеджер в компании «Глобал Фешн». / Здорово! Удачи с твоей новой работой! |
|---|--|

2.

| | |
|---|---|
| - Hi, Nick! What's new? - Oh, I just got a promotion at work! They bumped me up to Sales Director. - Really? That's great news! Congratulations! - Thanks. | / Привет, Ник! Что нового? / Я только что получил повышение по работе. Меня повысили до директора по продажам. / Правда? Это хорошие новости! Поздравляю! / Спасибо. |
|---|---|

3.

| | |
|--|--|
| - Hi, Pam! How're you? - Good, thanks. - I've got news for you! Jack and I are getting married next month! | / Привет, Пэм! Как дела? / Спасибо, хорошо. / У меня для тебя новости! Мы с Джеком собираемся пожениться в следующем месяце! |
|--|--|

| | |
|--|--|
| - Oh, really! That's wonderful news! I'm glad for you! | / Правда? Отличные новости! Я рада за вас. |
|--|--|

4.

| | |
|---|---|
| - Hi! How are you doing? - I'm good! Yourself? - I'm also good, thanks. I hear you got a new job! - That's right! - So, how is it? Do you like it? - It's OK, but it pays less than my last job. | / Привет! Как поживаешь? / Хорошо. Ты как? / Также хорошо, спасибо. Я слышал, ты нашел новую работу! / Это верно. / И как? Тебе нравится? / Нормально, но платят меньше, чем на предыдущей работе. |
|---|---|

5.

| | |
|--|--|
| — Gosh, Kate! Is that you? It's been a long time! How've you been? — I'm fine. Yourself? — Good, thanks. It is so good to see you! You look great! You haven't changed a bit! — Neither have you. So, how's life? What's new? — Sorry, I'm in a bit of a rush right now. Mmm... How about we go out for a drink some night? What do you say? — Sounds good! Do you have my number? — No. — Here it is. 698 765 46 34. — Great! I'll call you tomorrow afternoon to make a time for this weekend. | / Боже! Кейт! Ты ли это? Давно не виделись! Как ты? / Прекрасно! А ты? / Хорошо, спасибо. Отлично выглядишь. Ты совсем не изменилась / Ты тоже не изменилась. Как жизнь? Что нового? / Прости, но я сейчас немного спешу. Ммм... Как насчет того, чтобы сходить куда-нибудь как-нибудь вечером? Что скажешь? / Отличная мысль! У тебя есть мой номер? / Нет. / Записывай. 698 765 4634. / Отлично! Я позвоню тебе завтра днем, и мы договоримся о времени на выходные. |
|--|--|

6.

| | |
|---|---|
| — Hey, Paul! How are you? — I'm good. Yourself? I haven't seen you around lately. Where have you been? — Oh, I was out of town. I spent three weeks in Switzerland. — Was it for business or travel? — I was visiting my friends in Geneva. | / Привет, Пол! Как дела? / Хорошо. А у тебя? Тебя не видно в последнее время. Где ты был? / Меня не было в городе. Я провел три недели в Швейцарии. / Это была деловая поездка или отпуск? / Я навещал друзей в Женеве. |
|---|---|

7.

| | |
|--|--|
| — Jessica! Hello! — Hi! How are you? — Good, thanks. You look great! It's been ages since I last saw you. — Three years exactly. — Right. You haven't changed a bit! So, what's up? What's been happening in your life? — Not much has been going on. Same old. | / Джессика! Привет! / Привет! Как дела? / Спасибо, хорошо. Ты выглядишь прекрасно! Сто лет тебя не видел. / Три года, если точно. / Верно. Ты совсем не изменилась. Ну, как дела? Что происходит? / Ничего особенно и не произошло. Все по-старому. |
|--|--|

8.

| | |
|--|--|
| — Hey, Peter! — Hey! What's up? You are so tan! Where have you been? — I just got back from Australia. | / Привет, Питер! / Привет! Как дела? Ты такой загорелый! (А ты загорел!) Где это ты был? / Я только вернулся из Австралии. / Из Австралии? Круто! Что ты там делал? |
|--|--|

| | |
|--|--|
| — Australia?! Cool! What did you do there? | / Это была еще одна поездка для занятий серфингом. Ты же знаешь, что я большой фанат серфинга. |
| — It was another surf-trip. You know, I'm a huge fan of surfing. | / Ну и как ? |
| — How was it? | / О, это было потрясающе! Знаешь, отдых всегда проходит быстро. |
| — Oh, it was fantastic! You know, it's never long enough. | |

9.

| | |
|---|---|
| - Hi! What's your name? | / Привет! Как вас зовут ? |
| - Carol. What's yours? | / Кэрол. А вас как зовут ? |
| - Peter. Where are you from, Carol? | / Питер. Откуда вы, Кэрол? |
| - I'm from the US. And you? | / Я из США. А вы? |
| - I'm from Russia. Nice to meet you, Carol. | / Я из России. Приятно с вами познакомиться, Кэрол. |
| - Nice to meet you. | / Взаимно. |

10.

| | |
|--|---|
| - Hi! I'm George. And you are...? | / Привет! Меня зовут Джордж. А вы...? |
| - I'm Gina. | / Я Джина. |
| - How are you, Gina? | / Как ваши дела, Джина? |
| - Good, thanks. | / Спасибо, хорошо. |
| - Where are you from? | / Откуда вы? |
| - I'm from Britain. How about you? Where are you from? | / Из Великобритании. А вы? Откуда вы? |
| - And I'm from Israel. Nice to meet you, Gina. | / А я из Израиля. Приятно познакомиться, Джина. |
| - Nice to meet you. | / Взаимно. |
| - Is this your first time here? | / Вы здесь в первый раз? |
| - No, it's my second time. | / Нет, второй. |
| - Where are you staying here? | / Где вы остановились? |
| - I'm staying at a hotel. | / В отеле. |

11.

| | |
|--|---|
| - Hi! What's your name? | / Привет! Как тебя зовут ? |
| - Jess. It's short for Jessica. And you are...? | / Джесс. Это сокращенное от Джессика. А тебя...? |
| - I'm Brant. How are you doing, Jess? | / Брант. Как поживаешь, Джесс? |
| - I'm fine! Yourself? | / Прекрасно! А ты? |
| - Good, thanks. Where are you staying? | / Хорошо, спасибо. Где ты остановилась? |
| - I'm staying at a hotel. It's up there on the hill. Where are you staying? | / Я остановилась в отеле. Он там, на холме. А где ты остановился? |
| - My hotel is right here, across the road. | / Мой отель здесь рядом, через дорогу. |
| - Where are you from? | / Откуда ты? |
| - I'm from Holland. How about you? Where are you from? | / Я из Голландии. А ты откуда? |
| - I'm from Australia. | / Я из Австралии. |
| - Australia?! I thought you were French. I heard you speak French to your friend over there. | / Австралия?! Я подумал, что ты француженка. Я слышал, как ты разговаривала по-французски со своей подружкой вон там. |
| - I am French, but I live in Australia. | / Я и есть француженка, но живу в Австралии. |

12.

| | |
|--|---|
| - Hi! How're you? | / Привет! Как дела? |
| - Good, thanks. What's your name? | / Хорошо, спасибо. Как вас зовут? |
| - Sveta. What's yours? | / Света. А вас как? |
| - I'm Peter. Nice to meet you. | / Меня Питер. Приятно с вами познакомиться. |
| - Nice to meet you. | / Взаимно. |
| - Are you Russian? | / Вы русская? |
| - Yes, I am. | / Да. |
| - Where are you from in Russia? | / Где вы живете в России? |
| - I'm from Nizhniy Novgorod. | / В Нижнем Новгороде. |
| - I have some friends in Nizhniy Novgorod. | / У меня есть друзья в Нижнем Новгороде. |
| - Oh, really? And where are you from? | / Правда? А вы откуда? |
| - I'm from Norway. | / Из Норвегии. |

13.

| | |
|---|---|
| - Hi! How're you? | / Привет! Как дела? |
| - Good, thanks. | / Спасибо, хорошо. |
| - What's your name? | / Как вас зовут? |
| - Kate. | / Кейт. |
| - And I'm Paolo. Where are you from, Kate? | / А меня Паоло. Откуда вы, Кейт? |
| - I'm from Moscow, Russia. | / Из России, из Москвы. |
| - Really? I've been there once. | / Правда? Я был там однажды. |
| - And where are you from? | / А вы откуда? |
| - I'm from Italy. | / Я из Италии. |
| - Oh, I love Italy. I've been there six or seven times. | / О, я обожаю Италию. Я была там 6 или 7 раз. |
| - That's great! | / Это здорово! |
| - Where do you live in Italy? | / Где вы живете в Италии? |
| - I live in Venice. | / Я живу в Венеции. |
| - Well, Venice is a beautiful place. | / Венеция — это красивое место. |

14.

| | |
|---|--|
| - Hi! What's your name? | / Привет! Как вас зовут ? |
| - Nick. What's yours? | / Ник. А вас как? |
| - Sandra. Nice to meet you. | / Сандра. Приятно познакомиться. |
| - Nice to meet you. Where are you from? | / Взаимно. Откуда вы? |
| - I'm from Germany. And you? / | / Из Германии. А вы? |
| - I'm from the US. | / Я из США. |
| - Is this your first time in Moscow? | / Вы в первый раз в Москве? |
| - No, I've been here a couple of times. | / Нет, я был здесь пару раз. |
| - Are you here on business or vacation? | / Вы здесь по делам или на отдыхе ? |
| - I'm here for work. How about you? | / Я здесь по работе. Как насчет вас? (А вы?) |
| - I'm here on vacation. | / Я здесь на отдыхе. |
| - Do you like it here? | / Вам здесь нравится? |
| - Yeah! I like it a lot! | / Очень нравится! |
| - Where are you staying here? | / Где вы остановились? |
| - I'm staying with some friends of mine. How about you? | / Я остановилась у друзей. А вы ? |
| - I'm staying at the Hayatt. It's the new hotel next to Red Square. | / Я остановился в «Хаяте». Это новый отель рядом с Красной площадью. |
| - It must be very expensive. | / Должно быть, он очень дорогой. |
| - It is very expensive. You can't find a cheap hotel in Moscow. | / Он действительно очень дорогой. В Москве нет дешевых отелей. |

15.

| | |
|-------------------------|--------------------------|
| - Hi! What's your name? | / Привет! Как вас зовут? |
|-------------------------|--------------------------|

| | |
|---|--|
| <p>- David. What's yours? - Fred. Nice to meet you. - Nice to meet you. Where are you from? - I'm from Canada. And you? - I'm from Sweden. - Is this your first time in Shanghai? - Yes, this is my first time. - Are you here on business or vacation? - I'm here for a business convention. How about you? Are you here on business or vacation? - Both. We've come here for the film festival. I'm also looking for some property to buy.</p> <p>- Are you here by yourself? - No, I'm here with my wife. She's gone shopping.</p> <p>- Where are you staying? / - We're staying at the Marriott.</p> | <p>/ Дэвид. А вас? / Фред. Приятно познакомиться. / Взаимно. Откуда вы? / Я из Канады. А вы? / Я из Швеции. / Вы первый раз в Шанхае? / Да, первый. / Вы здесь по делам или на отдыхе? / Я приехал на бизнес-конференцию. А вы? Вы здесь по делам или на отдыхе? / И то и другое. Мы приехали на кинофестиваль, и еще я хочу купить недвижимость. / Вы здесь один? / Нет, с женой. Она отправилась по магазинам. / Где вы остановились? / Мы остановились в «Мариотте».</p> |
|---|--|

16.

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|--|---|
| <p>- Hello! I'm Liz. And you are.....? - I'm Henry. How are you doing, Liz? - Good, thanks. - Are you staying in this hotel? - Yes, I am. Are you staying here too? - No. Hotels are expensive here. I'm renting an apartment in the city center. - Oh, OK! Are you here by yourself? - No, I'm here with my family. How about you? - I'm here with a friend. - Is this your first time in Colombo? - Actually, yes. This is my first time. - Do you like it here? - Yeah! It's a nice place. It's too hot though.</p> <p>- How long will you be in Sri Lanka? - Until the end of next week. - Will you stay in Colombo the whole time? - No, we'll stay here two more days and then we'll go to the Hikkaduwa resort. - Oh, it's a long way from here. - Five hours by car. OK, it was nice chatting with you. I've got to get going now. / - OK. Have a good time!</p> | <p>/ Привет! Меня зовут Лиз. А вас? / Я Генри. Как ваши дела, Лиз? / Хорошо, спасибо. / Вы остановились в этом отеле? / Да. Вы тоже здесь остановились? / Нет. Отели здесь дорогие. Я снимаю квартиру в центре города. / Ясно. Вы здесь один? / Нет, я здесь с семьей. А вы? / Я здесь с другом. / В первый раз в Коломбо? / В общем, да. В первый раз. / Вам здесь нравится? / Да! Хорошее место. Только слишком жарко. / Сколько вы пробудете в Шри-Ланке? / До конца следующей недели. / И все это время будете в Коломбо? / Нет, мы пробудем здесь еще два дня, а потом поедem на курорт Хиккадува. / О, это далеко отсюда. / Пять часов на машине. Ладно, приятно было с вами поболтать. Мне пора идти. / Ладно. Хорошо вам провести время!</p> |
|--|---|

17.

| | |
|---|---|
| <p>- Hi! How are you? - Good, thanks. - I think I saw you yesterday at reception.</p> <p>- Yeah, I was trying to book tickets for a water-park. My kids want to go splash around.</p> | <p>/ Здравствуйте! Как ваши дела? / Спасибо, хорошо. / Мне кажется, я видела вас вчера на ресепшине. / Да, я пытался заказать билеты в аквапарк. Мои дети хотят поплескаться в воде.</p> |
|---|---|

| | |
|--|--|
| <p>- Which one do you want to go to? There are three water parks in Dubai.</p> <p>- I hear Wild Wadi is pretty good.</p> <p>- Are you staying in this hotel?</p> <p>- Yes, we are.</p> <p>- In that case you should go to Ice-Land. It's closer, and then it's new. Wild Wadi is rather old.</p> <p>- OK, thank you. We'll go to Ice-Land then. Do we need to book tickets in advance?</p> <p>- No, you usually buy tickets there.</p> <p>- Do you live in Dubai?</p> <p>- No, I actually work here for my husband's company. Your English is very good. Where are you from? Are you Russian?</p> <p>- That's right. I'm from Saint Petersburg.</p> <p>- Really? I've been there once. Ten years ago. It's a beautiful city. You speak very good English for a Russian person. Where did you learn it?</p> <p>- I spent some time in the US. And now I'm working for an American company. OK. Thanks again for your recommendation.</p> <p>- You are welcome. Have a nice day!</p> | <p>/ В какой аквапарк вы хотите поехать? В Дубае три аквапарка.</p> <p>/ Я слышал, что «Вайлд Вади» — неплохой аквапарк.</p> <p>/ Вы проживаете в этом отеле?</p> <p>/ Да.</p> <p>/ В таком случае вам следует поехать в «Ай-сленд». Он ближе, и потом, он более новый. «Вайлд Вади» довольно старый.</p> <p>/ Хорошо, спасибо. Тогда мы поедem в «Айсленд». Нам надо бронировать билеты заранее?</p> <p>/ Нет, обычно вы покупаете билеты в аквапарке.</p> <p>/ Вы живете в Дубае?</p> <p>/ Нет, я здесь работаю в компании моего мужа. Вы хорошо говорите по-английски. Откуда вы? Вы русский?</p> <p>/ Верно. Я из Санкт-Петербурга.</p> <p>/ Правда? Я была там однажды. Десять лет назад. Это красивый город. Вы хорошо говорите по-английски для русского человека. Где вы его учили?</p> <p>/ Я жил какое-то время в США. А сейчас я работаю в американской компании.</p> <p>Спасибо еще раз за вашу рекомендацию.</p> <p>/ Пожалуйста. Хорошего дня.</p> |
|--|--|

2. Деловая переписка

1. Обращение

Dear Sirs, Dear Sir or Madam

Dear Mr, Mrs, Miss or Ms

Dear Frank,

2. Вступление, предыдущее общение.

Thank you for your e-mail of (date)...

Further to your last e-mail...

I apologise for not getting in contact with you before now...

Thank you for your letter of the 5th of March.

With reference to your letter of 23rd March

With reference to your advertisement in «The Times»

3. Указание причин написания письма

I am writing to enquire about

I am writing to apologise for

I am writing to confirm

I am writing in connection with

We would like to point out that...

4. Просьба

Could you possibly...

(если вам не известно имя адресата)

(если вам известно имя адресата; в том случае когда вы не знаете семейное положение женщины следует писать Ms, грубой ошибкой является использование фразы “Mrs or Miss”) (В обращении к знакомому человеку)

Спасибо за ваше письмо от (числа)

Отвечая на ваше письмо...

Я прошу прощения, что до сих пор не написал вам...

Спасибо за ваше письмо от 5 Марта

Относительно вашего письма от 23 Марта

Относительно вашей рекламы в Таймс

Я пишу вам, чтобы узнать...

Я пишу вам, чтобы извиниться за...

Я пишу вам, что бы подтвердить...

Я пишу вам в связи с ...

Мы хотели бы обратить ваше внимание на ...

Не могли бы вы...

I would be grateful if you could ...

I would like to receive

Please could you send me...

5. Соглашение с условиями.

I would be delighted to ...

I would be happy to

I would be glad to

6. Сообщение плохих новостей

Unfortunately ...

I am afraid that ...

I am sorry to inform you that

We regret to inform you that...

7. Приложение к письму дополнительных материалов

We are pleased to enclose ...

Attached you will find ...

We enclose ...

Please find attached (for e-mails)

8. Высказывание благодарности за проявленный интерес.

Thank you for your letter of

Thank you for enquiring

We would like to thank you for your letter of ...

9. Переход к другой теме.

We would also like to inform you ...

Regarding your question about ...

In answer to your question (enquiry) about ...

I also wonder if...

10. Дополнительные вопросы.

I am a little unsure about...

I do not fully understand what...

Could you possibly explain...

11. Передача информации

I'm writing to let you know that...

We are able to confirm to you...

I am delighted to tell you that...

We regret to inform you that...

12. Предложение своей помощи

Would you like me to...?

If you wish, I would be happy to...

Let me know whether you would like me to...

13. Напоминание о намеченной встрече или ожидание ответа

I look forward to ...

hearing from you soon

meeting you next Tuesday

seeing you next Thursday

14. Подпись

Kind regards,

Yours faithfully,

Yours sincerely,

Я был бы признателен вам, если бы вы ...

Я бы хотел получить.....

Не могли бы вы выслать мне...

Я был бы рад ...

Я был бы счастлив...

Я был бы рад...

К сожалению...

Боюсь, что...

Мне тяжело сообщать вам, но ...

К сожалению, мы вынуждены сообщить вам о...

Мы с удовольствием вкладываем...

В прикрепленном файле вы найдете...

Мы прилагаем...

Вы найдете прикрепленный файл...

Спасибо за ваше письмо

Спасибо за проявленный интерес...

Мы хотели бы поблагодарить вас за...

Мы так же хотели бы сообщить вам о...

Относительно вашего вопроса о...

В ответ на ваш вопрос о...

Меня также интересует...

Я немного не уверен в ...

Я не до конца понял...

Не могли бы вы объяснить...

Я пишу, чтобы сообщить о ...

Мы можем подтвердить ...

Мы с удовольствием сообщаем о ...

К сожалению, мы вынуждены сообщить вам о...

Могу ли я (сделать)...?

Если хотите, я с радостью...

Сообщите, если вам понадобится моя помощь.

Я с нетерпением жду,

когда смогу снова услышать вас

встречи с вами в следующий Вторник

встречи с вами в Четверг

С уважением...

Искренне Ваш (если имя человека Вам не известно)

(если имя Вам известно)

3. Наука и образование

analysis - анализ, исследование;

critical analysis — критический анализ;

advanced research — перспективные исследования;

basic research — фундаментальные исследования;

to be engaged in research — заниматься научно-исследовательской работой;

This researches cover a wide field — исследования охватывают широкую область;

after the study of the matter — после изучения этого вопроса;

humane studies — гуманитарные науки;

history and allied studies — история и родственные ей предметы;

a new study of Shakespeare — новая работа /книга/ о Шекспире;

pilot study - предварительное, экспериментальное исследование

desk study - чисто теоретическое исследование;

thorough examination — а) всестороннее исследование; б) тщательное изучение (материала);

to carry on an investigation — проводить исследовательскую работу;

the scientific method of inquiry — научный метод исследования;

we must apply ... to find a solution — мы должны применить..., чтобы решить;

comparative [experimental] method of investigation — сравнительный [экспериментальный] метод исследования;

his method is to compare different versions — его метод состоит в сопоставлении разных вариантов;

there are several methods of doing this — существует несколько способов сделать это;

ampliative inference — индуктивный метод;

a method that is attended by some risk — метод, связанный с некоторым риском;

convenient method — подходящий метод;

to approximate to a solution of the problem — подходить к решению задачи;

to use ... approach(to) - подход interdisciplinary approach — подход с точки зрения различных наук;

we began the work by collecting material — Мы начали работу со сбора материала;

we have two problems before us — перед нами две задачи;

data for study — материал исследования;

laboratory data — данные лабораторных исследований;

adequacy of data — достоверность данных;

acceptance of a theory — согласие с какой-л. теорией;

application of a theory in actual practice — применение теории в практической деятельности;

the backbone of a theory — основа теории;

to back up a theory with facts — подкрепить теорию фактами;

to construct a theory — создать теорию;

the results of the experiment contradicted this theory/agreed with the theory — результаты опыта шли вразрез с этой теорией/согласовывались с теорией;

professor – профессор;

lecturer – лектор;

researcher – исследователь;

research – исследование;

graduate - имеющий учёную степень; выпускник;

post-graduate или post-graduate student – аспирант;

masters student – магистрант;

PhD student – докторант;

master's degree - степень магистра;

bachelor's degree - бакалаврская степень;
degree – степень;
thesis - диссертация; исследовательская работа;
dissertation – диссертация;
lecture – лекция;
higher education - высшее образование;
semester – семестр;
student union - студенческий союз;
tuition fees - плата за обучение;
university campus - университетский район; кампус;

4. Чтение и перевод научной литературы по направлению исследования

КОМПЬЮТЕРНОЕ ОБОРУДОВАНИЕ

laptop - лэптоп; ноутбук; портативный компьютер;
desktop computer (часто используется сокращение desktop) - персональный компьютер;
tablet computer (часто используется сокращение tablet) – планшет;
PC (сокращённо от personal computer) - персональный компьютер;
screen – экран;
keyboard – клавиатура;
mouse – мышка;
monitor – монитор;
printer – принтер;
wireless router - беспроводной роутер; маршрутизатор;
cable – кабель;
hard drive - жёсткий диск;
speakers – громкоговорители;
power cable - кабель питания;

ЭЛЕКТРОННАЯ ПОЧТА

Email - электронная почта;
to email - посылать письма по электронной почте;
to send an email – послать;
email address - адрес электронной почты, email;
username - имя пользователя;
password – пароль;
to reply – ответить;
to forward – переслать;
new message - новое сообщение;
attachment – приложение;

ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРА

to plug in - подключить что-либо к компьютеру;
to unplug - отсоединить; вытащить из розетки;
to switch on или to turn on – включить;
to switch off или to turn off – выключить;
to start up - запустить систему;
to shut down - выключить систему;
to restart – перезагрузить;

ИНТЕРНЕТ

the Internet – интернет;
website – сайт;
ISP (сокращённо от internet service provider) - поставщик услуг интернета;
Firewall - система защиты доступа; средство сетевой защиты;
web hosting - Web-хостинг;

wireless internet или WiFi – беспроводной;
to download – скачивать;
to browse the Internet - плавать в интернете;

file – файл;
folder – папка;
document – документ;
hardware - элементы электронных устройств; жарг. железо;
software - программное обеспечение;
network – сеть;
to scroll up - прокрутить вверх;
to scroll down - прокрутить вниз;
to log on – войти;
to log off – выйти;
space bar - клавиша для пробела;
virus – вирус;
antivirus software - антивирусная программа;
processor speed - скорость процессора;
memory – память;
word processor - текстовый процессор;
database - база данных;
spreadsheet - электронная таблица;
to print – распечатать;
to type – печатать;
lower case letter - нижний регистр (клавиатуры);
upper case letter или capital letter - заглавные буквы;

5. Аннотирование научных статей

Основные штампы (key-patterns) аннотаций на английском и русском языках

1. The article (paper, book, etc.) deals with... - Эта статья (работа, книга и т.д.) касается...
2. As the title implies the article describes.... - Согласно названию, в статье описывается...
3. It is specially noted... - Особенно отмечается...
4. A mention should be made... - Упоминается...
5. It is spoken in detail... - Подробно описывается...
6. ...are noted - Упоминаются...
7. It is reported... - Сообщается...
8. The text gives a valuable information on.... - Текст дает ценную информацию...
9. Much attention is given to... - Большое внимание уделяется...
10. The article is of great help to ... - Эта статья окажет большую помощь...
11. The article is of interest to... - Эта статья представляет интерес для...
12. It (the article) gives a detailed analysis of - 12. Она (статья) дает детальный анализ...
13. It draws our attention to... - Она (статья, работа) привлекает наше внимание к...
14. The difference between the terms...and...should be stressed - Следует подчеркнуть различие между терминами ...и...
15. It should be stressed (emphasized) that... - Следует подчеркнуть, что...
16. ...is proposed - Предлагается...
17. ...are examined - Проверяются (рассматриваются)
18. ...are discussed - Обсуждаются...
19. An option permits... - Выбор позволяет...
20. The method proposed ... etc. - Предлагаемый метод... и т.д.
21. It is described in short ... - Кратко описывается ...
22. It is introduced - Вводится ...

23. It is shown that - Показано, что ...
24. It is given ... - Дается (предлагается) ...
25. It is dealt with - Рассматривается ...
26. It is provided for ... - Обеспечивается ...
27. It is designed for - Предназначен для ...
28. It is examined, investigated ... - Исследуется ...
29. It is analyzed ... - Анализируется ...
30. It is formulated - Формулируется ...
31. The need is stressed to employ... - Подчеркивается необходимость

использования...

32. Attention is drawn to... - Обращается внимание на ...

33. Data are given about... - Приведены данные о ...

34. Attempts are made to analyze, formulate ... - Делаются попытки проанализировать, сформулировать ...

35. Conclusions are drawn.... - Делаются выводы ...

36. Recommendations are given ... - Даны рекомендации ...

Образцы клише для аннотаций на английском языке

- The article deals with ...
- As the title implies the article describes ...
- The paper is concerned with...
- It is known that...
- It should be noted about...
- The fact that ... is stressed.
- A mention should be made about ...
- It is spoken in detail about...
- It is reported that ...
- The text gives valuable information on...
- Much attention is given to...
- It is shown that...
- The following conclusions are drawn...
- The paper looks at recent research dealing with...
- The main idea of the article is...
- It gives a detailed analysis of...
- It draws our attention to...
- It is stressed that...
- The article is of great help to ...
- The article is of interest to ...
- is/are noted, examined, discussed in detail, stressed, reported, considered.

6. Основные правила презентации научно-технической информации

Начало презентации

Good morning / afternoon / evening ladies and gentlemen

Доброе утро / день / вечер дамы и господа

My name is... I am ...

Меня зовут ... Я являюсь ...

Today I would like to talk with you about ...

Сегодня я хотел бы поговорить с вами о...

My aim for today's presentation is to give you information about ...

Цель моей сегодняшней презентации – проинформировать вас о...

I have been asked to comment on what I think of the way ...

Меня попросили сказать / прокомментировать, что я думаю о способе ...

Please feel free to interrupt me if there are any questions. Пожалуйста, не стесняйтесь прерывать меня, если возникнут любые вопросы.
If you have any questions, please feel free to ask me at the end of the presentation. Если у вас есть какие-либо вопросы, пожалуйста, задайте их по окончании презентации.

Сообщение о плане презентации

At the outset ... Вначале ...
First of all, ... / Above all, ... Прежде всего ...
First I would like to talk about ... Сначала я хотел бы сказать о ...
I'd like to start by saying ... Я бы хотел начать с ...
Before discussing ... Перед тем как обсуждать ...
Describing this process, it is necessary to start with ... Описывая этот процесс, необходимо начать с ...
Firstly, we must become accustomed to the terminology, which uses ... Сначала мы должны ознакомиться с терминологией, которую использует ...
I'd like to come to the right point ... Я бы хотел сразу приступить к делу ...
I am going to divide my review / report / article into 3 areas / parts ... Я собираюсь разделить свой обзор / доклад / статью на 3 части ...
I will begin with a definition of ..., then go on to a brief review ... Я начну с определения ..., затем перейду к краткому обзору ...
Let us start by mentioning a few facts ... Давайте начнем с упоминания некоторых фактов ...
Then I would like to take a look at... Затем я хотел бы взглянуть на ...
Following that we should talk about ... Вслед за этим мы должны поговорить о ...
Lastly we are going to discuss ... В заключение мы обсудим ...
I would like to talk to you today about _____ for ___ minutes. Сегодня я хотел бы поговорить с вами о _____ в течение _____ минут.
We should be finished here today by _____ o'clock. Мы должны закончить сегодня к _____ часам.

Управление презентацией

Now we will look at ... Сейчас мы посмотрим на ...
I'd like now to discuss... Я бы хотел обсудить сейчас ...
Before moving to the next point I need to ... Прежде чем перейти к следующему вопросу, мне необходимо ...
Let's now talk about... Давайте сейчас поговорим о ...
Let's now turn to... Давайте перейдем сейчас к ...
Let's move on to... Давайте перейдем к ...
That will bring us to our next point ... Это приведет нас к нашему следующему пункту ...
Moving on to our next point ... Переходим к нашему следующему пункту ...
Let us now turn to ..., namely to ... Теперь перейдем к ..., а именно к ...
We come now to the description of ... Теперь мы подошли к описанию ...
Let's switch to another topic ... Перейдем на другую тему ...
Let us now proceed to consider how ... Давайте перейдем к рассмотрению того, как ...
Firstly ... Во-первых ...
Secondly ... Во-вторых ...
Thirdly ... В-третьих ...
I'd like to describe in detail ... Я бы хотел подробно описать ...
Let's face the fact ... Давайте обратимся к факту ...
Consider another situation. Рассмотрим другую ситуацию ...
Let's go back a bit to ... Давайте немного вернемся к ...

| | |
|--|---|
| It will take up too much time / space ... | Это займет слишком много времени / места ... |
| This point will be discussed later / after ... | Этот вопрос будет обсуждаться позднее / после ... |
| Lastly ... | Наконец / в заключение ... |
| Eventually we must confess ... | В конечном итоге, мы должны признаться ... |
| Now we come to the final phase of ... | Теперь перейдем к заключительному этапу ... |
| One more question remains to discuss ... | Остается еще один вопрос для обсуждения ... |
| And the last point, ... | И последний вопрос / замечание, ... |
| A final remark. | Последнее замечание. |
| Подведение итогов | |
| I would just like to sum up the main points again ... | Я бы еще раз хотел подвести итоги основных пунктов ... |
| If I could just summarize our main points before your questions. So, in conclusion ... | Я хочу только подвести итоги наших главных пунктов перед тем, как вы начнете задавать вопросы. Итак, в заключение ... |
| Finally let me just sum up today's main topics ... | В заключение, позвольте мне подвести итоги сегодняшних основных тем ... |
| Concluding what has been said above, I want to stress that ... | Подводя итог тому, что было сказано выше, я хочу подчеркнуть, что ... |
| I will sum up what has been said ... | Я подытожу все сказанное ... |
| To conclude this work ... | В завершение этой работы ... |
| To summarize, the approach to ... described here is ... | Резюмируем: подход к ..., описанный здесь, состоит в ... |
| We arrived at the conclusion that ... | Мы пришли к заключению, что ... |
| We shouldn't rush to a conclusion ... | Мы не должны делать поспешный вывод ... |
| We find the following points significant ... | Мы находим важными следующие моменты ... |
| We can draw just one conclusion since ... | Мы можем сделать лишь один вывод, поскольку ... |
| As a summary I would like to say that ... | В качестве обобщения, я бы хотел сказать, что ... |
| Finally, the results are given in ... | И, наконец, результаты представлены в ... |
| Уточнения | |
| I'm sorry, could you expand on that a little? | Простите, можно немножко поподробнее? |
| Could you clarify your question for me? | Могли бы вы прояснить этот вопрос для меня? |
| I'm sorry I don't think I've understood your question, could you rephrase it for me? | Извините, по-моему, я не понял вашего вопроса. Могли бы вы изложить его иначе (перефразировать) для меня? |
| I think what you are asking is ... | Я думаю то, о чем вы спрашиваете, это ... |
| If I've understood you correctly you are asking about ... | Если я правильно вас понял, вы спрашиваете о ... |
| So you are asking about ... | Итак, вы спрашиваете о ... |
| Thus ... | Таким образом ... |
| Thus we see ... | Таким образом, мы видим ... |
| In consequence ... | В результате ... |
| In consequence of ... | Вследствие ... |
| Turning now to possible variants ... | Переходя теперь к возможным вариантам ... |
| We can further divide this category into two types ... | В дальнейшем мы можем разделить эту категорию на два типа ... |
| >We can now go one step further ... | Теперь мы можем продвинуться на шаг вперед ... |
| That is why we have repeatedly suggested that ... | Вот почему мы неоднократно предлагали ... |

| | |
|---|--|
| However this conclusion may turn out to be hasty, if ... | Однако этот вывод может оказаться поспешным, если ... |
| Maybe we could get definite results at an earlier date ... | Возможно, мы могли бы получить определенные результаты на более раннюю дату (раньше) ... |
| No definite conclusions have so far been reached in these discussions ... | В ходе этих дискуссий так и не были сделаны какие-либо определенные выводы ... |
| Results are encouraging for ... | Результаты обнадеживающие, поскольку ... |
| Results from such research should provide ... | Результаты такого исследования должны обеспечить ... |
| That yields no results ... | Это не дает никаких результатов ... |
| The logical conclusion is that ... | Логическим заключением является то, что ... |
| The result was astounding ... | Результат был ошеломляющим ... |
| The results are not surprising ... | Результаты неудивительны ... |
| Then eventually I came to the conclusion that ... | Затем, со временем, я пришел к выводу, о том что ... |
| There are two important consequences of ... | Есть два важных следствия ... |
| The first step is to develop ... | Первый шаг состоит в том, чтобы разработать ... |
| The second phase of is that ... | Второй этап ... в том, чтобы ... |
| There are two main stages in the procedure ... | В данной процедуре есть два главных этапа ... |
| Although I think that ... | Хотя я полагаю, что ... |
| I strongly believe that ... | Я решительно полагаю, что ... |
| In order to understand ... | Для того чтобы понять ... |
| It has to be said that ... | Необходимо сказать, что ... |
| Many experts are coming to believe that only ... | Многие эксперты все больше приходят к убеждению, что только ... |
| Some experts, however, think that ... | Некоторые эксперты, однако, думают, что ... |
| Someone may say that ... | Кто-то может сказать, что ... |
| Though we used to think ... | Хотя мы привыкли полагать ... |
| It is generally considered that ... | Обычно полагают, что ... |
| We should realize that ... | Мы должны осознавать, что ... |
| Now we understand why it is so hard to ... | Теперь мы понимаем, почему так трудно ... |
| Consider how it can be done ... | Рассмотрим, как это может быть сделано ... |
| At first glance it would seem that ... | На первый взгляд могло бы показаться, что ... |
| It can be viewed in a different light ... | Можно иначе смотреть на это ... |
| It has been assumed that ... | Предполагалось, что ... |
| Let us assume for a moment that ... | Предположим на минуту, что ... |
| Suppose, for example, that ... | Предположим, например, что ... |
| Though it might seem paradoxical, ... | Хотя это могло бы показаться парадоксальным ... |
| You might know that ... | Вы, возможно, знаете, что ... |
| But it can be claimed that ... | Но можно утверждать, что ... |
| Let us not forget that ... | Давайте не будем забывать, что ... |
| This simplified approach ignores the importance of ... | Этот упрощенный подход игнорирует важность ... |

1.4 Самостоятельное изучение тем курса (для заочной формы обучения)

Самостоятельное изучение тем курса предполагает изучение тем практических занятий, представленных в разделе 1, 2, 3 данных методических указаний студентами заочной формы обучения в межсессионный период.

II. Другие виды самостоятельной работы

2.1 Выполнение самостоятельного письменного домашнего задания

2.1.1 Подготовка к ролевой игре

Студенты получают ролевые карточки. Им необходимо обдумать свою роль, стратегию своей роли, вопросы и ответы.

1. Вы устраиваетесь на работу. Ответить на вопросы интервьюера. You are applying for a job as ... (a manager, a book-keeper, an accountant, a financial analyst assistant, any job you want). Practice the following interview questions.

1. Can you tell me a little about yourself?
2. What kind of training or experience do you have in this field?
3. Do you have a job now?
4. What are your responsibilities?
5. Why do you want to change your job?
6. Why did you leave your last job?
7. What do you think are your strong points (greatest strengths)?
8. What do you consider to be your weak points (greatest weaknesses)?
9. Why are you interested in this job?
10. Do you want to work full-time or part-time?
11. What salary do you want?
12. Do you have any questions?

Образец интервью:

Andrew Brandon has a job interview.

Interviewer: Good morning, Mr. Brandon. My name is Ms. Martin. Please have a seat.

Andrew: Good morning, Ms. Martin. It's pleasure to meet you.

I.: You've applied for the Saturday position, haven't you?

A.: Yes, Ms. Martin.

I.: Can you tell me what made you reply to our advertisement?

A.: Well, I am looking for a part-time job to help me through university. I think that I'd be really good at this kind of work.

I.: Do you know exactly what you would be doing as a shop assistant?

A.: Well, I imagine I would be helping customers, keeping a check on the supplies in the store, and preparing the shop for business.

I.: What sort of student do you regard yourself as? Do you enjoy studying?

A.: I suppose I'm a reasonable student. I passed all my exams and I enjoy my studies a lot.

I.: Have you any previous work experience?

A.: No. I've been too busy with all the subjects to get a good result. But last summer holidays I worked part-time at a take-away food store.

I.: Now, do you have any questions you'd like to ask me about the position?

A.: Yes. Could you tell me what hours I'd have to work?

I.: We open at 9.00, but you would be expected to arrive at 8.30 and we close at 6.00 pm. You would be able to leave then. I think I have asked you everything I wanted to. Thank you for coming to the interview.

A.: Thank you, Ms. Martin. When will I know if I have been successful?

I.: We'll be making our decision next Monday. We'll give you a call.

A.: Thank you. Goodbye.

I.: Goodbye, Mr. Brandon.

2. Беседа – устройство на работу. Ответьте на вопросы интервьюера. Job Interview. Decide the best response to your interviewer's questions.

1. Why should we hire you and not someone with experience?
 - a) I offer energy, intelligence and loyalty.

- b) First come, first served.
 - c) You need to hire me to get the answer.
2. What do you consider loyalty to a firm?
- a) No stealing stationery.
 - b) Confidentiality and dependability.
 - c) Coming to work.
3. What are your weaknesses?
- a) I can't resist chocolate cake.
 - b) Expecting others to be as honest as I am.
 - c) Always arriving late for meetings.
4. Why do you want this job?
- a) It is a job with prospects.
 - b) It pays well.
 - c) My friend works here; he likes the company.
5. Where would you like to be in five years?
- a) I don't know.
 - b) Running the company.
 - c) In a challenging position with responsibility.
6. Why do you want to work for this company?
- a) I've been unemployed for too long.
 - b) Well, I've heard that it's a company that pays its employees well.
 - c) It's a company with future.
7. How did you hear about this vacancy?
- a) I researched your company and rang Human Resources.
 - b) A friend of a friend told me about it.
 - c) My brother works here.
8. Have you looked at our website?
- a) Yes. It is very comprehensive.
 - b) Not yet, but I will after the interview.
 - c) Do you have a website?
9. We need someone now, not in three months. Could you begin earlier if you were offered the job?
- a) My present company will not allow it.
 - b) Well, that is a question I didn't expect.
 - c) If I were offered this job, I would try.
10. Do you like working with your current boss?
- a) No. I think he can't manage people.
 - b) No. He is too aggressive and lazy.
 - c) No. However, I've learnt a lot from him.
11. During the busy summer period we all work every weekend. Would you have a problem with this?
- weekend.
- a) I would hope to arrange a system so that not everyone has to work every weekend.
 - b) I'm a team player and would be prepared to work when necessary.
 - c) I have holidays booked and enjoy my free time too much.
12. Why do you think we should employ you?
- a) Some other company will if you don't.
 - b) I believe you won't find anyone better than me.
 - c) I believe I'm the best person for the job.

2.1.2 Подготовка к практико-ориентированному заданию

1. Составьте деловое письмо, выдержите структуру и стиль: Напишите письмо – поздравление: Вы только что узнали, что Мистер Грин назначен новым управляющим директором компании «Браун и Грин ЛТД». Отправьте свои искренние поздравления по этому поводу. Пожелайте успехов на новом посту. Выразите надежду на плодотворное сотрудничество с этой фирмой в будущем.

Примерный ответ:

Dear Mr N. Green,
 I have just read of your promotion to Production Manager of “Brown and Green LTD”. Let me offer my warmest congratulations.
 I don't have to tell you that all of us here wish you the best of luck in your new position.
 We are sure that we'll establish good trade relations with you and our cooperation will be to the mutual benefit of the companies.

Yours faithfully,
 I. Petrov

2. Составьте деловое письмо, выдержите структуру и стиль: Письмо – сообщение. Сообщите вашему деловому партнеру, что ваш менеджер по продажам прибывает к ним 4 Мая. Попросите организовать для него посещение вашего предприятия. Сообщите, что он уполномочен заключить контракт на закупку их продукции. Поблагодарите заранее.

Useful Phrases

| | |
|---|--|
| We would be very much obliged ... | Мы были бы весьма признательны ... |
| I shall be grateful to you ... | Мы будем Вам благодарны ... |
| We shall appreciate it if... | Мы будем Вам признательны, если ... |
| We are indebted to the Chamber of Commerce and Industry for your address. | Мы обязаны за Ваш адрес Торгово-промышленной палате. |
| We owe your address to ... a certain company. | Мы обязаны за Ваш адрес ... такой-то фирме. |
| Please let us know... | Просим Вас сообщить нам ... |
| We would ask (request) you to ... | Мы просили бы Вас ... |
| We'd be obliged if... | Мы были бы обязаны, если бы ... |
| We'd be glad to have your latest catalogue. | Мы были бы рады получить Ваш последний каталог. |
| Kindly inform us of the position of the order. | Просим Вас ставить нас в известность о ходе выполнения заказа. |
| We confirm our consent to the alterations. | Подтверждаем свое согласие с данными изменениями. |
| Please acknowledge receipt of our Invoice. | Просим Вас подтвердить получение нашего счета-фактуры. |

3. Составьте деловое письмо, выдержите структуру и стиль: Письмо – приглашение. Напишите приглашение от имени ректора УГГУ на конференцию, на которой будут обсуждаться вопросы об использовании нового компьютерного оборудования на открытых карьерах. Конференция состоится в понедельник 20 мая 2019 с 9.00 до 17.00 в УГГУ. Попросите дать ответ.

Примерный ответ:

Dear Charles Milton,
 I would like to invite you to a seminar that I'm confident will interest you.
 The 3D Technologies Seminar held at the Moscow Crocus Congress Centre on June 13 will feature lectures by several key programmers and designers in the field of 3D modeling, with topics including trilinear filtering, anti-aliasing and mipmapping.
 I am enclosing 3 tickets for you. I hope that you decide to attend and I am looking forward to seeing you there.
 Best regards,

Igor Petrov,
Managing Director Ltd. The company "Center"

4. Составьте деловое письмо, выдержите структуру и стиль: Письмо – заказ. Напишите письмо менеджеру отеля и закажите 1 комнату с ванной для менеджера по сбыту Мистера Мартина, указав, что он прибудет по делам фирмы с 30 октября по 9 ноября. Попросите подтвердить заказ как можно быстрее.

Useful Phrases

I would like to reserve a single room / double room / twin room / suite for 2. Я хотел бы номер на одного / на двоих / номер с двумя кроватями / люкс на 2.

I would like a room with a bath / shower / balcony / sea view. Я хотел бы номер с ванной / душем / балконом / видом на море.

Does the room have internet access / air conditioning / television? В номере есть интернет / кондиционер / телевизор?

Please confirm my booking via fax / e-mail. Прошу подтвердить мою бронь по факсу / электронной почте.

Please send me the price list for the transfer services (airport, etc.). Пожалуйста, пришлите мне цены на трансферы (в / из аэропорта и пр.).

The arrival date is ... – дата прибытия ...

Please include breakfast – Прошу включить завтрак в стоимость.

Does the room have a shared bathroom? - Туалет и ванная в номере общие?

I would like to make a reservation - Я хотел бы забронировать номер.

I have a reservation under ... - У меня забронирован номер на фамилию ...

I need to change my reservation for the following dates: arrival - ..., departure - ... Please confirm my new reservation if the room is (rooms are – если номеров несколько) available for these dates. Мне нужно изменить даты моего бронирования на следующие: дата приезда - ... дата отъезда - ... Пожалуйста, подтвердите бронирование на эти даты, если у вас есть свободные номера.

Please be informed that it will be a late arrival. We plan to arrive at _____ o'clock p.m. Please keep our room till that time. Пожалуйста, имейте ввиду, что мы приедем поздно. Планируемое время прибытия _____ (в 12-часовом формате). Пожалуйста, оставьте за нами забронированный номер.

Please be informed that it will be an early arrival. We would like to check in at _____. Please inform us if it possible. Пожалуйста, обратите внимание, что мы прибываем рано. Мы хотели бы заселиться в _____ (время в 12-часовом формате). Если это возможно, пожалуйста, подтвердите.

What is the price per night? - Какова цена за 1 ночь?

Is breakfast included? - Входит ли в стоимость завтрак?

Can you offer me any discount? - Вы можете сделать скидку?

What time do I need to check out? - Во сколько я должен освободить номер?

Would it be possible to have a late check-out? - Возможно ли освободить номер попозже?

Could you send me some photos of the room? - Не могли бы вы выслать мне несколько фотографий номера?

5. Составьте деловое письмо, выдержите структуру и стиль: Письмо – извинение. Известите вашего делового партнера, что к сожалению вы не можете осуществить поставку, о которой договаривались раньше, в поставленный срок в связи с забастовкой на вашем заводе. Вы сожалеете, что не своевременная поставка заказа причинит им большие неудобства. Вы предлагаете осуществить эту поставку за пол-цены и компенсировать причиненные неудобства. Выразите уверенность, что такая ситуация больше не повториться и сообщите, что точный срок данной поставки сообщите электронной почтой в течение 2 дней.

Примерный ответ:

Dear Bernard Bishop,
This is to acknowledge that we are in receipt of your notice, whereby you informed us that the goods shipped

to you on June 25, 2011 did not conform to our agreement dated 16 May, 2011.
 We regret this unintentional mistake on our part. In this fault our service department.
 While we recognize that the time for performing under this agreement has expired, we are requesting that you
 extend the time to July 20, 2011, in order that we may cure the defect by replacing the shipment with goods that conform to our agreement.
 Please accept our apology for this inconvenience. We will be looking forward to your response.
 Very truly yours,
 Igor Petrov,
 Managing Director

6. Составьте деловое письмо, выдержите структуру и стиль: Письмо – запрос. Вы узнали из газеты «Таймс» от 25 января 2007 о производстве нового магнитофона «Филипс». Попросите выслать дополнительную информацию, в том числе сведения о стоимости, размерах скидки в случаях оптовой закупки, сроках поставки и условиях оплаты. Срочно попросите ответить.

Useful Phrases

| | |
|---|---|
| We are interested in... and would ask you to send us your offer (tender, quotation) for these goods (for this machine, for this equipment). | Мы заинтересованы в ... и просили бы Вас выслать нам Ваше предложение на этот товар (котировку и на эту машину, на это оборудование) ... Нам требуются ... |
| We require ... We are regular buyers of... Please send us samples of your goods stating your lowest prices and best terms of payment. | Мы являемся постоянными покупателями ... Просим Вас выслать нам образцы Вашего товара с указанием Ваших крайних цен и лучших условий платежа. |
| Please let us know if you can send us your quotation for... (if you can offer us...) | Просим Вас сообщить нам, сможете ли Вы сделать нам предложение на ... (сможете ли Вы предложить нам ...) |
| Please inform us by return at what price, on what terms and when you could deliver... | Просим Вас сообщить нам обратной почтой, по какой цене, на каких условиях и в какой срок Вы могли бы поставить ... |
| We are interested in ... advertised by you in... | Мы заинтересованы в ... разрекламированной Вами в ... |
| We have seen your machine, Model 5 at the exhibition and... | Мы видели Вашу машину модели № 5 на выставке и ... |
| We have read your advertisement in... | Мы прочитали Ваше рекламное объявление в ... |
| We have received your address from ... | Мы получили Ваш адрес от ... |
| We learn from ... that you are exporters of... | Мы узнали от .., что Вы являетесь экспортерами ... |

7. Составьте деловое письмо, выдержите структуру и стиль: Письмо – жалоба. С сожалением сообщите, что из полученной партии товара, вы не сможете принять 2 контейнера, т.к. качество товара в них не соответствует стандарту качества. Сообщите, что вынуждены вернуть эту часть товара и хотите получить взамен товар надлежащего качества. Попросите поскорее вам ответить.

Useful phrases and sentences

| | |
|---|--|
| We regret to inform you that you have supplied goods below the standard we expected from the samples. | С сожалением сообщаем Вам, что Вы поставили товар, качество которого ниже стандарта, ожидавшегося нами судя по образцам. |
| The bulk of the goods delivered is not up to sample (is inferior to sample). | Большая часть поставленного Вами товара по качеству ниже образца. |

| | |
|---|---|
| <p>Unfortunately, we find that you have sent us the wrong goods. We have had an analysis made and the report says that the chemical content is ... % less than guaranteed. We cannot accept these containers as they are not the size and shape we ordered.</p> <p>Although the quality of the goods is not up to sample, we are prepared to accept them if you reduce the price by 12 %.</p> <p>We much regret that we have to complain about the insufficient (inadequate) packing (or carelessness in packing, or packing of the wrong type, i.e. unsuitable to local conditions).</p> <p>The packing inside the case was too loose with the result that there was some shifting of the contents and several things have been broken; the attached list will give you all the details.</p> <p>We hope you will pay more attention to packing to avoid any breakage in future.</p> <p>A number of cases arrived in a badly damaged condition, the lids were broken and the contents were crushed. As the period of guarantee has not expired yet, we ask you to replace the machine by another one. We cannot make use of the goods and are very sorry to have to return them to you. We regret that unless we hear from you soon, we shall have to cancel our order.</p> | <p>К сожалению мы обнаружили, что Вы поставили нам не тот товар. Мы произвели анализ, и из акта видно, что ее (напр, руды) химическое содержание на ... % хуже, чем гарантировано. Мы не можем принять эти контейнеры, так как и по размеру и по форме они отличаются от заказанных нами. Хотя качество товара не соответствует образцу, мы готовы принять его, если Вы снизите цену на 12 %.</p> <p>Мы очень сожалеем, что нам приходится заявлять Вам жалобу о недостаточной упаковке (или о небрежности при упаковке, или об упаковке, не соответствующей местным условиям).</p> <p>Упаковка внутри ящика была не совсем жесткой, в результате чего содержимое, ящика перемещалось, и часть его была сломана. Из прилагаемого списка Вы можете узнать все подробности.</p> <p>Мы надеемся, что впредь Вы будете уделять больше внимания упаковке, с тем чтобы избегать каких-либо поломок.</p> <p>Ряд ящиков прибыли в сильно поврежденном состоянии, были сломаны крышки и попорчено (помято) содержимое.</p> <p>Поскольку еще не истек срок гарантии, просим Вас заменить данную машину другой.</p> <p>Мы не можем использовать этот товар и, к сожалению, должны вернуть его Вам.</p> <p>Мы сожалеем, но если в ближайшем будущем мы не получим от Вас известий, нам придется аннулировать наш заказ.</p> |
|---|---|

8. Составьте деловое письмо, выдержите структуру и стиль: Напишите рекомендательное письмо Мистеру Кристину Рейли, которого вы хорошо знаете о том, что ваш хороший друг Мистер Энтони Дуглас примерно в конце сентября приезжает в Лондон и что ему очень хотелось бы познакомиться с Мистером Рейли и осмотреть его завод по производству мебели для офисов. Сообщите, что Мистер Дуглас является управляющим директором компании по производству лаков и красок «Дуглас и сын ЛТД». Они открывают новый отдел фирмы и хотели бы узнать во что обойдется обставить новые офисы. Упомяните, что таким образом Мистер Дуглас может стать новым клиентом Мистера Рейли. Передайте наилучшие пожелания Мистеру Рейли и его жене.

Примерный ответ:

| |
|--|
| <p style="text-align: center;">Reference for Mr Alexandr Ivanov</p> <p>Alexandr Ivanov joined the Ltd. The company "Center" in July 2008. Since then he has proved to be a most reliable and effective member of the sales team.</p> <p>Alexandr is professional and efficient in his approach to work and very well-liked by his colleagues and executive clients. He is well-presented and able to work both independently and as part of a team.</p> <p>His contribution to all areas of company activity in which he has been involved have been much appreciated.</p> |
|--|

I believe that Alexandr will make a valuable addition to any organization that he may join. We deeply regret his decision to move on and I recommend him without hesitation.
I would gladly answer any request for further information.
Sincerely,
Igor Petrov
Managing Director

2.1.3 Подготовка к опросу

Подготовьте высказывания на иностранном языке:

1. Расскажите, что вы знаете о получении степени магистра, истории возникновения присуждения степеней.

Примерный ответ:

Master's Degrees

Students and employers demand for advanced education and certification within professional fields of study has sparked much of the growth in master's degree enrollments.

The master's degree is designed to provide additional education or training in the student's specialised branch of knowledge. Master's degrees are offered in many different fields, and there are two main types of programs: academic and professional.

Academic Master's: The master of arts (M.A.) and the master of science (M.S.) degrees are usually awarded in the traditional arts, sciences, and humanities disciplines. The M.S. is also awarded in technical fields such as engineering and agriculture. Original research, research methodology, and field investigation are emphasised. These programs are usually completed in one or two academic years of full-time study. They may lead directly to the doctoral level.

Professional Master's: These degree programs are designed to lead the student from the first degree to a particular profession. They do not lead to doctoral programs. Such master's degrees are often designated by specific descriptive titles, such as master of business administration (M.B.A.), master of social work (M.S.W.), master of education (M.Ed.), or master of fine arts (M.F.A.). Other subjects of professional master's programs include journalism, international relations, architecture, and urban planning. Professional master's degrees are oriented more toward direct application of knowledge than toward original research.

They often require that every student take a similar or identical program of study that lasts from one to three years, depending on the institution and the field of study.

History of Academic Degree

An academic degree is a college or university diploma, often associated with a title and sometimes associated with an academic position, which is usually awarded.

The most common degrees awarded today are Bachelor's, Master's and Doctoral degrees. Most higher education institutions generally offer certificates and programs of Master of Advanced Studies, which is known as a *Diplôme d'études supérieures spécialisées* under its original French name.

The modern academic system of academic degrees evolved and expanded in the medieval university, spreading everywhere across the globe. No other European institution has spread over the entire world in the way in which the traditional form of the European university has done. The degrees awarded by European universities – the bachelor's degree, the licentiate, the master's degree, and the doctorate – have been adopted in the most diverse societies throughout the world.

The doctorate (Latin: *doceo*, I teach) appeared in medieval Europe as a license to teach at a medieval university. Its roots can be traced to the early church when the term "doctor" referred to the Apostles, church father and other Christian authorities who taught and interpreted the Bible.

Originally the terms "master" and "doctor" were synonymous, but over time the doctorate came to be regarded as a higher qualification than the master degree.

In the medieval European universities, candidates who had completed three or four years of study in the prescribed texts of the trivium (grammar, rhetoric, and logic), and the quadrivium (mathematics, geometry, astronomy and music), together known as the Liberal Arts, and who had successfully passed examinations held by their master, would be admitted to the degree of bachelor of arts.

Further study would earn one the Master of Arts degree. Master of Arts was eligible to enter study under the "higher faculties" of Law, Medicine or Theology, and earn first a bachelor's and then master or doctor's degrees in these subjects. Thus a degree was only a step on the way to becoming a fully qualified master – hence the English word "graduate", which is based on the Latin gradus ("step").

Today the terms "master", "doctor" (from the Latin "teacher") and "professor" signify different levels of academic achievement, but in the Medieval university they were equivalent terms, the use of them in the degree name being a matter of custom at a university. (Most universities conferred the Master of Arts, although the highest degree was often termed Master of Theology or Doctor of Theology depending on the place).

The earliest doctoral degrees (theology - Divinitatis Doctor (D.D.), philosophy - Doctor of philosophy (D.Phil., Ph.D.) and medicine - Medicinæ Doctor (M.D., D.M.) reflected the historical separation of all University study into these three fields. Over time the D.D. has gradually become less common and studies outside theology and medicine have become more common (such studies were then called "philosophy", but are now classified as sciences and humanities - however this usage survives in the degree of Doctor of Philosophy).

2. Прочитайте текст и выделите существенно значимую научную и второстепенную информацию.

Summary Making

Summaries are often found in academic work. A summary is the shortest account of the main content and conclusions of the original text. In fact it is enumeration of the main thematic point of the original paper which is made up of the words and phrases borrowed from the text and your own wording of them into a very small number of sentences.

When writing a summary, you may adhere to the following plan:

- 1) the heading;
- 2) the theme of the paper;
- 3) the key problems (thematic points) discussed;
- 4) the conclusion at which the author arrives.

The manner of presenting the material is very concise and it tends to be critical. The summary writer appreciates the material from his point of view and uses as a rule a wide range of clichés, which can be divided into several groups:

- 1) those introducing the heading and the author:

The article (text) is head-lined ...

The head-line of the article (I have read) is ...

The article is entitled ...

The author of the article (text) is ...

The article is written by ...

- 2) those introducing the leading theme of the original paper:

The text deals with ...

The article is devoted to...

The chapter is about..

The article touches upon...

- 3) those drawing the reader's attention to the major points of the contents:

The author emphasizes the idea of...

The author points out that ...

Attention is drawn to the fact...

In the opinion of the author it is .

- 4) those introducing secondary information:

Further the author reports

The author states...

The article goes on to say...

According to the text ...

5) those forming a conclusion to which the reader's attention is drawn:

The author comes to the conclusion that...

The author concludes by saying ...

The basic approach of the author is that, etc.

Примерный ответ:

Science: The Endless Resource

Our future demands investment in our people, institutions and ideas. Science is an essential part of that investment, an endless and sustainable resource with extraordinary dividends. The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in the youth. These responsibilities are the proper concern of the Government, for they vitally affect health, jobs and national security

The bedrock wisdom of this statement has been demonstrated time and again in the intervening half century. The return from public investments in fundamental science has been enormous, both through the knowledge generated and through the education of an unmatched scientific and technical workforce. Discoveries in mathematics, physics, chemistry, biology and other fundamental sciences have seeded and have been driven by important advances in engineering, technology, and medicine.

The principal sponsors and beneficiaries of scientific enterprise are people.

Their continued support, rooted in the recognition of science as the foundation of a modern knowledge-based technological society, is essential. This investment has yielded a scientific enterprise without peer, whether measured in term of discoveries, citations, awards and prizes, advanced education, or contributions to industrial and informational innovation. Scientific strength is a treasure which we must sustain and build on for the future.

To fulfill our responsibility to future generations by ensuring that our children can compete in the global economy, we must invest in the scientific enterprise at a rate commensurate with its growing importance to society. That means we must provide physical infrastructure that facilitates world class research, including access to cutting-edge scientific instrumentation and to world-class information and communication systems. We must provide the necessary educational opportunities for each of our citizens. Failure to exercise our responsibility will place our children's future at risk.

Science does indeed provide an endless frontier. Advancing that frontier and exploring the cosmos we live in helps to feed our sense of adventure and our passion for discovery. Science is also an endless resource: in advancing the frontier, our knowledge of the physical and living world constantly expands. The unfolding secrets of nature provide new knowledge to address crucial challenges, often in unpredictable ways. These include improving human health, creating breakthrough technologies that lead to new industries and high quality jobs, enhancing productivity with information technologies and improved understanding of human interactions, meeting our national security needs, protecting and restoring the global environment, and feeding and providing energy for a growing population.

The challenges of the twenty-first century will place a high premium on sustained excellence in scientific research and education. We approach the future with a strong foundation, built by the wise and successful stewardship of this enterprise over many decades, and with an investment strategy that was framed as three interconnected strategic goals:

- Long term economic growth that creates jobs and protects the environment;
- A government that is more productive and more responsive to the needs of its citizens;
- World leadership in basic science, mathematics, and engineering.

Our policies in these areas should be working to prepare the future.

Our future demands investment in our people, institutions and ideas.

Science is an essential part of that investment. The Government should accept new responsibilities for promoting the flow of new scientific knowledge. The bedrock wisdom of this statement has been demonstrated time and again in the intervening half century. The principal sponsors and beneficiaries of scientific enterprise are people. Scientific strength is a treasure which we must sustain and build on for the future. To fulfill our responsibility to future generations, we must invest in the scientific enterprise at a rate commensurate with its growing importance to society. Science does

indeed provide an endless frontier. We approach the future with an investment strategy that was framed as interconnected strategic goals: long term economic growth; a more productive government and world leadership in basic science, mathematics, and engineering. The challenges of the twenty-first century will place a high premium on sustained excellence in scientific research and education. Our policies in these areas should be working to prepare the future.

Summary

The text under discussion is entitled *Science: The Endless Resource*. It deals with the role of science in modern life. First, it is stressed the Government should accept new responsibilities for promoting the flow of new scientific knowledge. Attention is drawn to the fact that fundamental science discoveries have seeded important advances in the society, scientific knowledge being an endless resource affecting health, jobs and national security. It is reported that unfolding secrets of nature provides new knowledge to address crucial challenges. The text goes on to say that we must provide physical infrastructure and educational opportunities that facilitate world class research. The author concludes that challenges of the twenty-first century will place a high premium on excellence in scientific research and education. To my mind, the main idea of the text is to show that science is the foundation of a modern knowledge-based technological society.

3. Составьте аннотацию научной статьи.

Примерный ответ:

Laser-based lidar (light detection and ranging) has also proven to be an important tool for oceanographers. While satellite pictures of the ocean surface provide insight into overall ocean health and hyperspectral imaging provides more insight, lidar is able to penetrate beneath the surface and obtain more specific data, even in murky coastal waters. In addition, lidar is not limited to cloudless skies or daylight hours. “One of the difficulties of passive satellite-based systems is that there is watersurface reflectance, water-column influence, water chemistry, and also the influence of the bottom”, said Chuck Bostater, director of the remote sensing lab at Florida Tech University (Melbourne, FL). “In shallow waters we want to know the quality of the water and remotely sense the water column without having the signal contaminated by the water column or the bottom”. A typical lidar system comprises a laser transmitter, receiver telescope, photodetectors, and range-resolving detection electronics. In coastal lidar studies, a 532-nm laser is typically used because it is well absorbed by the constituents in the water and so penetrates deeper in turbid or dirty water (400 to 490 nm penetrates deepest in clear ocean water). The laser transmits a short pulse of light in a specific direction. The light interacts with molecules in the air, and the molecules send a small fraction of the light back to telescope, where it is measured by the photodetectors.

Abstract (Summary). The text focuses on the use of laser-based lidar in oceanography. The ability of lidar to penetrate into the ocean surface to obtain specific data in murky coastal waters is specially mentioned. Particular attention is given to the advantage of laser-based lidars over passive satellite-based systems in obtaining signals not being contaminated by the water column or the bottom. A typical lidar system is described with emphasis on the way it works. This information may be of interest to research teams engaged in studying shallow waters.

2.2 Дополнительное чтение профессионально ориентированных текстов и выполнение заданий на проверку понимания прочитанного

№1

Job Application Forms

When you apply for a job, you will be asked to send your CV (resume), together with a letter or e-mail of application. It is important to know how to write a good resume, or a summary of background

and qualifications, and a letter of application (a cover letter, a letter of interest). All these skills can improve your chances for employment.

If you are applying for a new work place you have to send your CV (curriculum vitae) or Resume, the Application (Cover) Letter, and the Letter of Recommendation that are expected in such cases.

Most applicants for white-collar jobs get in touch with employers by mail (email). A letter to an employer should be type-written. In the application letter, introduce yourself and explain why you are writing. Briefly indicate an experience and skills you have that relate to the kind of job you are seeking.

Include your address and telephone number so that the employer can reach you. If you contact an employer by telephone, try to provide the same information that you would cover in a letter.

A resume or a CV is a summary of your history and professional qualifications. Most employers consider several applicants for each job opening.

Thus, the employer has to consider two sets of qualifications if he wants to choose from among the applicants: professional qualifications and personal characteristics. A candidate's education, experience and skills are included in the professional qualifications. These can be listed in a resume or summary of your background.

Employers often receive a lot of applications for a job, so it is very important to make sure that your CV and job application letter create the right impression and present your personal information in a brief, well-structured, and attractive way. A CV should be clear, with a limited number of main sections, so that an employer can pinpoint the information they are looking for quickly and easily.

You do not need to give a lot of details.

The resume usually consists of the following parts: Personal, Education, Work Experience, Interests and Skills, Hobbies.

Here is how you should organize your resume:

1. Your name, address and phone number go at the top.

2. Under **Personal** you write:

a) when and where you were born;

b) your marital status (married, single or divorced), your children;

c) citizenship.

3. Under **Education** you describe:

a) University (school) you finished and the years of study (for example 2010-2014 The State University of Architecture and Civil Engineering of Voronezh);

b) the diplomas and degrees obtained, also mention the subject (e.g. The State University of Voronezh, Economics);

c) a higher degrees (e.g. Master; Ph.D), and the university which granted it.

4. **Work Experience:**

List the jobs, the years you worked, the position you held. This should be presented in the chronological order starting from the last job.

If you are a research scientist or deal with studies, you should list publications and mention in brackets their total number.

In case you have no work experience in the field, mention your summer jobs, extracurricular activities, awards.

5. **Interests and Skills:**

Include the foreign languages you speak, computer skills, extensive travel, particular interests or professional membership (for example, if you are after a job in computer programming, mention it).

6. The last is **Hobbies:**

It is good to mention here a hobby that can help get the job you are after (e.g. playing chess, reading).

It should be noted that a resume (CV) can be structured differently and may vary in length from one page to three.

Send your Resume, along with an Application (Cover) Letter and a Letter of Recommendation to a specific person. The person should be the top person in the area where you want to work. Refer him (her) to your Resume and ask for an interview.

The samples of a Resume (CV), an Application (Cover) Letter (a Letter of Interest) and a Letter of Recommendation:

Application Letter

8 September, 2014

Dear Mr. Jones,

I am writing to apply for the job (position) of an accountant advertised in yesterday's "Financial Times". I enclose my Resume and a Letter of Recommendation from Mr. J. Smith of Smith and Sponsor Bank, Manchester.

I have recently moved to your town and feel that my qualifications would enable me to be a productive member of your company.

I am available for an interview.

I look forward to hearing from you.

Yours sincerely

Letter of Recommendation

19 November, 2014

Dear Mr. Jones,

Having known Mrs. Biggins for three years as a staff-member of my department, I am pleased to write this Letter of Recommendation for her.

During the years that Mrs. Biggins worked with us she always excelled in whatever activity she undertook.

It is important to mention here that she has good working knowledge of French and German and speaks both languages fluently. I also want to emphasize her computer skills.

Mrs Biggins has my fullest support and I would be pleased to provide further information if necessary.

Yours sincerely,

Post-Reading

1. Explain the following.

- 1) to apply for a job
- 2) a summary of background and qualifications
- 3) a white-collar job
- 4) job opening
- 5) two sets of qualifications
- 6) to pinpoint the information
- 7) extracurricular activities

2. Match the English word combinations with the Russian equivalents.

- | | |
|--------------------------------|--|
| 1. as advertised | a) в вашем распоряжении для интервью |
| 2. broaden my experience | b) ждать ответа |
| 3. my CV is enclosed | c) основываться на объявлении в газете |
| 4. available for the interview | d) расширить свой опыт |
| 5. hearing from you | e) прилагать свое резюме |

3. Fill the gaps with the suitable words: *position, wide, to apply, fluently, ideally, in.*

I wish _____ the position of a salesman as advertised _____ Tuesday's Herald Tribune. This is a _____ for which I believe I am _____ suited. I speak Spanish _____ and have _____ experience of working abroad.

4. Answer the questions below.

- What information does an application letter usually include?
- Why is it important to send both an application letter and a CV to the job a person applies for?
- In what cases do people have to write a resume?
- How is a resume structured?
- Should the resume you write be a detailed personal history or a summary of your personal history and qualifications?

Job interview

Study the most common sample questions at the job interview and the answers to them (pay attention to comments given in brackets).

1. How would you describe yourself? (Also: What are your strengths / positive traits? Why should we hire you?)

- I consider myself hardworking / reliable / dependable / helpful / outgoing / organised / honest/ cooperative.

- I'm a team-player / an experienced team-leader / a seasoned (experienced) professional / a dedicated worker.

- I'm good at dealing with people / handling stress.

- I pay attention to details.

- I understand my customers' needs.

- I learn quickly and take pride in my work.

- I love challenges and getting the job done.

2. What kind of qualifications do you have?

- I graduated in IT from the University of London.

- I hold a master's degree (MA) / a bachelor's degree (BA) in Modern Languages from the University of New York.

- I took a one year accounting training program at Oxford College.

- I haven't done any formal training for this job, but I have worked in similar positions and have ten years of experience in this field.

3. Why did you leave your last job?

- I was laid off / made redundant, because the company relocated / downsized / needed to cut costs.

- I resigned from my previous position, because I didn't have enough room to grow with my employers.

- I wanted to focus on finding a job that is nearer to home / that represents new challenges / where I can grow professionally / that helps me advance my career.

4. What do you do in your current role?

- I'm responsible for the day-to-day running of the business / for recording and conveying messages for the departments.

- I ensure that high standard of customer care is maintained.

- I liaise with the Business Development and Business Services Units.

- I deal with incoming calls and correspond with clients via e-mails.

- I'm in charge of the high-priority accounts.

5. What relevant experience do you have? (It might be a good idea to revise Present Perfect Simple and Continuous to talk about experiences you've had/ actions that you started in the past and are still in progress.)

- I have worked as a Sales Representative for several years.

- I have good organizational skills as I have worked as an Event Organizer / Personal Assistant for the last six years.

- I have great people skills: I've been working in Customer Service and been dealing with complaints for five years.

6. Why would you like to work for us?

- I would like to put into practice what I learned at university.

- I would like to make use of the experience I have gained in the past ten years.

- I believe that your company will allow me to grow both professionally and as a person.

- I've always been interested in E-Commerce / Marketing / Computer Programming and your company excels (is one of the best) in this field.

7. What are your weaknesses / negative traits?

- I'm a perfectionist and I may be too hard on myself or my co-workers sometimes.

- I might need to learn to be more flexible when things are not going according to plan. This is something I'm working on at the moment.

- I occasionally focus on details instead of looking at the bigger picture. I'm learning how to focus on the overall progress as well.

8. When can you commence employment with us? (When can you start work?)

- I will be available for work in January, next year.

- I can start immediately.

- I have to give three weeks' notice to my current employer, so the earliest I can start is the first of February.

9. Do you have any questions?

- What would be the first project I'd be working on if I was offered the job?

- Who would I report to? Who would I be working closely with?

- Are there any benefits your company offers its employees?

- When will I get an answer? How soon can I start?

Additional sample questions

Questions about your Qualifications

>>What can you do for us that someone else can't do?

>>What qualifications do you have that relate to the position?

>>What new skills or capabilities have you developed recently?

>>Give me an example from a previous job where you've shown initiative.

>>What have been your greatest accomplishments recently?

>>What is important to you in a job?

>>What motivates you in your work?

>>What have you been doing since your last job?

>>What qualities do you find important in a coworker?

Questions about your Career Goals

>>What would you like to be doing five years from now?

>>How will you judge yourself successful? How will you achieve success?

>>What type of position are you interested in?

>>How will this job fit in your career plans?

>>What do you expect from this job?

>>Do you have a location preference?

>>Can you travel?

>>What hours can you work?

>>When could you start?

Questions about your Work Experience

>>What have you learned from your past jobs?

>>What were your biggest responsibilities?

>>What specific skills acquired or used in previous jobs relate to this position?

>>How does your previous experience relate to this position?

>>What did you like most/least about your last job?

>>Whom may we contact for references?

Questions about your Education

>>How do you think your education has prepared you for this position?

>>What were your favorite classes/activities at school?

>>Why did you choose your major?

>>Do you plan to continue your education?

E-mail writing has become a large part of modern communication, particularly in business. The world has become much smaller now that we have the ability to send and receive e-mail messages over great distances at an incredible speed. However e-mail was originally used as an informal means of communication. Therefore business e-mail letters are less formal in style than ordinary business letters.

E-mail is short for electronic mail. E-mail correspondence gets from one place to another in a matter of minutes. Connecting to the Internet provides you with e-mail services and an e-mail address which looks like this: *nickname@someplace.com* (@ means *at*, and *com* indicates the domain, in this case, a company). The Internet is a communication network that links computers all around the world via modems. Companies send documents from one place to another in minutes. E-mail is an up-to-date method of transmitting data, text files, and digital photos from one computer to another over the Internet. And now e-mails have become one of the most widely used forms of business and personal communication. E-mails are quick, so they are good for chatting, inviting people out, keeping in touch and doing business.

E-mails do not necessarily contain all the elements important for business letters. So e-mails are usually shorter and it takes less time to compile and send them. The e-mail language is much closer to spoken English than traditional business correspondence style.

Information about the sender and the receiver (addressee) appears at the top in a special frame – so the writer doesn't have to use traditional greetings. *Mr Black, Dear Peter, Peter* are all acceptable ways of starting an e-mail.

As e-mails are designed for speed, they usually avoid the formal expressions used in letters, and people often do not write in complete sentences using abbreviations. A message should be short to fit on one screen, whenever possible, thus keeping all important information visible at once. Be sure your message is easy to answer.

You can end your e-mail with:

Best wishes

All best wishes

Best regards

Regards

Yours

To people you know well, you can end with:

All the best

Best

People often sign e-mail with their first name.

There are a few important points to remember when composing e-mail, particularly when the e-mail's recipient is someone who does not know you.

- Include a meaningful subject line; this helps clarify what your message is about.
- Open your e-mail with a greeting like *Dear Dr. Jones*, or *Ms. Smith*.
- Use standard spelling and punctuation.
- Don't write unnecessarily long e-mails (4 or 5 paragraphs). Write clear, short paragraphs.
- In business e-mails, try not to use abbreviations such as PLS (please) and BTW (by the way).
- Finish with a closing decision, hope or apology.
- Include a Signature Block in every e-mail – your name, title, business address, telephone number, fax numbers, e-mail address and website address.

Be polite and give as many contact details as possible so that the reader can contact you in different ways.

Even in today's modern age of the Internet, it is still necessary to send and receive faxes. Most companies, large or small, have a fax machine. This allows them to send facsimiles of any document. A fax message is the message that is sent or received over a fax machine (phone lines are used) or online fax service. The word *fax* comes from the word *facsimile* standing for *perfect copy*.

The original document is scanned with a fax machine; the information is then transmitted as electrical signals through the telephone system. A fax message is often sent when particular official

correspondence needs to be sent or received urgently and it is not possible to send the documents via email.

Post-Reading

1. Explain the following.

- 1) an e-mail message
- 2) in a matter of minutes
- 3) a communication network
- 4) an up-to-date method
- 5) personal communication
- 6) a sender and a receiver
- 7) subject line
- 8) a Signature Block

2. Match the pairs of synonyms from A and B and translate them.

| A | B |
|------------|---------------|
| 1. current | a. transmit |
| 2. send | b. reply |
| 3. include | c. contain |
| 4. answer | d. up-to-date |

3. Make the sentences complete by translating the words in brackets.

1. We have come to deliver a (сообщение).
2. They have supplied (современный) equipment.
3. I sent the documents (с помощью) fax.
4. I will be able to (пересылать) that email to you.

4. Complete the sentences choosing the best variant corresponding to the contents of the text.

1. The most widely used form of communication is ...
 - a) a fax message.
 - b) an email.
 - c) a business letter.
2. The symbol @ is followed by ...
 - a) the person's name.
 - b) headers and footers.
 - c) the domain.
3. A fax machine processes a text as a ...
 - a) a graphic image.
 - b) a bit map.
 - c) electrical signals.
4. A fax messages faces a competition from ...
 - a) modern technologies.
 - b) e-mails.
 - c) business letters.

5. Answer the questions below.

What are the advantages and disadvantages of e-mails?

Are e-mail letters as formal in style as ordinary letters?

What are the rules for writing e-mails?

What is the structure of an e-mail?

Do you know what the symbol @ means?

What is the procedure of sending a fax message?

Modern academic education in our country comprises four stages: Bachelor's degree, Specialist's degree, Master's degree, Postgraduate degree. Academic degrees abroad differ in many ways which is the point of our further discussion.

A degree is an academic qualification awarded on completion of a higher education course (a first degree, usually known as Bachelor's degree) or a piece of research (a higher/further degree, doctorate and so on). There exists considerable diversity of degrees in various countries. But in spite of the lack of equivalence of degrees some similarities can be found among certain groups of countries, particularly those of the British Commonwealth, continental Europe, America and the Far East.

One can distinguish the principal types of academic degrees – bachelor, master, and doctor which represent different levels of academic achievements. The naming of degrees eventually became linked with the subject studied, arts is used for the humanities, science – for natural and exact sciences.

The Bachelor's Degree is the oldest and best known academic degree. Some varieties of bachelor's, or baccalaureate, degrees are Bachelor of Arts (BA) degree and Bachelor of Science (BSc). Abbreviations vary between institutions. Other baccalaureate degrees offered by most universities are Bachelor of Education, Bachelor of Music, Bachelor of Business Administration, Bachelor of Divinity, Bachelor of Home Economics.

The Bachelor's degree can be attained by students who pass their university examinations, or in some cases other examinations of equivalent level. This normally involves at least three years of full-time study after passing the advanced level certificate of education at the age of about eighteen, so most people who become BA, BSc, etc. do so at the age of at least twenty-one. First degrees in medicine require six years of study, some others four.

It is now quite usual for students in subject such as engineering to spend periods during their degree courses away from their academic studies, in industrial location so that they may get practical experience. A student of a foreign language normally spends a year in a country where that language is spoken. Bachelors' degrees are usually awarded on the basis of answers to several three-hour examinations together with practical work or long essays or dissertations written in conjunction with class work. Degrees are classified. About a tenth (or less) of candidates win first-class, honours degrees, three quarters - second-class, and the rest - third class, or pass without fail. A person studying for a degree at a British university is called ***an undergraduate***.

About 33 per cent of students continue to study for ***degrees of Master*** (of Arts, Science, Education, Business Administration, Music, Fine Arts, Philosophy, etc.). About 45 varieties of Master of Arts and 40 varieties of Master of Science degrees are reported. The degree of Master in general requires one or two further years of study, with examination papers and substantial dissertation. Bachelors' and Masters' degree can be conferred "with honours" in various classes and divisions, or "with distinction". This is indicated by the abbreviation "(Hons)" and is often a prerequisite for progression to a higher level of study.

A minority (about 15 per cent) goes on further, preparing theses which must make original contributions to knowledge, for the most advanced degree of ***Doctor of Philosophy (Phd) or Doctor of Science (DSc)***. Abbreviations for degrees can place the level either before or after the faculty or discipline depending on the institution. For example, DSc and ScD both stand for the doctorate of science.

Doctor's degrees in many foreign countries are of two distinct types: ***professional or practitioner's degrees, and research degrees***.

The former represent advanced training for the practice of various professions, chiefly in medicine and law. The principal ones are Doctor of Sc. Medicine, Doctor of Dental Science of Dental Surgery, Doctor of Veterinary Medicine, Doctor of Pharmacy, and Doctor of Jurisprudence. These degrees carry on implication of advanced research.

Quite different in character are the research doctorates which represent prolonged periods of advanced study, usually at least three years beyond the baccalaureate, accompanied by a dissertation designed to be a substantial contribution to the advancement of knowledge. The most important of these is the Doctor of Philosophy, which represents advanced research in any major field of knowledge.

Second in importance and much more recent as a research degree is the Doctor of Sc. Education (Ed.D.) It was first awarded by Harvard in 1920, but was preceded by the equivalent Doctor of Pedagogy first conferred by New York University in 1891. The only other earned doctorates of the research type currently conferred by 10 or more institutions are the Doctor of the Science of Law and the Doctor of Business Administration.

Postgraduate Training Programs

All further education which comes after baccalaureate can be regarded as postgraduate education. It presupposes carrying a lot of research work, acquiring knowledge of new methodologies and new trends. It may lead to either a Master's degree (a three-year program of study) or PhD (usually a two-year course of study).

Postgraduate programmes are either research degrees or taught courses. Taught courses last one or more years and are either designed so that you deepen your knowledge gained from your first degree or for you to convert your expertise to another field of study. Examples of these include changing to law to become a solicitor and training to become a teacher.

Degrees by instruction are very similar to undergraduate courses in that most of the time is devoted to attending lectures. This may take up the first eight or nine months of the course and is followed by written examinations. A period of research lasting from two or three months usually follows and the results of it are presented in the form of a thesis. Finally, an oral examination is held, lasting perhaps an hour or two, to test the knowledge accumulated throughout the year. Most programmes, which involve classes and seminars lead up to a dissertation.

Research course is quite a different type of study from a taught course. First of all it lasts longer, for about three years providing Master's or doctorate qualifications. They allow you to conduct investigations into your own topic of choice and are of use in jobs where there are high levels of research and development.

The most well-known research qualification is the Doctor of Philosophy (PhD, a three-year study programme). There is a shorter version called a Master of Philosophy (MPhil) which takes the minimum amount of time of two years. Both of these qualifications require the students to carry out a piece of innovative research in a particular area of study. Also possible is the research based on Master of Science (MSc.) and Master of Arts (MA) degrees. A recent development is the Master of Research (MRes), which provides a blend of research and taught courses in research methods and may be taken as a precursor to a PhD.

It is a common practice for students to be registered initially for the MPhil and to be considered for transfer to the PhD after the first year of study, subject to satisfactory progress and to a review of the proposed research. All research degree programmes involve an element of research training designed to ensure that students are equipped with the necessary skills and methodological knowledge to undertake original research in their chosen field of study. The training programme includes the development of generic skills relevant to the degree programme and a future career. Although the training element is not a formal part of the assessment for the degree, it constitutes an important basis for research and may take up a significant part of the first year.

The start of a research degree involves a very extensive survey of all previous works undertaken in that area. At the same time, if a student is planning to carry out any practical experimentations, the necessary equipment must be obtained.

This preliminary part of the study can take up to six months, but it is important to note that the process of keeping up to date with other work going on in the subject must continue throughout the entire period of the research.

The next stage of a research course usually involves collecting information in some way. This might be through experimentation, in the case of arts, social sciences or humanities degree. The important thing is that something new must be found.

This second part of the procedure takes about two years in the case of a PhD. The research is written up in the form of a thesis during the final six months of the three-year period. Typically, this will

contain an introduction, methodology, results and discussion. As in the case with taught degrees, the research must then be examined orally. Occasionally, if the examiners are not completely happy with the work they may ask the candidate to rewrite parts of the thesis. Hopefully, a good supervisor will make sure this does not happen!

№4

Find a synonym in the box for the words or phrases in green in the sentences below.

establish reform naturalist headquarters

prestigious supervise expedition atlas

1. The researchers need to **start** a new laboratory.
2. A scientist's job is often considered **to have respect and give you influence**.
3. There is a need for **improvements** in our society.
4. The **journey to explore and do scientific research** was made in 1872.
5. Look up this city in the **book of maps**.
6. Could you **manage** the people on this project?
7. He's a **person who studies animals and plants**.
8. The **central office** can be found in Moscow.

The Russian Academy of Sciences (RAS)

In 1724, Peter the Great established the Academy of Sciences as part of his push for reform to strengthen Russia. He wished to make the country as economically and politically independent as possible and he was aware of how important scientific thought, along with education and culture, was to this. However, unlike other foreign organisations at that time, the Academy was a state institution, which Peter intended should offer scientists from any country the opportunity to do their research in complete freedom, as well as providing the opportunity for students to study under these famous people. The Academy officially opened in 1725.

Over the next three decades, work was done in many fields, among them, work on electricity and magnetism theory. Research enabled the development of mining, metallurgy, and other branches of Russian industry. Work was done in geodesy and cartography and 1745 saw the first atlas of Russia created.

From its earliest days, the Academy carried out mathematical research, which added greatly to the development of calculus, hydrodynamics, mechanics, optics, astronomy, and made discoveries in various fields, such as chemistry, physics and geology. In addition, expeditions in 1733-1742 and 1760-1770 helped contribute to the discovery of Russia's natural resources.

The 19th century was a time of many more contributions from the Academy. The Academy's naturalists were involved in voyages of discovery, including that of F.F. Bellingshausen and M.P. Lazarev in 1820, when Antarctica was discovered. In the fields of mathematics and physics, progress was furthered by N.I. Lobachevsky and his theory of non-Euclidean geometry as well as by P.L. Chebyshev who made progress in the field of probability, statistics and Number Theory. Other notable achievements were the invention of the radio, the creation of the periodic table of the chemical elements, the discovery of viruses and the cell mechanisms of immunity. In the 1890s and early 1900s, LP. Pavlov carried out experiments which resulted in the discovery of classical conditioning or conditioned reflexes. Clearly, throughout the 18th and 19th centuries and into the 20th century, the Russian Academy led the way in Russian science.

In 1925, the name of the Academy changed to the Academy of Sciences of the USSR. One of the achievements of the Academy was to help set up scientific research centres in all Soviet republics. The Academy also gave scientists the opportunity to work and study in different parts of the USSR and abroad. In 1934, its headquarters were moved to Moscow. At that time, it had 25 member institutions. The Academy continued to grow, reaching a high point of 260 member institutions. In 1991, after the breakup of the USSR, the Academy's name was changed to the Russian Academy of Sciences (RAS).

Today, the RAS supervises the research of a large group of institutions within Russia which focus on different research areas, including philosophy, botany, anthropology, palaeontology and archaeology

as well as nuclear physics, astrophysics, mathematics, computer engineering and many others. A special Internet system, called the Russian Space Science Internet (RSSI), which links over 3000 members, has also been set up.

Becoming a member of the RAS is not easy. Only scientific researchers who have done outstanding work or who have great potential are chosen to become members.

Last but not least, the RAS gives awards to members who have made significant discoveries. Its highest award is the Lomonosov Medal, named after the outstanding Russian scientist, writer and polymath of the 18th century. Many RAS award winners have later gone on to be awarded prestigious Nobel Prizes.

Read the text and decide if the following statements are true or false.

1. Peter the Great set up educational and cultural centres.
2. The Academy was unusual in not being a private interest.
3. The 19th century was a time of numerous expeditions to find Antarctica.
5. In the 20th century, the Academy changed name several times and moved its central office.
5. Nowadays, members are obliged to communicate via the Internet.

The Russian Academy of Sciences (RAS)

1. Основанная в 1724 году Петром Великим, Академия была открыта в 1725 году его вдовой Екатериной I и называлась Петербургской академией наук.

2. Академия предоставляла учёным из разных стран абсолютную свободу в проведении научных исследований.

3. С первых дней в Академии проводились исследования в области математики, которые внесли большой вклад в развитие математического анализа, гидродинамики, механики, оптики, астрономии, и привели к открытиям в таких областях, как химия, физика и геология.

4. Век девятнадцатый был веком многочисленных и важных открытий и члены Академии наук играли ведущую роль в развитии российской науки.

5. Среди выдающихся научных достижений числятся такие, как изобретение радио, создание Периодической системы элементов, открытие вирусов и клеточного механизма иммунитета.

6. Сегодня Российская академия наук координирует работу большой группы научно-исследовательских институтов по всей России, где ведутся научные исследования во многих областях.

7. Институт космических исследований Российской академии наук осуществил проект по созданию компьютерной сети, называемой Российская космическая научная сеть Интернет, объединяющей более 3000 членов.

Russian Nobel Prize winners in Physics and Chemistry

Match these words with their definitions.

1. superfluidity
 2. laser
 3. violence
 4. exception
 5. semiconductor
 6. heterostructure
 7. optoelectronics
 8. superconductor
- a. being able to transmit electrical current without resistance at very low or high temperatures
 - b. something which does not follow the normal pattern
 - c. material that can transmit electricity but not as well as metal
 - d. branch of electronics involving devices dealing with electromagnetic radiation
 - e. characteristic of matter which can flow endlessly without resistance
 - f. when there is just one boundary between material that can transmit electricity

- g. angry physical force
- h. device that produces intense, concentrated beam of light

Russian Nobel Prize winners in Physics and Chemistry

Because of its long history of supporting scientific research and education, Russia has produced a number of internationally recognised leaders in physics and chemistry.

The Russian Academy of Sciences (or the USSR Academy of Sciences, as it was called before 1991), played a major part in all their careers. With one exception, all were members of the Academy, carrying out their research and publishing their findings with the Academy's support.

1956 In 1956, Nikolay N. Semyonov was the first Russian to receive a Nobel Prize for Chemistry for his research into the mechanism of chemical reactions. He was trained as a physicist and chemist. During his career, working alone or with other distinguished scientists like Pyotr L. Kapitsa, he made many important discoveries and contributions to chemistry and physics. In 1931, Semyonov became the first director of the Institute of Chemical Physics of the Academy and was also one of the founders of the Moscow Institute of Physics and Technology (MIPT).

1958 The collaboration of Pavel A. Cherenkov, Igor Y. Tamm and Ilya M. Frank resulted in the discovery and description of the Cherenkov-Vavilov effect, a phenomenon which is very important in nuclear physics. For their work they received the Nobel Prize in 1958. All three of the scientists were professors at universities and the Academy's institutes and greatly influenced future generations of scientists.

1962 After receiving his doctoral degree from Leningrad University at the exceptionally young age of 19, Lev D. Landau went on to study abroad. When he returned to Russia, he became head of two of the Academy's institutes. Like Semyonov, he was also involved in founding the MIPT. He received the Nobel Prize for Physics in 1962, for his phenomenological theory of superfluidity in helium.

1964 Nikolay G. Basov and Aleksandr M. Prokhorov worked together on a project which led to the development of the laser and their receiving the 1964 Nobel Prize. Both worked at the Lebedev Institute of Physics (Basov was the Director from 1973-1988) and also taught at universities. Even though Prokhorov never became a member of the Academy, the Academy's General Physics Institute was renamed the A.M. Prokhorov General Physics Institute in his honour.

1978 Pyotr L. Kapitsa went to England after he had completed his studies at Petrograd Polytechnic Institute. He studied at Cambridge and also worked on various projects there. He returned to Russia in 1934 and continued his career there. He was also one of the founders of the MIPT. In addition, Kapitsa was a member of the Soviet National Committee of the Pugwash movement, a group of international scientists who wanted to use science for the good of humankind and not for violence and war. Kapitsa won the Nobel Prize for Physics in 1978, for his work on low-temperature physics.

2000 Zhores I. Alferov has been active in physics since graduating from the Electrotechnical Institute in Leningrad. He received the Nobel Prize for Physics in 2000, for the development of the semiconductor heterostructures used in high-speed electronics and optoelectronics.

2003 More recently, Russian Nobel Prize winners in 2003 were Vitaly L. Ginsburg and Alexei A. Abrikosov. Ginsburg, who holds a doctoral degree from Moscow State University, became the director of the Academy's Physics Institute after Igor Tamm. Ginsburg was influenced by Landau, with whom he had worked, and by Tamm, who had been his teacher. Alexei Abrikosov was educated at Moscow State University. He worked at the Landau Institute for Theoretical Physics for over 20 years (1965-1988) and also taught at Moscow State University during that time. They received the Nobel Prize for Physics for pioneering contributions to the theory of superconductors and superfluids.

Read the text and answer the questions in your own words.

1. How many Nobel Prize winners were members of the Academy?
2. Which scientists were among those who founded the Moscow Institute of Physics and Technology?
3. Which scientists, apart from Lev Landau, had things or places named after them?
4. Which scientists left the country to further their studies?
5. Who was the director of the Academy's Physics Institute before Vitaly Ginsburg?

Russian Nobel Prize winners in Physics and Chemistry

1. Николай Семёнов был первым русским учёным, получившим в 1956 году Нобелевскую премию по химии за разработку теории химических цепных реакций.

2. В 1958 году Павел Черенков, Игорь Тамм и Илья Франк получили Нобелевскую премию по физике за открытие и описание феномена, названного эффектом Вавилова-Черепкова, и имеющего большое значение для ядерной физики.

3. Лев Ландау был награжден Нобелевской премией в области физики в 1962 году за разработку теории сверхтекучести гелия II.

4. Николай Прохоров и Александр Басов в 1964 году получили Нобелевскую премию в области физики за новаторские исследования в области квантовой электроники, которые привели к созданию лазера.

5. За фундаментальные изобретения и открытия в области физики низких температур Пётр Капица был награждён в 1978 году Нобелевской премией.

6. Жорес Алфёров в 2000 году получил Нобелевскую премию по физике за разработку полупроводниковых гетероструктур, используемых в высокочастотной оптоэлектронике.

7. Виталий Гинзбург и Алексей Абрикосов разделили Нобелевскую премию по физике, полученную в 2003 году за создание теории сверхпроводимости и сверхтекучести.

№5

Complete the sentences below with words and phrases from the box.

accumulation of quantities integral calculus vital latter
chord distinction methodology infinitesimal differential calculus
vast tangent coordinate sake

1. A line segment joining two points on a curve is a
2. A ... is a line or surface that touches another.
3. The area of maths used to determine areas, volumes and lengths is called
4. The area of maths relating to changes in variable is called ...
5. If something is close to zero it is ...
6. You need to eat well for the ... of your health.
7. There is a ... amount of knowledge to learn in sciences.
8. There are two theories - one from ancient times and a modern one. The ... the modern one, is widely accepted now.
9. She claimed the ... of having solved the equation.
10. A ... is a number that identifies a position relative to a straight line.
11. ... is the system of methods followed in an area of study.
12. ... measures areas under a curve, distance travelled, or volume displaced.
13. If something is ..., it is of the utmost importance.

Gottfried Leibniz

Gottfried Leibniz was born and lived most of his life in Germany, he made visits to both Paris and London, for the sake of learning and study, but spent the vast majority of his working life as an employee of German royalty, as a philosopher, engineer and mathematician. It is for the latter that he is best remembered. His greatest achievement was as an inventor of calculus, the system of notation which is still in use today. Leibniz is remembered as an inventor, not the inventor of calculus. In England, Isaac Newton claimed the distinction, and was later to accuse Leibniz of plagiarism, that is, stealing somebody else's ideas but stating that they are original. Modern-day historians however, regard Leibniz as having arrived at his conclusions independently of Newton. They point out that there are important differences in the writings of both men. Newton, it must be said, was very protective of his achievements and jealous of others' success. It is important to mention that Leibniz published his writings on calculus three years before Newton published his most important work.

Leibniz was the first to use function to represent geometric concepts. Among other terms. Leibniz used what is now everyday language in mathematics to describe these concepts. Words such as tangent and chord, were first used by Leibniz. He also saw that linear equations in algebra could be arranged

into matrices. It was in this significant piece of work on calculus that he introduced mathematics and the world to the word coordinate. He also made important advances in algebra and logic in ways that still today, three hundred years later, have an impact on mathematics.

Leibniz importance for modern mathematics can be understood through his work, he was especially interested in infinitesimal calculus. This is an area of calculus developed from geometry and algebra. It is divided into two parts. There is differential calculus, which is concerned with measuring rates of change of quantities. And there is integral calculus, which studies the accumulation of quantities. That is, Leibniz was looking at ways of measuring the speed and the distance travelled, for example. Today, calculations of this type are used not only in mathematics but in every branch of science and in many fields which apply a scientific methodology, such as economics and statistics.

Despite the disagreements between Leibniz and Newton, modern mathematicians recognise each of them as being vital to the development of modern mathematics. Newton was certainly the first to apply calculus to the problems of physics. In mathematics itself, it is to Leibniz that we look for our system of writing equations and for the language we use to refer to the concepts. While both reached their understanding without the benefit of reading each other's work, it remains a fact that Leibniz was first to publish.

Read the text and answer the questions in your own words.

1. For what contribution to mathematics is Leibniz best remembered?
2. Who was Leibniz' main rival? About what did they disagree?
3. Which important geometrical terms did Leibniz invent?
4. What other areas of work also use Leibniz' calculus?
5. Who is considered more important for the development of modern mathematics?

Gottfried Leibniz

1. Считается, что Лейбниц является создателем математического анализа.
2. Он опубликовал свои работы по математическому анализу на три года ранее Ньютона.
3. Следует отметить, что Лейбниц был первым, кто использовал слова тангенс и хорда.
4. Лейбниц первым ввёл систему записи уравнений и современный математический язык.
5. Работы Лейбница в области анализа бесконечно малых представляют первостепенную важность.
6. Дифференциальное исчисление занимается измерением скорости изменения величин, тогда как интегральное исчисление изучает накопление величин.
7. Именно Готфрид Лейбниц внёс наибольший вклад в математический анализ и установил, что линейные уравнения могут быть преобразованы в матрицы.

Norbert Wiener

Complete the definitions below with words from the box.

cybernetics collaborative insight tend draw on elect via established imitate aspect

1. A feature or a side of something is a(n)
2. To ... means to copy.
3. The field of ... studies people and machines' practices and procedures to understand where they differ.
4. If work is ..., it is done by cooperating.
5. ... means by the use of.
6. If you have ... into something, you have special understanding.
7. To ... means to choose, perhaps for a position of responsibility.
8. If you ... something, you make use of a resource.
9. When you ... to do something, it is a habit you have.
10. If something is ..., it is made certain.

Norbert Wiener

Norbert Wiener, the famous applied mathematician, was born in 1894 in the USA and died in Stockholm, Sweden, in 1964. His father was a professor of Slavonic languages at Harvard. Norbert was a very intelligent child and his father was determined to make him a famous scholar. This is indeed what

he became, being awarded a PhD by Harvard at the age of 18. He also studied Philosophy, Logic and Mathematics at Cambridge and Gottingen.

His first important position was that of Instructor of Mathematics at MIT (Massachusetts Institute of Technology) in 1919, followed by that of Assistant Professor in 1929 and of Professor in 1931. Two years later, in 1933, he was elected to the National Academy of Sciences (USA), from which he resigned in 1941. In 1940 he started to work on a research project at MIT on anti-aircraft devices, a project which played an important part in his development of the science of cybernetics.

The idea of cybernetics came to Wiener when he began to consider the ways in which machines and human minds work. This led to the development of the idea of cybernetics, which is the study of the ways humans and machines process information, in order to understand their differences. It often refers to machines that imitate human behaviour. The term was coined from the Greek kubernetike which means the art of the steersman (the skill of a captain when controlling the ship). This idea made it possible to turn early computers into machines that imitate human ways of thinking, particularly in terms of control (via negative feedback) and communication (via the transmission of information).

Norbert Wiener was also deeply attracted to mathematical physics. This interest originated in the collaborative work that he did with Max Born in 1926 on quantum mechanics. But Wiener's interests were not limited to logic, mathematics, cybernetics or mathematical physics alone, as he was also familiar with every aspect of philosophy. In fact, he was awarded his doctorate for a study on mathematical logic that was based on his studies in philosophy. In addition to that, in a very different field, he wrote two short stories and a novel. Wiener also published an autobiography in two parts: *Ex-Prodigy: My Childhood and Youth* and *I Am a Mathematician*.

Norbert Wiener was an amazing mathematician, who was gifted with philosophical insight. In an age when scientists tended, and still tend, to specialise in their own very specific fields, this man was interested and involved in many different disciplines. Due to this, he was able to draw on many resources in his varied research, thus making him an incredibly successful applied scientist. Wiener was one of the most original and significant contemporary scientists and his reputation was securely established in the new sciences such as cybernetics, theory of information and biophysics.

Read the text and choose the correct answer.

1. Norbert Wiener's father
 - a. was awarded a PhD.
 - b. taught intelligent children.
 - c. was a language instructor.
2. Norbert Wiener began to think seriously about cybernetics
 - a. when he was at MIT.
 - b. when he was a science instructor.
 - c. after he resigned.
3. An example of cybernetics in action would be
 - a. a television
 - b. a computer
 - c. a ship
4. Wiener wrote a book about
 - a. himself
 - b. childhood
 - c. philosophy
5. According to the text, most scientists
 - a. know a lot about many different subjects,
 - b. are familiar with applied science,
 - c. deal with certain fields only.

Norbert Wiener

1. Норберт Винер был очень одарённым учеником и в 18 лет получил учёную степень доктора наук за диссертацию по проблемам математической логики.

2. В 1940-х годах Винер работал над устройствами противовоздушной обороны в Массачусетском технологическом институте (США), проектом, который сыграл важную роль в развитии Винером кибернетики.

3. Кибернетика, как идея, появилась в момент размышлений Винера о том, как работают машины и мозг человека.

4. Кибернетика занимается изучением процессов передачи информации живыми организмами и машинами.

5. Норберт Винер работал главным образом в областях логики, математики, кибернетики, математической физики и философии.

6. Благодаря тому, что Винер был специалистом во многих дисциплинах, он мог использоваться, в своих разнообразных научных исследованиях множество средств, что делало его поразительно успешным прикладным учёным.

7. Замечательным достижением XX столетия явилось создание машины, которая имитирует способ мышления человека.

№6

REPORTS AND PRESENTATIONS

Scientific report writing requires the use of certain techniques and conventions that are detailed, strict and not always easy to master. The main purpose of a scientific report is to communicate. A typical structure and style have evolved to convey essential information and ideas as concisely and effectively as possible. The main aim of the report is to state your opinion on the issue or to provide precise information about a practical investigation.

Audience. Assume that your intended reader has a background similar to yours before you started the project. That is, a general understanding of the topic but no specific knowledge of the details. The reader should be able to reproduce whatever you did by following your report.

Clarity of Writing. Good scientific reports share many of the qualities found in other kinds of writing. To write is to think, so a paper that lays out ideas in a logical order will facilitate the same kind of thinking. Make each sentence follow from the previous one, building an argument piece by piece. Group related sentences into paragraphs, and group paragraphs into sections. Create a flow from beginning to end.

Style. It is customary for reports to be written in the third person or the 'scientific passive', for example, instead of writing 'I saw', one writes 'it was observed'; rather than, 'I think that ...' one writes 'it could be stated that ...' and so on. Avoid jargon, slang, or colloquial terms. Define acronyms and any abbreviations not used as standard measurement units. Most of the report describes what you did, and thus it should be in the past tense (e.g., "values were averaged"), but use present or future tense as appropriate (e.g., "x is bigger than y" or "that effect will happen"). Employ the active rather than passive voice to avoid boring writing and contorted phrases (e.g., "the software calculated average values" is better than "average values were calculated by the software").

Typical Sections. There are four major sections to a scientific report, sometimes known as IMRAD – Introduction, Methods, Results, And Discussion. Respectively, these sections structure your report to say "here's the problem, here's how I studied it, here's what I found, and here's what it means." There are additional minor sections that precede or follow the major sections including the title, abstract, acknowledgements, references, and appendices. All sections are important, but at different stages to different readers. When flipping through a journal, a reader might read the title first, and if interested further then the abstract, then conclusions, and then if he or she is truly fascinated perhaps the entire paper. You have to convince the reader that what you have done is interesting and important by communicating appeal and content in all sections.

Title of the report. Convey the essential point of the paper. Be precise, concise, and use key words. Avoid padding with phrases like "A study of ..." or headlines like "Global warming will fry Earth!" It is usual to write the title as one phrase or sentence. A good title is brief and informative. Titles should not exceed 10 or 12 words, and they should reveal the content of the study. Many titles take one of these two forms: a simple nominal sentence (Asymmetric Information, Stock Returns and Monetary

Policy) or beginning with The effect of (for example, The Effects of Financial Restrictions and Technological Diversity on Innovation). Sometimes it is impossible to make word-by-word translation from Russian into English, for example, Об оценке работы фирмы should be translated as Assessing the Firm Performance or К проблеме хеджевых фондов is translated as Hedge Funds. Sometimes the title contains two parts, the first one is the topic, while the second is its specific details (International Financial Contagion: Evidence from the Argentine Crisis of 2001- 2002). If the report is of a very problematic issue its title may be in the form of a question (Was There a Credit Crunch in Turkey?)

Introduction. This section should contain a brief history of the research problem with appropriate references to the relevant literature and the purpose of the study. Introduce the problem, moving from the broader issues to your specific problem, finishing the section with the precise aims of the paper (key questions). Craft this section carefully, setting up your argument in logical order. Refer to relevant ideas/theories and related research by other authors. Answer the question "what is the problem and why is it important?" The introduction should also explain whether the study is an extension of a previous one, or whether a completely new hypothesis is to be tested. The final section of the introduction generally includes a list of all the hypotheses being tested in the study. The results of the current study are not to be referred to in the introduction.

You may use the following expressions:

| | | |
|------------|-------------|--|
| This paper | aims at | Настоящий доклад имеет своей целью... |
| | deals with, | В настоящем докладе рассматриваются... |
| | considers | |
| | describes | В настоящем докладе делается описание... |
| | examines | В настоящем докладе исследуется ... |
| | presents | В настоящем докладе представлен... |
| | reports on | В настоящем докладе сообщается о ... |

Examples of an Introduction

A. There has been a European Union foreign policy, confirmed in constitutional form in the Union Treaty, since 1993. The first decade, most commentators agree, has proved to be difficult: 'painful and problematic' according to one. As the twenty-first century progresses, replete with an array of new challenges, the need for a reassessment, and perhaps reinvigoration of Union 'foreign and security policy' is widely argued. The purpose of this article is to provide both a retrospective, of the evolution of the Union's foreign policy so far, and a prospective, of the challenges which it presently faces.

B. This paper examines companies incorporated under the Companies Act 1985. Its purpose is to consider the suitability of such companies for not-for-profit-organisations ('NFPOs').

Methods. Explain how you studied the problem, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed, study area, etc. Provide enough detail for the reader to reproduce what you did. Include flowcharts, maps or tables if they aid clarity or brevity. Answer the question "what steps did I follow?" but do not include results yet. Here you may use such expressions as:

| | |
|--|---|
| A method of ...is proposed | Предлагается метод... |
| Data on... are discussed | Обсуждаются данные по ... |
| Present data encompass a period of ... | Настоящие данные охватывают период в |
| The design of the experiments was to reveal... | Эксперименты были направлены на выявление |
| | ... |
| The effect of... on... is discussed | Обсуждается влияние ... на ... |
| The methods used for ... are discussed | Описываются методы, используемые для ... |

Results. Explain your actual findings, using subheadings to divide the section into logical parts, with the text addressing the study aims. Tables are an easy and neat way of summarizing the results. An alternative or additional way of presenting data is in the form of line graphs, bar-charts, pie-charts, etc.

Graphs, charts and illustrations are referred to as 'figures' (for example, Fig. 1) in the text of the report. All figures should be numbered in order of appearance in the text. For each table or graph, describe and interpret what you see (you do the thinking -- do not leave this to the reader). Expressions to describe results obtained may be:

| | |
|---|--|
| The most important results are as follows | Самые важные результаты имеют следующий вид... |
| The results indicate the dominant role of | Результаты указывают на доминирующую роль... |
| The results of ... are discussed | Обсуждаются результаты ... |
| The results of observations are supported by... | Результаты наблюдений дополняются |

Discussion. This is the most difficult section of a report to write and requires considerable thought and care. Essentially it is a consideration of the results obtained in the study, guided by any statistical tests used, indicating whether the hypotheses tested are considered true or are to be rejected.

This is best thought of in three steps: the main results must be very briefly summarized; the procedure must be critically assessed and weaknesses noted; and a final evaluation of the results made in terms of the design, leading to a final judgment concerning the hypotheses being tested. The discussion can only refer to results, which are presented in the results section. Any detailed results which only appear in the appendixes cannot be discussed.

Evaluation of the results should include reference to other research with indications as to whether or not the current findings are in agreement with other findings (that is, reference is made to the introduction). The main conclusions reached should be summarized at the end of the discussion. Suggestions for follow-up research can also be given.

Discuss the importance of what you found, in light of the overall study aims. Stand back from the details and synthesize what has (and has not) been learned about the problem, and what it all means. Say what you actually found, not what you hoped to find. Begin with specific comments and expand to more general issues. Recommend any improvements for further study. Answer the question "what is the significance of the research?"

Important Note: this section is often combined with either the Results section or the Conclusions section. Decide whether understanding and clarity are improved if you include some discussion as you cover the results, or if discussion material is better as part of the broader summing up.

Conclusions. Restate the study aims or key questions and summarize your findings using clear, concise statements. Keep this section brief and to the point.

Acknowledgments. This is an optional section. Thank people who directly contributed to the paper, by providing data, assisting with some part of the analysis, proofreading, typing, etc. It is not a dedication; so don't thank Mom and Dad for bringing you into the world, or your roommate for making your coffee.

References. Within the text, cite references by author and year unless instructed otherwise, for example "Comrie (1999) stated that ..." or "several studies have found that x is greater than y (Comrie 1999; Smith 1999)." For two authors, list both names, and for three or more use the abbreviation "et al." (note the period) following the first name, for example "Comrie and Smith (1999)" or "Comrie et al. (1999)." Attribute every idea that is not your own to avoid plagiarism.

2.3 Подготовка доклада

Подготовьте доклад по одной из предложенных тем. Темы представлены в КОМ для данной дисциплины по соответствующему профилю подготовки магистров.

Правила предоставления информации в докладе

| | |
|--------|------------------------------------|
| Размер | A4 |
| Шрифт | Текстовый редактор Microsoft Word, |

| | |
|-----------------|---|
| | шрифт Times New Roman 12 |
| Поля | слева – 2 см., сверху и справа – 1,5 см., снизу – 1 |
| Абзацный отступ | 1,25 см устанавливается автоматически |
| Стиль | Примеры выделяются курсивом |
| Интервал | межстрочный интервал – 1 |
| Объем | 2 -3 страницы (до 10 минут устного выступления) |
| Шапка доклада | <i>Иванова Мария Ивановна</i> Екатеринбург, Россия ФГБОУ ВПО УГГУ, АТПМ-19 НАЗВАНИЕ ДОКЛАДА |
| | Список использованной литературы |

Краткое содержание статьи должно быть представлено на 7-10 слайдах, выполненных в PowerPoint.

2.4 Подготовка к тесту

Тест направлен на проверку сформированности лексических и грамматических навыков и речевых умений в рамках изученных тем при формировании иноязычной профессионально-ориентированной коммуникативной компетенции. Для успешного написания теста необходимо повторение лексических единиц, представленных н стр. 51-64.

2.5 Аннотирование и реферирование текстов по специальности

Read the text “Laser lidar” and study the summary to this text.

Laser-based lidar (light detection and ranging) has also proven to be an important tool for oceanographers. While satellite pictures of the ocean surface provide insight into overall ocean health and hyperspectral imaging provides more insight, lidar is able to penetrate beneath the surface and obtain more specific data, even in murky coastal waters. In addition, lidar is not limited to cloudless skies or daylight hours. “One of the difficulties of passive satellite-based systems is that there is watersurface reflectance, water-column influence, water chemistry, and also the influence of the bottom”, said Chuck Bostater, director of the remote sensing lab at Florida Tech University (Melbourne, FL). “In shallow waters we want to know the quality of the water and remotely sense the water column without having the signal contaminated by the water column or the bottom”. A typical lidar system comprises a laser transmitter, receiver telescope, photodetectors, and range-resolving detection electronics. In coastal lidar studies, a 532-nm laser is typically used because it is well absorbed by the constituents in the water and so penetrates deeper in turbid or dirty water (400 to 490 nm penetrates deepest in clear ocean water). The laser transmits a short pulse of light in a specific direction. The light interacts with molecules in the air, and the molecules send a small fraction of the light back to telescope, where it is measured by the photodetectors.

Abstract (Summary). The text focuses on the use of laser-based lidar in oceanography. The ability of lidar to penetrate into the ocean surface to obtain specific data in murky coastal waters is specially mentioned. Particular attention is given to the advantage of laser-based lidars over passive satellite-based systems iN obtaining signals not being contaminated by the water column or the bottom. A typical lidar system is described with emphasis on the way it works. This information may be of interest to research teams engaged in studying shallow waters.

THE CENTRALITY OF MARKETING

1. Most management and marketing writers now distinguish between selling and marketing. The ‘selling concept’ assumes that resisting consumers have to be persuaded by vigorous hard-selling techniques to buy non-essential goods or services. Products are sold rather than bought. The ‘marketing concept’, on the contrary, assumes that the producer’s task is to find wants and fill them. In other words, you don’t sell what you make, you make what will be bought. As well as satisfying existing needs, marketers can also anticipate and create new ones. The markets for the Walkman, video recorders,

videogames consoles, CD players, personal computers, the internet, mobile phones, mountain bikes, snowboards and genetic engineering, to choose some recent examples, were largely created than identified.

2. Marketers are consequently looking for market opportunities- profitable possibilities of filling unsatisfied needs or creating new ones in areas in which the company is likely to enjoy a differential advantage due to its distinctive competencies (the things it does particularly well). Market opportunities are generally isolated by market segmentation. Once a target market has, been identified a company has to decide what goods or services to offer. This means that much of the work of marketing has been done before the final product or service comes into existence. It also means that the marketing concept has to be understood throughout the company, e.g. in the production department of a manufacturing company as much as in the marketing department itself. The company must also take account of the existence of competitors who always have to be identified, monitored and defeated in the search for loyal customers.

3. Rather than risk launching a product or service solely on the basis of intuition or guesswork, most companies undertake market research or marketing research. They collect and analyze information about the size of a potential market, about consumers' reaction to particular product or service features, and so on. Sales representatives, who also talk to customers, are another important source of information.

4. Once the basic offer, e.g. a product concept, has been established, the company has to think about the marketing mix, i.e. all the various elements of a marketing program their integration, and the amount of effort that a company can expend on them in order to influence the target market. The best-known classification of these elements is the 'Four Ps': product, place, promotion and price. Aspects to be considered in marketing products include quality, features (standard and optional), style, brand name, size, packaging, services and guarantee. Place in marketing mix includes such factors as distribution channels, location of point of sale, transport, inventory size, etc. Promotion groups together advertising, publicity, sales promotion, and personal selling, while price includes the basic list price, discounts, the length of the payment period, possible credit terms, and so on. It is the job of a product manager or a brand manager to look for ways to increase sales by changing the marketing mix.

5. It must be remembered that quite apart from consumer markets (in which people buy products for direct consumption) there exists an enormous producer or industrial or business market, consisting of all the individuals and organizations that acquire goods or services that are used in the production of other goods, or in the supply of services to others. Few consumers realize that the producer market is actually larger than the consumer market, since it contains all the raw materials, manufactured parts and components that go into consumer goods, plus capital equipment such as buildings and machines, supplies such as energy and pens and papers, and services ranging from cleaning to management consulting, all of which have to be marketed. There is consequently more industrial than consumer marketing. There is consequently more industrial than consumer marketing, even though ordinary consumers are seldom exposed to it.

First summary

Marketing means that you don't have to worry about selling your product, because you know it satisfies a need. Companies have to identify market opportunities by market segmentation: doing market research, finding a target market, and producing the right product. Once a product concept has been established, marketers regularly have to change the marketing mix-the product's features, its distribution, the way it is promoted, and its price- in order to increase sales. Industrial goods- components and equipment for producers of other goods- have to be marketed as well as consumer goods.

Second summary

The marketing concept has now completely replaced the old-fashioned selling concept. Companies have to identify and satisfy the needs of particular market segments. A product's features are often changed, as are in price, the places in which it is sold, and the way in which it is promoted. More important than the marketing of consumer goods is the marketing of industrial or producer goods.

Third summary

The marketing concept is that a company's choice of what goods and services to offer should be based on the goal of satisfying consumers' needs. Many companies limit themselves to attempting to satisfy the needs of particular market segments. Their choice of action is often the result of market

research. A product's features, the methods of distributing and promoting it, and its price, can all be changed during the course of its life, if necessary. Quite apart from the marketing of consumer products, with which everybody is familiar, there is a great deal of marketing of industrial goods.

Group work (expert group): Each group will read one of the texts about some systems of higher education and will make a summary of its specific features.

SYSTEMS OF HIGHER EDUCATION IN FRANCE AND GERMANY

Both France and Germany have systems of higher education that are basically administered by state agencies. Entrance requirements for students are also similar in both countries. In France an examination called the baccalauréat is given at the end of secondary education. Higher education in France is free and open to all students who have passed this examination. A passing mark admits students to a preparatory first year at a university, which finishes in another, more strict examination. Success in this examination allows students to attend universities for other three or four years until get the first university degree, called a licence in France.

Basic differences, however, distinguish these two countries' systems. French educational districts, called academies, are under the direction of a rector, who is appointed by the national government and is in charge of the university. The uniformity in curriculum in the country leaves each university with little to distinguish itself. That is why many students prefer to go to Paris, where there are better accommodations and more entertainment for students. Another difference is the existence in France of higher-educational institutions known as great school, which give advanced professional and technical training. Different great schools give a scrupulous training in all branches of applied science and technology. Their diplomas have higher value than the ordinary licence.

In Germany, a country made up of what were once strong principalities, the regional universities have autonomy in determining their curriculum under the direction of rectors. Students in Germany change universities according to their interests and the strengths of each university. In fact, it is a custom for students to attend two, three, or even four different universities in the course of their studies, and the professors at a particular university may teach in four or five others. This mobility means that schemes of study and examination are free and individual, what is not typical for France.

Each of these countries has influenced higher education in other nations. The French, either through colonial influence or through the work of missionaries, introduced many aspects of their system in North and West Africa, the Caribbean, and the Far East. In the 1870s Japan's growing university system was remodeled along French lines. France's great schools have been copied as models of technical schools. German influence has come in philosophical concepts regarding the role of universities. The Germans were the first to stress the importance of universities in the sphere of research. The doctoral degree, or Ph.D., invented in Germany, has gained popularity in systems around the world.

THE SYSTEM OF HIGHER EDUCATION IN GREAT BRITAIN

The autonomy of higher-educational institutions is important in Great Britain. Its universities enjoy almost complete autonomy from national or local government in their administration and the determination of their curricula. However the schools receive nearly all of their funding from the state. Entry requirements for British universities are rather difficult. A student must have a General Certificate of Education (corresponding to the French baccalauréat) by taking examinations in different subjects. If they have greater number of "advanced level" passes, in contrast to General Certificate of Secondary Education ("ordinary level") passes, then the student has better chances of entering the university of his choice. This selective admission to universities, and the close supervision of students by a tutorial system, makes it possible for most British students to complete a degree course in three years instead of the standard four years. Great Britain's academic programs are more highly specialized than the same programs in other parts of Europe. Great Britain's model of higher education has been copied to different degrees in Canada, Australia, India, South Africa, New Zealand, and other former British colonial territories in Africa, Southeast Asia, and the Pacific.

THE SYSTEM OF HIGHER EDUCATION IN THE UNITED STATES

The system of higher education in the United States differs from European in certain ways. In the United States, there is a national idea that students who have completed secondary school should have at least two years of university education. That is why there is a great number of “junior colleges” and “community colleges.” They give two years of undergraduate study. Traditional universities and colleges, where a majority of students complete four years of study for a degree. Universities that provide four-year study courses can be funded privately or can have state or city foundations that depend heavily on the government for financial support. Private universities and colleges depend on students payments. The state governments fund the nation’s highly developed system of universities, which give qualified higher education.

In the American system, the four-year, or “bachelor’s,” degree is ordinarily given to students after collecting of course “credits,” or hours of classroom study. The quality of work done in these courses is assessed by continuous record of marks and grades during a course. The completion of a certain number (and variety) of courses with passing grades leads to the “bachelor’s” degree. The first two years of a student’s studies are generally taken up with obligatory courses in a broad range of subjects, also some “elective” courses are selected by the student. In the third and fourth years of study, the student specializes in one or perhaps two subject fields. Postgraduate students can continue advanced studies or research in one of the many graduate schools, which are usually specialized institutions. At these schools students work to get a “master’s” degree (which involves one to two years of postgraduate study) or a doctoral degree (which involves two to four years of study and other requirements).

A distinctive feature of American education is the de-emphasis on lecture and examination. Students are evaluated by their performance in individual courses where discussion and written essays are important. The American model of higher learning was adopted wholesale by the Philippines and influenced the educational systems of Japan and Taiwan after World War II.

2.6 Подготовка к экзамену

Подготовка к экзамену включает в себя повторение всех изученных тем курса.

Билет на экзамен включает в себя тест и практико-ориентированное задание.

| <i>Наименование оценочного средства</i> | <i>Характеристика оценочного средства</i> | <i>Методика применения оценочного средства</i> | <i>Наполнение оценочного средства в КОС</i> | <i>Составляющая компетенции, подлежащая оцениванию</i> |
|---|--|--|---|--|
| Экзамен: | | | | |
| Тест | Система стандартизированных заданий, позволяющая автоматизировать процедуру измерения уровня знаний и умений обучающегося. | Тест состоит из 20 вопросов. | КОС - тестовые задания | Оценивание уровня знаний, умений, владений |
| Практико-ориентированное задание | Задание, в котором обучающемуся предлагают осмыслить реальную профессионально-ориентированную ситуацию | Количество заданий в билете – 1. Предлагаются задания по изученным темам в виде практических ситуаций. | КОС-Комплект заданий | Оценивание уровня знаний, умений и навыков |

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФГБОУ ВО «Уральский государственный горный университет»



Проректор по учебно-методическому комплексу

С.А. Уповор

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Тема 1: Представление и знакомство

1.1 Запомните слова и выражения, необходимые для освоения темы курса:

1.

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| <p>- Hi, Sarah! What's up? - I just got a new job! - Really? What's the job? - A brand-manager at Global Fashion. - That's great! Good luck with your new job!</p> | <p>/ Привет, Сара! Как дела? / Я только что нашла новую работу! / Правда? И что за работа? / Бренд-менеджер в компании «Глобал Фешн». / Здорово! Удачи с твоей новой работой!</p> |
|--|---|

2.

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| <p>- Hi, Nick! What's new? - Oh, I just got a promotion at work! They bumped me up to Sales Director. - Really? That's great news! Congratulations! - Thanks.</p> | <p>/ Привет, Ник! Что нового? / Я только что получил повышение по работе. Меня повысили до директора по продажам. / Правда? Это хорошие новости! Поздравляю! / Спасибо.</p> |
|--|--|

3.

| | |
|---|---|
| <p>- Hi, Pam! How're you? - Good, thanks. - I've got news for you! Jack and I are getting married next month! - Oh, really! That's wonderful news! I'm glad for you!</p> | <p>/ Привет, Пэм! Как дела? / Спасибо, хорошо. / У меня для тебя новости! Мы с Джеком собираемся пожениться в следующем месяце! / Правда? Отличные новости! Я рада за вас.</p> |
|---|---|

4.

| | |
|--|---|
| <p>- Hi! How are you doing? - I'm good! Yourself? - I'm also good, thanks. I hear you got a new job! - That's right! - So, how is it? Do you like it? - It's OK, but it pays less than my last job.</p> | <p>/ Привет! Как поживаешь? / Хорошо. Ты как? / Тоже хорошо, спасибо. Я слышал, ты нашел новую работу! / Это верно. / И как? Тебе нравится? / Нормально, но платят меньше, чем на предыдущей работе.</p> |
|--|---|

5.

| | |
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| <p>— Gosh, Kate! Is that you? It's been a long time! How've you been? — I'm fine. Yourself? — Good, thanks. It is so good to see you! You look great! You haven't changed a bit! — Neither have you. So, how's life? What's new? — Sorry, I'm in a bit of a rush right now. Mmm... How about we go out for a drink some night? What do you say? — Sounds good! Do you have my number? — No. — Here it is. 698 765 46 34. — Great! I'll call you tomorrow afternoon to make a time for this weekend.</p> | <p>/ Боже! Кейт! Ты ли это? Давно не виделись! Как ты? / Прекрасно! А ты? / Хорошо, спасибо. Отлично выглядишь. Ты совсем не изменилась / Ты тоже не изменилась. Как жизнь? Что нового? / Прости, но я сейчас немного спешу. Ммм... Как насчет того, чтобы сходить куда-нибудь как-нибудь вечером? Что скажешь? / Отличная мысль! У тебя есть мой номер? / Нет. / Записывай. 698 765 4634. / Отлично! Я позвоню тебе завтра днем, и мы договоримся о времени на выходные.</p> |
|---|---|

6.

| | |
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| <p>— Hey, Paul! How are you? — I'm good. Yourself? I haven't seen you around lately. Where have you been?</p> | <p>/ Привет, Пол! Как дела? / Хорошо. А у тебя? Тебя не видно в последнее время. Где ты был?</p> |
|--|---|

| | |
|--|---|
| — Oh, I was out of town. I spent three weeks in Switzerland. | / Меня не было в городе. Я провел три недели в Швейцарии. |
| — Was it for business or travel? | / Это была деловая поездка или отпуск? |
| — I was visiting my friends in Geneva. | / Я навещал друзей в Женеве. |

7.

| | |
|--|---|
| — Jessica! Hello! | / Джессика! Привет! |
| — Hi! How are you? | / Привет! Как дела ? |
| — Good, thanks. You look great! It's been ages since I last saw you. | / Спасибо, хорошо. Ты выглядишь прекрасно! Сто лет тебя не видел. |
| — Three years exactly. | / Три года, если точно. |
| — Right. You haven't changed a bit! So, what's up? What's been happening in your life? | / Верно. Ты совсем не изменилась. Ну, как дела? Что происходит? |
| — Not much has been going on. Same old. | / Ничего особенно и не произошло. Все по-старому. |

8.

| | |
|--|--|
| — Hey, Peter! | / Привет, Питер! |
| — Hey! What's up? You are so tan! Where have you been? | / Привет! Как дела? Ты такой загорелый! (А ты загорел!) Где это ты был? |
| — I just got back from Australia. | / Я только вернулся из Австралии. |
| — Australia?! Cool! What did you do there? | / Из Австралии? Круто! Что ты там делал? |
| — It was another surf-trip. You know, I'm a huge fan of surfing. | / Это была еще одна поездка для занятий серфингом. Ты же знаешь, что я большой фанат серфинга. |
| — How was it? | / Ну и как ? |
| — Oh, it was fantastic! You know, it's never long enough. | / О, это было потрясающе! Знаешь, отдых всегда проходит быстро. |

9.

| | |
|---|---|
| - Hi! What's your name? | / Привет! Как вас зовут ? |
| - Carol. What's yours? | / Кэрол. А вас как зовут ? |
| - Peter. Where are you from, Carol? | / Питер. Откуда вы, Кэрол? |
| - I'm from the US. And you? | / Я из США. А вы? |
| - I'm from Russia. Nice to meet you, Carol. | / Я из России. Приятно с вами познакомиться, Кэрол. |
| - Nice to meet you. | / Взаимно. |

10.

| | |
|--|---|
| - Hi! I'm George. And you are...? | / Привет! Меня зовут Джордж. А вы...? |
| - I'm Gina. | / Я Джина. |
| - How are you, Gina? | / Как ваши дела, Джина? |
| - Good, thanks. | / Спасибо, хорошо. |
| - Where are you from? | / Откуда вы? |
| - I'm from Britain. How about you? Where are you from? | / Из Великобритании. А вы? Откуда вы? |
| - And I'm from Israel. Nice to meet you, Gina. | / А я из Израиля. Приятно познакомиться, Джина. |
| - Nice to meet you. | / Взаимно. |
| - Is this your first time here? | / Вы здесь в первый раз? |
| - No, it's my second time. | / Нет, второй. |
| - Where are you staying here? | / Где вы остановились? |
| - I'm staying at a hotel. | / В отеле. |

11.

| | |
|---|----------------------------|
| - Hi! What's your name? | / Привет! Как тебя зовут ? |
| - Jess. It's short for Jessica. And you are...? | |

| | |
|--|--|
| <p>- I'm Brant. How are you doing, Jess? - I'm fine! Yourself? - Good, thanks. Where are you staying? - I'm staying at a hotel. It's up there on the hill. Where are you staying? - My hotel is right here, across the road. - Where are you from? - I'm from Holland. How about you? Where are you from? - I'm from Australia. - Australia?! I thought you were French. I heard you speak French to your friend over there.</p> <p>- I am French, but I live in Australia.</p> | <p><i>/ Джесс. Это сокращенное от Джессика. А тебя...?</i> <i>/ Брант. Как поживаешь, Джесс?</i> <i>/ Прекрасно! А ты?</i> <i>/ Хорошо, спасибо. Где ты остановилась?</i> <i>/ Я остановилась в отеле. Он там, на холме. А где ты остановился?</i> <i>/ Мой отель здесь рядом, через дорогу.</i> <i>/ Откуда ты?</i> <i>/ Я из Голландии. А ты откуда?</i> <i>/ Я из Австралии.</i> <i>/ Австралия?! Я подумал, что ты французженка. Я слышал, как ты разговаривала по-французски со своей подружкой вон там.</i> <i>/ Я и есть французженка, но живу в Австралии.</i></p> |
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12.

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| <p>- Hi! How're you? - Good, thanks. What's your name? - Sveta. What's yours? - I'm Peter. Nice to meet you. - Nice to meet you. - Are you Russian? - Yes, I am. - Where are you from in Russia? - I'm from Nizhniy Novgorod. - I have some friends in Nizhniy Novgorod. - Oh, really? And where are you from? - I'm from Norway.</p> | <p><i>/ Привет! Как дела?</i> <i>/ Хорошо, спасибо. Как вас зовут?</i> <i>/ Света. А вас как?</i> <i>/ Меня Питер. Приятно с вами познакомиться.</i> <i>/ Взаимно.</i> <i>/ Вы русская?</i> <i>/ Да.</i> <i>/ Где вы живете в России?</i> <i>/ В Нижнем Новгороде.</i> <i>/ У меня есть друзья в Нижнем Новгороде.</i> <i>/ Правда? А вы откуда?</i> <i>/ Из Норвегии.</i></p> |
|--|---|

13.

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| <p>- Hi! How're you? - Good, thanks. - What's your name? - Kate. - And I'm Paolo. Where are you from, Kate? - I'm from Moscow, Russia. - Really? I've been there once. - And where are you from? - I'm from Italy. - Oh, I love Italy. I've been there six or seven times.</p> <p>- That's great! - Where do you live in Italy? - I live in Venice. - Well, Venice is a beautiful place.</p> | <p><i>/ Привет! Как дела?</i> <i>/ Спасибо, хорошо.</i> <i>/ Как вас зовут?</i> <i>/ Кейт.</i> <i>/ А меня Паоло. Откуда вы, Кейт?</i> <i>/ Из России, из Москвы.</i> <i>/ Правда? Я был там однажды.</i> <i>/ А вы откуда?</i> <i>/ Я из Италии.</i> <i>/ О, я обожаю Италию. Я была там 6 или 7 раз.</i> <i>/ Это здорово!</i> <i>/ Где вы живете в Италии?</i> <i>/ Я живу в Венеции.</i> <i>/ Венеция — это красивое место.</i></p> |
|--|--|

14.

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| <p>- Hi! What's your name? - Nick. What's yours? - Sandra. Nice to meet you. - Nice to meet you. Where are you from? - I'm from Germany. And you? /</p> | <p><i>/ Привет! Как вас зовут ?</i> <i>/ Ник. А вас как?</i> <i>/ Сандра. Приятно познакомиться.</i> <i>/ Взаимно. Откуда вы?</i> <i>/ Из Германии. А вы?</i></p> |
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| <ul style="list-style-type: none"> - I'm from the US. - Is this your first time in Moscow? - No, I've been here a couple of times. - Are you here on business or vacation? - I'm here for work. How about you? - I'm here on vacation. - Do you like it here? - Yeah! I like it a lot! - Where are you staying here? - I'm staying with some friends of mine. How about you? - I'm staying at the Hayatt. It's the new hotel next to Red Square. - It must be very expensive. - It is very expensive. You can't find a cheap hotel in Moscow. | <ul style="list-style-type: none"> / Я из США. / Вы в первый раз в Москве? / Нет, я был здесь пару раз. / Вы здесь по делам или на отдыхе ? / Я здесь по работе. Как насчет вас? (А вы?) / Я здесь на отдыхе. / Вам здесь нравится? / Очень нравится! / Где вы остановились? / Я остановилась у друзей. А вы ? / Я остановился в «Хаяте». Это новый отель рядом с Красной площадью. / Должно быть, он очень дорогой. / Он действительно очень дорогой. В Москве нет дешевых отелей. |
|--|--|

15.

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| <ul style="list-style-type: none"> - Hi! What's your name? - David. What's yours? - Fred. Nice to meet you. - Nice to meet you. Where are you from? - I'm from Canada. And you? - I'm from Sweden. - Is this your first time in Shanghai? - Yes, this is my first time. - Are you here on business or vacation? - I'm here for a business convention. How about you? Are you here on business or vacation? - Both. We've come here for the film festival. I'm also looking for some property to buy. - Are you here by yourself? - No, I'm here with my wife. She's gone shopping. - Where are you staying? / - We're staying at the Marriott. | <ul style="list-style-type: none"> / Привет! Как вас зовут? / Дэвид. А вас? / Фред. Приятно познакомиться. / Взаимно. Откуда вы? / Я из Канады. А вы? / Я из Швеции. / Вы первый раз в Шанхае? / Да, первый. / Вы здесь по делам или на отдыхе? / Я приехал на бизнес-конференцию. А вы? Вы здесь по делам или на отдыхе? / И то и другое. Мы приехали на кинофестиваль, и еще я хочу купить недвижимость. / Вы здесь один? / Нет, с женой. Она отправилась по магазинам. / Где вы остановились? / Мы остановились в «Мариотте». |
|---|---|

16.

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|---|---|
| <ul style="list-style-type: none"> - Hello! I'm Liz. And you are.....? - I'm Henry. How are you doing, Liz? - Good, thanks. - Are you staying in this hotel? - Yes, I am. Are you staying here too? - No. Hotels are expensive here. I'm renting an apartment in the city center. - Oh, OK! Are you here by yourself? - No, I'm here with my family. How about you? - I'm here with a friend. - Is this your first time in Colombo? - Actually, yes. This is my first time. - Do you like it here? - Yeah! It's a nice place. It's too hot though. - How long will you be in Sri Lanka? | <ul style="list-style-type: none"> / Привет! Меня зовут Лиз. А вас? / Я Генри. Как ваши дела, Лиз? / Хорошо, спасибо. / Вы остановились в этом отеле? / Да. Вы тоже здесь остановились ? / Нет. Отели здесь дорогие. Я снимаю квартиру в центре города. / Ясно. Вы здесь один? / Нет, я здесь с семьей. А вы? / Я здесь с другом. / В первый раз в Коломбо? / В общем, да. В первый раз. / Вам здесь нравится? / Да! Хорошее место. Только слишком жарко. / Сколько вы пробудете в Шри-Ланке? |
|---|---|

| | |
|--|--|
| <ul style="list-style-type: none"> - Until the end of next week. - Will you stay in Colombo the whole time? - No, we'll stay here two more days and then we'll go to the Hikkaduwa resort. - Oh, it's a long way from here. - Five hours by car. OK, it was nice chatting with you. I've got to get going now. / - OK. Have a good time! | <ul style="list-style-type: none"> / До конца следующей недели. / И все это время будете в Коломбо? / Нет, мы пробудем здесь еще два дня, а потом поедem на курорт Хиккадува. / О, это далеко отсюда. / Пять часов на машине. Ладно, приятно было с вами поболтать. Мне пора идти. / Ладно. Хорошо вам провести время! |
|--|--|

17.

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|---|---|
| <ul style="list-style-type: none"> - Hi! How are you? - Good, thanks. - I think I saw you yesterday at reception. - Yeah, I was trying to book tickets for a water-park. My kids want to go splash around. - Which one do you want to go to? There are three water parks in Dubai. - I hear Wild Wadi is pretty good. - Are you staying in this hotel? - Yes, we are. - In that case you should go to Ice-Land. It's closer, and then it's new. Wild Wadi is rather old. - OK, thank you. We'll go to Ice-Land then. Do we need to book tickets in advance? - No, you usually buy tickets there. - Do you live in Dubai? - No, I actually work here for my husband's company. Your English is very good. Where are you from? Are you Russian? - That's right. I'm from Saint Petersburg. - Really? I've been there once. Ten years ago. It's a beautiful city. You speak very good English for a Russian person. Where did you learn it? - I spent some time in the US. And now I'm working for an American company. OK. Thanks again for your recommendation. - You are welcome. Have a nice day! | <ul style="list-style-type: none"> / Здравствуйте! Как ваши дела? / Спасибо, хорошо. / Мне кажется, я видела вас вчера на ресепшине. / Да, я пытался заказать билеты в аквапарк. Мои дети хотят поплескаться в воде. / В какой аквапарк вы хотите поехать? В Дубае три аквапарка. / Я слышал, что «Вайлд Вади» — неплохой аквапарк. / Вы проживаете в этом отеле? / Да. / В таком случае вам следует поехать в «Ай-сленд». Он ближе, и потом, он более новый. «Вайлд Вади» довольно старый. / Хорошо, спасибо. Тогда мы поедem в «Айсленд». Нам надо бронировать билеты заранее? / Нет, обычно вы покупаете билеты в аквапарке. / Вы живете в Дубае? / Нет, я здесь работаю в компании моего мужа. Вы хорошо говорите по-английски. Откуда вы? Вы русский? / Верно. Я из Санкт-Петербурга. / Правда? Я была там однажды. Десять лет назад. Это красивый город. Вы хорошо говорите по-английски для русского человека. Где вы его учили? / Я жил какое-то время в США. А сейчас я работаю в американской компании. / Спасибо еще раз за вашу рекомендацию. / Пожалуйста. Хорошего дня. |
|---|---|

1.2 Подготовьте устный рассказ по теме на основе предложенного:

Let me introduce myself. My name is ... Now I work as an economist in a joint-stock company. I graduated from the Ural State Mining University in 2017 and got a qualification of an economist-specialist of Finance and Credit.

I am interested in dealing in securities. I often read such journal as “Money and Credit”, “Money”, “Banks and Banking”.

In order to develop my scientific outlook I have decided to take a master's degree course at the Ural State Mining University. This year is quite difficult; I've had to combine my work and studies, to

attend classes in different disciplines, to read a lot of material to get ready for final examinations. I prefer dealing with applied sphere of science. I don't have any articles published yet, but I'm working at.

I have already started collecting and working up the material for my master's thesis. My research deals with the Russian security market and general principles of functioning of similar markets abroad. The subject of my investigation is different kinds of securities and stock exchanges where the given financial instruments circulate. My thesis consists of two chapters. The first chapter is devoted to the analysis of stock price fluctuations, indicators, indices and factors. In the second chapter I am going to develop some new rules and principles to receive legible formulations. The most interesting aspect, I think, is an attempt to formulate some laws of a revolution in the field of securities in the contemporary Russian economic environment. I hope my research will be of great importance and serve as guidance to forecast different situations at the Russian security market. I don't use any special equipment except my notebook. Of course, I'm not satisfied with the result obtained. I have a long way to go. I plan to submit my thesis in two years.

My scientific supervisor is Mr... He is professor, Doctor of Economics.

The English language plays an important role in my life and study. I think of improving my speaking skills, so I'll be able to talk to foreign specialists on my own, to take part in scientific conferences abroad. But now I am reading a lot of specialized and scientific books and journals in English searching the material for my thesis.

YOUR FIRST INTERVIEW

With unemployment so high, and often scores of applicants chasing every job, you have to count yourself lucky to be called for an interview. If it's your first, you're bound to be nervous. (In fact if you're not nervous maybe your attitude is wrong!) But don't let the jitters side-track you from the main issue - which is getting this job. The only way you can do that is by creating a good impression on the person who is interviewing you. Here's how:

DO: ♪ Find out as much as you can about the job beforehand. Ask the job centre or employment agency for as much information as possible; ♪ Jot down your qualifications and experience and think about how they relate to the job. Why should the employer employ you and not somebody else? ♪ Choose your interview clothing with care; no one is going to employ you if you look as though you've wandered out of a disco. Whether you like it or not, appearance counts. ♪ Make sure you know where the interview office is and how to get there. Be on time, or better, a few minutes early. ♪ Bring a pen; you will probably be asked to fill in an application form. Answer all the questions as best you can. And write neatly. The interviewer will be looking at the application during the interview; he or she must be able to read it. ♪ Have a light meal to eat, and go to the toilet. If you don't, you may well be thinking about your inside during the interview.

DON'T: ♪ Ever walk into the interview chewing gum, sucking on a sweet or smoking. ♪ Forget to bring with you any school certificates, samples of your work or letters of recommendation from your teachers or anyone else you might have worked part-time for. ♪ Have a drink beforehand to give you courage. ♪ The interview is designed to find out more about you and to see if you are suitable for the job. The interviewer will do this by asking you questions. The way you answer will show what kind of person you are and if your education, skills and experience match what they're looking for.

DO: ♪ Make a real effort to answer every question the interviewer asks. Be clear and concise. Never answer 'Yes' or 'No' or shrug. ♪ Admit it if you do not know something about the more technical aspects of the job. Stress that you are willing to learn. ♪ Show some enthusiasm when the job is explained to you. Concentrate on what the interviewer is saying, and if he or she asks if you have any questions, have at least one ready to show that you're interested and have done your homework. ♪ Sell yourself. This doesn't mean exaggerating (you'll just get caught out) or making your experience or interests seem unimportant (if you sell yourself short no one will employ you). ♪ Ask questions at the close of the interview. For instance, about the pay, hours, holidays, or if there is a training programme.

DON'T: ♪ Forget to shake hands with the interviewer. ♪ Smoke or sit down until you are invited to. ♪ Give the interviewer a hard time by giggling, yawning, rambling on unnecessarily or appearing cocky or argumentative. ♪ Ever stress poor aspects of yourself, like your problem of getting up in the morning. Always show your best side: especially your keenness to work and your sense of responsibility.

After the interview:

Think about how you presented yourself: could you have done better? If so, and you do not get the job, you can be better prepared when you are next called for an interview. Good luck!

1.3 Систематизация грамматического материала:

Система времен английского глагола действительного залога

Present Simple употребляется для выражения:

1. постоянных состояний,
2. повторяющихся и повседневных действий (часто со следующими наречиями: always, never, usually и т.д.). Mr Gibson is a businessman. He lives in New York, (постоянное состояние) He usually starts work at 9 am. (повседневное действие) He often stays at the office until late in the evening, (повседневное действие)
3. непреложных истин и законов природы, The moon moves round the earth.
4. действий, происходящих по программе или по расписанию (движение поездов, автобусов и т.д.). The bus leaves in ten minutes.

Маркерами present simple являются: usually, always и т.п., every day / week / month / year и т.д., on Mondays I Tuesdays и т.д., in the morning / afternoon / evening, at night / the weekend и т.д.

Present Continuous употребляется для выражения:

1. действий, происходящих в момент речи He is reading a book right now.
2. временных действий, происходящих в настоящий период времени, но не обязательно в момент речи She is practising for a concert these days. (В данный момент она не играет. Она отдыхает.)
3. действий, происходящих слишком часто и по поводу которых мы хотим высказать раздражение или критику (обычно со словом "always") "You're always interrupting me!"(раздражение)
4. действию, заранее запланированным на будущее. He is flying to Milan in an hour. (Это запланировано.)

Маркерами present continuous являются: now, at the moment, these days, at present, always, tonight, still и т.д.

Во временах **Continuous** обычно **не употребляются** глаголы:

1. выражающие восприятия, ощущения (see, hear, feel, taste, smell), Например: This cake tastes delicious. (Но не: This cake is tasting delicious)
2. выражающие мыслительную деятельность [know, think, remember, forget, recognize(ze), believe, understand, notice, realise(ze), seem, sound и др.],
Например: I don't know his name.
3. выражающие эмоции, желания (love, prefer, like, hate, dislike, want и др.), Например: Shirley loves jazz music.
4. include, matter, need, belong, cost, mean, own, appear, have (когда выражает принадлежность) и т.д. Например: That jacket costs a tot of money. (Но не: That jacket is costing a lot of money.)

Present perfect употребляется для выражения:

1. действий, которые произошли в прошлом в неопределенное время. Конкретное время действия не важно, важен результат, Kim has bought a new mobile phone. (Когда она его купила? Мы это не уточняем, поскольку это не важно. Важного, что у нее есть новый мобильный телефон.)
2. действий, которые начались в прошлом и все еще продолжают в настоящем, We has been a car salesman since /990. (Он стал продавцом автомобилей в 1990 году и до сих пор им является.)

3. действий, которые завершились совсем недавно и их результаты все еще ощущаются в настоящем. They have done their shopping. (Мы видим, что они только что сделали покупки, поскольку они выходят из супермаркета с полной тележкой.)

4. Present perfect simple употребляется также со словами "today", "this morning / afternoon" и т.д., когда обозначенное ими время в момент речи еще не истекло. He has made ten photos this morning. (Сейчас утро. Указанное время не истекло.)

К маркерам present perfect относятся: for, since, already, just, always, recently, ever, how long, yet, lately, never, so far, today, this morning/ afternoon / week / month / year и т.д.

Present perfect continuous употребляется для выражения:

1. действий, которые начались в прошлом и продолжаются в настоящее время He has been painting the house for three days. (Он начал красить дом три дня назад и красит его до сих пор.)

2. действий, которые завершились недавно и их результаты заметны (очевидны) сейчас. They're tired. They have been painting the garage door all morning. (Они только что закончили красить. Результат их действий очевиден. Краска на дверях еще не высохла, люди выглядят усталыми.)

Примечание.

1. С глаголами, не имеющими форм группы Continuous, вместо present perfect continuous употребляется present perfect simple. Например: I've known Sharon since we were at school together. (А не: I've been knowing Sharon since we were at school together.)

2. С глаголами live, feel и work можно употреблять как present perfect continuous, так и present perfect simple, при этом смысл предложения почти не изменяется. Например: He has been living/has lived here since 1994.

К маркерам present perfect continuous относятся: for, since, all morning/afternoon/week/day и т.д., how long (в вопросах).

Выполните упражнения для закрепления материала:

1. Underline the correct tense.

- 1 The plane leaves/has left at four o'clock. We must be at the airport by two o'clock.
- 2 It gets/is getting colder and colder every day.
- 3 Have you seen Linda? I have been looking/am looking for her for almost an hour.
- 4 Sam is a very interesting person. He knows/has known all kinds of unusual facts.
- 5 First, you are heating/heat the oven to a temperature of 180°C.
- 6 Have you heard the news? They have just elected/have been electing a new club chairman!
- 7 Martha is finding/has found a new job. She is starting text week.
- 8 The teacher has been correcting/has corrected essays for three hours.
- 9 Michael's car broke down last week, so he uses/is using his father's for the time being.
- 10 It rarely gets/is getting very hot in Britain.

2. Choose the correct answer.

- 1 'I met our new boss this morning.'
'I ...C... him, too. He's very nice.'
A am meeting
B have been meeting
C have met
- 2 '... in a hotel?'
'No, but my parents did last summer in Rome.'
A Have you ever stayed
B Did you ever stay
C Are you ever staying
- 3 'Who is in that new film?'
'Well, a young actress ... the leading role.'

- A has been playing
 B plays
 C has played
- 4 'Is David at home?'
 'Yes, but he ... a shower at the moment.'
 A is having
 B has been having
 C has
- 5 'Why are you so upset?'
 'I ... my favourite ring.'
 A lose
 B have been losing
 C have lost
- 6 'Have you found a house yet?'
 'No. I ... with my aunt at the moment.'
 A stay
 B am staying
 C have stayed

3 Put the adverbs of frequency in the correct position.

- 1 A: Do you wear sunglasses in the winter?
 B: No, I do. (never)
No, I never do.
- 2 A: Do you like fishing, Alan?
 B: Yes, I go fishing at weekends, (sometimes)
- 3 A: Do you go to the gym very often?
 B: Yes, I go. (once a week)
- 4 A: How often do you visit your parents?
 B: I visit them, (every weekend)
- 5 A: Do you eat in restaurants very often?
 B: No, I do. (rarely)
- 6 A: Do you like oysters?
 B: I don't know. I have eaten oysters, (never)
- 7 A: How often do you go on holiday?
 B: I go on holiday, (once a year)
- 8 A: When do you read your post?
 B: I read it on the way to work, (usually)
- 9 A: Shall I lock the door?
 B: Of course. You should lock the door when you go out. (always)
- 10 A: You are breaking things! (always)
 B: I'm sorry. I don't mean to.

4. Identify the tenses, then match them to the correct descriptions.

- 1 The plane to Sydney leaves at eleven o'clock.
 2 I have written two letters this morning.
 3 They're going on holiday on Saturday.
 4 Graham has known Errol for five years.
 5 You're always leaving the door open.
 6 We are rehearsing a new play at the moment.
 7 George has bought a new car.
 8 Lisa has been cleaning the house all morning.
 9 Look! Alison has dyed her hair!
 10 More and more people are recycling their rubbish.

a) actions which started in the past and continue up to the present

- b) action which has recently finished and whose result is visible in the present
- c) to put emphasis on the duration of an action which started in the past and continues up to the present
- d) to express criticism or annoyance
- e) timetables and programmes
- f) actions that we have arranged to do in the near future
- g) action which has happened within a specific time period which is not over at the moment of speaking
- h) action which happened at an unstated time in the past
- i) changing or developing situations
- j) temporary actions

5. Put the verbs in brackets into the correct present form.

- 1 A: Tortoises ...live... (live) to be very old.
B: I've heard of one which is over a hundred years old.
- 2 A: Are you still busy?
B: Yes. I (read) this article for an hour and I still ... (not/finish).
- 3 A: More and more people ... (go) to university these days.
B: Yes. I think it's a good thing.
- 4 A: I ... (have) a party tonight. Do you want to come?
B: Yes. What time does it start?
- 5 A: Why are your shoes wet?
B: I ... (wash) the car.
- 6 A: What's the matter?
B: I ... (break) my ankle.
- 7 A: What do I need to do next?
B: You (add) the sugar to the mixture and you ... (mix) it well.
- 8 A: Who ... (use) my car?
B: I have.
- 9 A: Are you new here?
B: No. Actually, I ... (live) here for almost ten years.
- 10 A: Pete is playing his music very loud.
B: Again! He ... (always/do) that!
- 11 A: Have you made plans for Saturday yet?
B: I ... (go) to the cinema with Jack.
- 12 A: Mr Collins is a very good teacher.
B: Well, he ... (teach) Maths for twenty-five years, you know.
- 13 A: Are you going to the concert on Saturday night?
B: Yes. Actually, I ... (already/buy) the tickets.
- 14 A: Hello, Simon.
B: Oh! We ... (always/meet) each other in this supermarket.

6. a) Put the verbs in brackets into the correct tense.

Dear Kathleen,

I 1) ...'m writing... (write) to tell you my news. My school 2) (choose) me to spend six weeks at a school in the USA. I'm very happy about it!

At the moment, 13) (pack) things for my trip, because I 4) (leave) next week. My mother 5) (book) the ticket.

I 6) (wait) for this opportunity for ages, so I'm very excited. I 7) (finish) reading two books about the USA and 18) ... (borrow) another one from the school library. I 9) (become) more and more nervous every day!

Well, I must go now. I've got a lot of things to do. I'll write to you from the USA.

Love, Tracy

b) Which of the present forms in the text above are used to express:

- 1 actions which happened at an unstated time in the past

- 2 actions which started in the past and continue up to the present with emphasis on duration
- 3 actions happening at or around the moment of speaking
- 4 changing and developing situations
- 5 actions that we have arranged to do in the near future

STATE VERBS

State Verbs are verbs which describe a state rather than an action and therefore do not normally have continuous tenses. These include:

a) verbs which express likes and dislikes: like, love, dislike, hate, enjoy, prefer, adore, etc.
e.g. I love chocolate ice cream.

b) verbs of the senses: see, hear, smell, taste, feel, look, sound. We often use can or could with these verbs when we refer to what we see, hear, etc. at the moment of speaking, *e.g. Jim must be at home. I can see his car parked outside.*

c) verbs of perception: know, believe, understand, realise, remember, forget, notice, recognise, think, seem, see (=understand), expect (=think), etc.
e.g. I expect they will be late.

d) some other verbs such as be, contain, include, belong, fit, need, matter, cost, mean, own, want, owe, have (=possess), require, weigh, wish, keep (=continue), etc. *e.g. My uncle owns a hotel.*

Some of the above verbs are used in continuous tenses when they describe actions and not states.

Study the following examples:

- 1 I think he's lying. (= believe)
I'm thinking about the plan. (= am considering)
- 2 The food tastes delicious. (= has a delicious flavour)
He is tasting the food. (= is testing the flavour of)
- 3 I can see some people. (= perceive with my eyes)
I see what you mean. (= understand)
I'm seeing my doctor tomorrow. (= am meeting)
- 4 It looks as if they've finished the job. (= appears)
Mike is looking out of the window, (is directing his eyes.)
- 5 This perfume smells nice. (= has a nice smell)
He is smelling the milk. (= is sniffing)
- 6 The baby's hair feels like silk. (= has the texture of)
She is feeling the baby's forehead. (= is touching)
- 7 Bob has a Porsche. (= possesses)
He's having a shower at the moment. (= is taking a shower)
- 8 The chicken weighs 2 kilos. (= has a weight of)
The butcher is weighing the meat. (= is measuring how heavy it is)
- 9 This dress fits you perfectly. (= it is the right size)
We are fitting new locks. (= are putting in)
- 10 He appears to be nervous. (= seems)
He is appearing in a new play. (= is taking part)
- 11 He is a rude person. (= character - permanent state)
He is being rude. (= behaviour - temporary situation, usually with adjectives such as careful, silly, (im)polite, lazy, etc.)

Note: a) The verb enjoy can be used in continuous tenses to express specific preference. *e.g. I'm enjoying this party a lot. (specific preference)*

BUT: *I enjoy going to parties. (I enjoy parties in general.)*

b) The verbs look (when we refer to a person's appearance), feel (= experience a particular emotion), hurt and ache can be used in either the continuous or simple tenses with no difference in meaning. *e.g. You look/are looking great today.*

7. Put the verbs in brackets into the present simple or the present continuous.

- 1 A: Why ...*are you smelling*... (you/smell) the soap?

- B: It ... (smell) lovely. It's like roses!
- 2 A: Why ... (you/taste) the soup?
- B: To see if it ... (taste) good. I think it needs more salt.
- 3 A: I ... (feel) very tired.
- B: You should go to bed early.
- 4 A: I ... (see) Andy this evening.
- B: I ... (see). So, you don't want to come to the cinema with me, do you?
- 5 A: How much (the bag of apples/weigh)?
- B: I don't know yet. The man ... (weigh) the bag now.
- 6 A: I ... (think) about buying a new car soon.
- B: Why? I ... (think) your car is fine. You don't need a new one.
- 7 A: What ... (you/look) at?
- B: The sky. It ... (look) as if it's going to rain.
- 8 A: I really ... (enjoy) home-made food.
- B: So do I, and I ... (enjoy) every bit of this meal.
- 9 A: Why ... (you/feel) the radiator?
- B: It ... (feel) cold in here. Is the heating on?
- 10 A: That famous opera singer ... (appear) at the opera house tonight.
- B: Yes. He ... (appear) to be feeling better after his operation.
- 11 A: Chris ... (be) a sensible person, isn't he?
- B: Yes, but in this case he ... (be) rather foolish.
- 12 A: My dad ... (fit) the old blind from the living room in my bedroom today.
- B: Really? ... (it/fit) that window?
- 13 A: My back ... (hurt).
- B: Why don't you lie down for a while?

8. Fill in the gaps with have / has been (to) or have / has gone (to).

- 1 A: Hello, Jim! Have you seen Mum?
- B: Yes. She ...*has gone to*... the shops. She'll be back soon.
- 2 A: Where ... you ... today?
- B: I ... the cinema.
- 3 A: Shall we go on a picnic this weekend?
- B: Oh, yes! I ... not ... on a picnic for ages.
- 4 A: I'm going to India this year.
- B: I ... never ... India.
- A: Really? I ... there twice before.
- 5 A: Where are the children?
- B: They ... the park to play football.
- A: ... Dad ... with them?
- B: Of course. Don't worry!

9. Underline the correct word in bold.

- 1 I always/**already** do the housework on Saturdays.
- 2 We haven't booked our summer holiday **just**/**yet**.
- 3 My brother has **just**/**ever** joined the football club.
- 4 Linda has **already**/**ever** bought a new dress for the party.
- 5 Have you **so far**/**ever** tasted Japanese food?
- 6 Joe has been in Paris **since**/**for** two weeks.
- 7 I have **never**/**just** seen this film before.
- 8 The secretary has typed twenty letters **yet**/**so far** this morning.
- 9 I have been working here **since**/**still** July.
- 10 The Taylors have moved house **recently**/**so far**.
- 11 They **still**/**already** haven't employed a new supervisor.

10. Put the verbs in brackets into the correct present form.

- 1 A: Linda ...*is learning*... (learn) to drive at the moment.
B: I know. She told me last week.
- 2 A: Has Alan got a job?
B: Oh yes. He ... (be) the manager of a leisure centre.
- 3 A: Do you want to have a break now?
B: Not yet. I ... (write) a report for tomorrow's meeting.
- 4 A: It's ten o'clock. Have you given the manager his letters?
B: Yes, and I ... (also/type) six reports so far this morning.
- 5 A: Is Jeff still in the garden?
B: Yes. He ... (plant) flowers all afternoon.
- 6 A: That author is very well-known, isn't she?
B: Yes. She ... (write) twenty novels so far.
- 7 A: You look very happy today.
B: I am. I ... (just/hear) some good news.
- 8 A: What time ... (the play/start) tonight?
B: Seven o'clock, I think.
- 9 A: Are you new to this company?
B: Not really. In fact, I ... (work) here for almost two years.
- 10 A: Are you ready for the concert?
B: Yes. I ... (practise) for weeks.
- 11 A: Do you do any exercise at all?
B: Yes. Actually, I ... (go) swimming three times a week.

Past simple употребляется для выражения:

1. действий, произошедших в прошлом в определенное указанное время, то есть нам известно, когда эти действия произошли, They graduated four years ago. (Когда они закончили университет? Четыре года назад. Мы знаем время.)

2. повторяющихся в прошлом действий, которые более не происходят. В этом случае могут использоваться наречия частоты (always, often, usually и т.д.), He often played football with his dad when he was five. (Но теперь он уже не играет в футбол со своим отцом.) Then they ate with their friends.

3. действий, следовавших непосредственно одно за другим в прошлом.
They cooked the meal first.

4. Past simple употребляется также, когда речь идет о людях, которых уже нет в живых.
Princess Diana visited a lot of schools.

Маркерами past simple являются: yesterday, last night / week / month / year I Monday и т.д., two days I weeks I months I years ago, then, when, in 1992 и т.д.

People used to dress differently in the past. Women used to wear long dresses. Did they use to carry parasols with them? Yes, they did. They didn't use to go out alone at night.

• **Used to** (+ основная форма глагола) употребляется для выражения привычных, повторяющихся в прошлом действий, которые сейчас уже не происходят. Эта конструкция не изменяется по лицам и числам. Например: Peter used to eat a lot of sweets. (= Peter doesn't eat many sweets any more.) Вопросы и отрицания строятся с помощью did / did not (didn't), подлежащего и глагола "use" без -d.

Например: Did Peter use to eat many sweets? Mary didn't use to stay out late.

Вместо "used to" можно употреблять past simple, при этом смысл высказывания не изменяется. Например: She used to live in the countryside. = She lived in the countryside.

Отрицательные и вопросительные формы употребляются редко.

Past continuous употребляется для выражения:

1. временного действия, продолжавшегося в прошлом в момент, о котором мы говорим. Мы не знаем, когда началось и когда закончилось это действие, At three o'clock yesterday afternoon Mike and his son were washing the dog. (Мы не знаем, когда они начали и когда закончили мыть собаку.)

2. временного действия, продолжавшегося в прошлом (longer action) в момент, когда произошло другое действие (shorter action). Для выражения второго действия (shorter action) мы употребляем past simple, He was reading a newspaper when his wife came, (was reading = longer action: came = shorter action)

3. двух и более временных действий, одновременно продолжавшихся в прошлом. The people were watching while the cowboy was riding the bull.

4. Past continuous употребляется также для описания обстановки, на фоне которой происходили события рассказа (повествования). The sun was shining and the birds were singing. Tom was driving his old truck through the forest.

Маркерами past continuous являются: while, when, as, all day / night / morning и т.д.
when/while/as + past continuous (longer action) when + past simple (shorter action)

Past perfect употребляется:

1. для того, чтобы показать, что одно действие произошло раньше другого в прошлом. При этом то действие, которое произошло раньше, выражается past perfect simple, а случившееся позже - past simple,

They had done their homework before they went out to play yesterday afternoon. (=They did their homework first and then they went out to play.)

2. для выражения действий, которые произошли до указанного момента в прошлом,
She had watered all the flowers by five o'clock in the afternoon.
(=She had finished watering the flowers before five o'clock.)

3. как эквивалент present perfect simple в прошлом. То есть, past perfect simple употребляется для выражения действия, которое началось и закончилось в прошлом, а present perfect simple - для действия, которое началось в прошлом и продолжается (или только что закончилось) в настоящем. Например: Jill wasn't at home. She had gone out. (Тогда ее не было дома.) ЛИ isn 't at home. She has gone out. (Сейчас ее нет дома.)

К маркерам past perfect simple относятся: before, after, already, just, till/until, when, by, by the time и т.д.

Выполните упражнения для закрепления материала:

1. Brian and Ruth went on a day trip yesterday. Look at the notes below and say what they did, using the linking words from the list.

first, then, next, after that, later, finally

SA: First, they travelled to Brighton by train.

9:15 - 10:30 - travel to Brighton by train

10:30 - 11:30 - look around shops

11:30 - 12:30 - walk on beach

14:30 - 2:00 - eat lunch at seaside restaurant

2:00 - 4:30 - visit funfair

4:30 - 5:30 - have afternoon tea

2. Now, in pairs, ask and answer questions about what Brian and Ruth were doing at the times in the list below, as in the example.

SA: What were Brian and Ruth doing at half past nine in the morning?

SB: They were travelling to Brighton by train.

9:30 am

11:00 am

11:45 am

1:15 pm

2:30 pm

5:00 pm

3. Put the verbs in brackets into the past simple or the past continuous.

A) The sun 1) ...*was shining*... (shine) and the birds 2) ... (sing) as Mike 3) ... (drive) down the country lane. He 4) ... (smile), because he 5) ... (look forward) to the journey ahead. Mike 6) ... (enjoy) driving, especially when he 7) ... (go) somewhere new. Then, suddenly, the engine 8) ... (begin) to make a strange noise and the car 9) ... (stop) dead in the middle of the road. Mike 10) ... (try) to start it, but nothing 11) ... (happen). He 12) ... (sigh), then 13) ... (get out) of the car. As he 14) ... (push) the car to the side of the road, Mike 15) ... (start) to wish he had stayed at home.

B) John 1) ... (enter) his flat and 2) ... (close) the door. He 3) ... (hang up) his coat when he 4) ... (hear) a strange noise. A tap 5) ... (run) in the kitchen. He 6) ... (walk) into the kitchen and 7) ... (turn) it off. Then, he 8) ... (freeze). Someone 9) ... (stand) behind him. He 10) ... (take) a deep breath and 11) ... (turn) around. His flatmate, Steve, 12) ... (lean) in the doorway. 'You 13) ... (give) me a fright!' John exclaimed. Steve 14) ... (laugh) at him. John 15) ... (start) to laugh, too. 'I 16) ... (think) you had gone to London today,' he said. 'No,' 17) ... (reply) Steve. 'Unfortunately, I 18) ... (miss) the train.'

4. Choose the correct answer.

- 1 'Were you expecting James and Paul to stay for dinner?'
'No, but I ...A... a lot of food, so it didn't matter.'
A had prepared
B was preparing
C had been preparing
- 2 Tony has been singing for years, hasn't he?'
'Yes. He his first record when he was sixteen.'
A made
B was making
C had made
- 3 There was a power cut last night.'
'I know. I some paperwork when the lights went out.'
A had been doing
B was doing
C had done
- 4 'Did you see Paul Simon in concert?'
'No. I was hoping to get tickets, but they '
A had sold out
B sold out
C were selling out
- 5 The restaurant was packed last night.'
'Yes. Luckily, I a table in advance.'
A was booking
B had booked
C had been booking
- 6 'Did you watch the film yesterday?'
'No. It by the time we got home.'
A finished
B was finishing
C had finished
- 7 'Did you stay up late last night?'
'No. I all day, so I went to bed early.'
A had been working
B worked

- C was working
- 8 'Did you enjoy your holiday?'
'Yes. We _____ most of our time on the beach.'
A had spent
B were spending
C spent
- 9 'Kim looked tired this morning.'
'I know. She _____ all night long.'
A studied
B had studied
C had been studying
- 10 'So what happened?'
'We _____ through the woods when we heard a gunshot.'
A had walked
B walked
C were walking

5. Put the verbs in brackets into the past simple or the present perfect.

- A A: I 1) ... 've seen... (see) this film before.
B: Me too, but I love this actor. He 2) ... (play) a lot of good roles.
A: 'Tom Cruise? I 3) ... (meet) him, you know.
B: Really? When?
A: When I 4) ... (be) in Los Angeles on holiday.
- B A: Who is that man?
B: He's an artist. He 1) ... (paint) a lot of beautiful pictures.
A: I think Van Gogh 2) ... (paint) the most beautiful pictures ever. But his life 3) ... (be) miserable.
- C A: I 1) ... (Just/hear from) an old friend of mine.
B: Oh, really?
A: Yes. Jim 2) ... (write) to me. I 3) ... (get) the letter this morning.
B: That's nice. When 4) ... (you/first/meet) him? A: He 5) ... (live) next door to me for three years, but he 6) ... (move) away last June and I 7) ... (not/see) him since.

6. Put the verbs in brackets into the correct tense.

- 1 A: What ...were you doing... (you/do) at ten o'clock this morning?
B: I ... (read) some important documents in my office.
- 2 A: Why are you so disappointed?
B: Because I ... (hope) that I would pass the test, but I didn't.
- 3 A: Have you found your bag yet?
B: No, but I ... (report) it stolen to the police yesterday.
- 4 A: Did you enjoy the play last night?
B: No, even though I ... (read) good reviews of it before I bought the tickets.
- 5 A: Have you written your report yet?
B: I ... (Just/start) when you came in, actually.
- 6 A: Sorry I'm late.
B: Where have you been? I ... (expect) you an hour ago.
- 7 A: We ... (go) to an antique market yesterday.
B: ... (you/buy) anything?
- 8 A: Were you surprised that the factory closed down?
B: Not really. In fact, I ... (know) it was going to happen.
- 9 A: Julia did well in the test, didn't she?
B: Yes. She ... (study) very hard for it.

7. Put the verbs in brackets into the correct tense.

A) When Simon 1) ...*arrived*... (arrive) at the cinema, dozens of people 2) ... (queue) outside. They 3) ... (wait) to see the same film as Simon. Simon, however, 4) ... (buy) a ticket in advance, so he 5) ... (walk) straight to the front of the queue and 6) ... (enter) the cinema. He 7) ... (feel) relieved that he didn't have to queue. He 8) ... (reach) his seat just as the lights 9) ... (go down) for the start of the film.

B) Last weekend, Cathy 1) ... (hire) a car and 2) ... (drive) to the seaside. When she 3) ... (arrive) the wind 4) ... (blow) and the sky 5) ... (be) cloudy. She 6) ... (get out) of the car and 7) ... (take) a walk along the seafront. Then she 8) ... (decide) to go for fish and chips at a nearby restaurant that she 9) ... (see) earlier and liked the look of. By the time she 10) ... (leave) the restaurant, it 11) ... (already/grow) dark. As she 12) ... (walk) to her car it 13) ... (begin) to rain. However, Cathy 14) ... (not/mind) because she 15) ... (have) a wonderful day.

8. Identify the tenses, then match them to the correct descriptions.

- 1 People used to have/had very simple lives in those days.
- 2 She was talking on the phone when her boss came in.
- 3 Sam was in hospital because he had crashed his car.
- 4 They had been studying hard all morning, so they were tired.
- 5 I was cooking lunch while he was pouring the drinks.
- 6 We had been living in the house for a year before we decorated the kitchen.
- 7 Princess Diana did a lot of work for charity.
- 8 At two o'clock this afternoon they were having lunch at work.
- 9 First, she knocked on the door. Then, she went inside.
- 10 We had bought the tickets before we went to the theatre.

- a) to talk about actions of people who are no longer alive
- b) action which happened before another past action or before a stated time in the past
- c) actions which happened immediately one after the other in the past
- d) to put emphasis on the duration of an action which started and finished in the past before another past action
- e) action which was in progress at a stated time in the past
- f) two or more simultaneous actions
- g) action in progress when another action interrupted it
- h) action which lasted for some time in the past and whose result was visible in the past
- i) past habit or state which is now finished
- j) action which finished in the past and whose result was visible in the past

9. Underline the correct tense.

- 1 Lynne was singing/had sung as she was cleaning the windows.
- 2 Mr Todd was teaching/had been teaching for thirty years when he retired.
- 3 I phoned Jack because I wanted/had wanted to ask him a question.
- 4 They had walked/had been walking for hours when they stopped for a rest.
- 5 The shop had been selling/had sold the table by the time I got there.
- 6 Joe was happy. He was winning/had won first prize in the competition.
- 7 It was raining/had rained while they were playing the football match.
- 8 Rob was opening/opened the box and looked inside.
- 9 Eve was delighted to hear that she was getting/had got the job.
- 10 People used to work/were working very long hours in those days.
- 11 I was running when I slipped/was slipping on the ice.
- 12 They were already buying/had already bought the tickets when they went to the concert.
- 13 Carol had broken/was breaking her arm, so she couldn't write for six weeks.
- 14 We had been staying/stayed in a hotel by the sea last summer.
- 15 Elvis Presley sang/had sung lots of hit songs.

- 16 I **opened/was opening** the door and stepped outside.
 17 They **had stood/were standing** outside when the results were announced.
 18 Alexander Graham Bell **had invented/invented** the telephone.
 19 She broke the glass while she **had washed/was washing** it.

10. Choose the correct answer.

- 1 He went to bed ..B... he had brushed his teeth.
 A before
 B after
 C while
- 2 I was watching television ... the doorbell rang.
 A when
 B as soon as
 C while
- 3 She ... hadn't finished the washing-up when the guests arrived.
 A yet
 B just
 C still
- 4 We had been walking for hours ... we reached the campsite.
 A since
 B for
 C before
- 5 John was repairing the car ... Steve was tidying the garage.
 A while
 B before
 C after
- 6 We went to Spain on holiday
 A tomorrow
 B next year
 C last year
- 7 I fell asleep ... I closed my eyes.
 A just
 B as soon as
 C already
- 8 ... did Jane and Ted get married?
 A How long
 B How long ago
 C While
- 9 She hasn't seen Jim ... she left school.
 A for
 B just
 C since
- 10 He won't go home ... he has finished his work.
 A how long
 B until
 C yet
- 11 I have lived in Kent ... ten years now.
 B for
 A since
 C before
- 12 We haven't finished work
 A yet
 B until

C just

13 ... did Tina meet Steve?

A How long

B How long ago

C While

11. Fill in the gaps with an appropriate past form.

One fine morning, a man 1) ...*was fishing*... (fish) in a river. The sun 2) ... (shine) and the man 3) ... (sit) on the river bank. Everything was very quiet and peaceful. The man 4) ... (wait) patiently for several hours when suddenly he 5) ... (feel) something pulling on the fishing line. He 6) ... (stand up) quickly and 7) ... (begin) to take in the line. He 8) ... (just/lift) the huge fish he had caught out of the water when there was a loud splash and it fell back into the river. At first, the man didn't know what 9) ... (happen). Then, he 10) ... (look) carefully at his fishing line. It 11) ... (snap). The poor man was so disappointed that he 12) ... (pack) away all his things and went home.

b) Which of the past forms in the text above are used to express:

1. emphasis on the duration of an action which started and finished in the past before another past action or a stated time in the past
2. action which happened at a definite time in the past-time stated, known or implied
3. actions which happened immediately one after the other in the past
4. to describe the atmosphere, the setting, etc. in the introduction to a story
5. action which happened before another past action

12. Complete the sentences using any appropriate past forms.

- 1 While Joanne ...*was washing*... her hair. Carl was cleaning the house.
- 2 I have no idea where I ... my wallet.
- 3 He ... his leg when he fell off his skateboard.
- 4 We ... in the classroom for ten minutes before the teacher arrived.
- 5 She ... to the theatre last night.
- 6 My tooth ... for a week before I went to the dentist's.
- 7 She cried when she ... her driving test.
- 8 What ... when the alarm went off?
- 9 They got into the car and ... away.
- 10 I could tell she ... the competition because she couldn't stop smiling.
- 11 We ... along the beach when we heard a cry for help.
- 12 Tom ... the piano for years before he became famous.

13. Put the verbs in brackets into the correct tense.

A: Hello, Mark. You 1) ...*took*... (take) a long time to answer the door.

B: Sorry. I 2) ... (not/hear) the bell. Come in, Tony.

A: 3) What (you/plan) to do today?

B: Well, I 4) ... (think) of going for a picnic in the country, but the weather is awful so I 5) ... (change) my mind.

A: Oh dear. Well, yesterday Mary 6) ... (tell) me that she 7) ... (buy) two tickets to see the Rocking Stars, but she couldn't go to the concert. So 8) ... (buy) the tickets from her, because I 9) ... (think) you'd like to go.

B: Tony, that's brilliant! I 10) ... (mean) to buy tickets for that concert, but they 11) ... (sell out) by the time I 12) ... (go) to the booking office.

A: Well, it's lucky I 13) ... (see) Mary, then, isn't it?

14. Put the verbs in brackets into the correct tense.

1 A: Look at Steve! He is soaking wet.

B: I know. He ...*has been washing*... (wash) the car.

2 A: Why ... (you/make) so much food?

B: Well, I ... (expect) guests, but they phoned to say they couldn't come.

- 3 A: Julia performed well at the concert.
B: Yes. She ... (practise) for months beforehand.
- 4 A: (you/ever/go) to Spain?
B: Yes. I ... (go) last year.
- 5 A: I like your new coat.
B: Thank you. I ... (wear) my old coat for years, so I decided to buy a new one.
- 6 A: Do you know this town well?
B: Of course. I ... (live) here for six years.

Future simple употребляется:

1. для обозначения будущих действий, которые, возможно, произойдут, а возможно, и нет, We'll visit Disney World one day.

2. для предсказаний будущих событий (predictions), Life will be better fifty years from now.

3. для выражения угроз или предупреждений (threats / warnings), Stop or I'll shoot.

4. для выражения обещаний (promises) и решений, принятых в момент речи (on-the-spot decisions), I'll help you with your homework.

5. с глаголами hope, think, believe, expect и т.п., с выражениями I'm sure, I'm afraid и т.п., а также с наречиями probably, perhaps и т.п. / think he will support me. He will probably go to work.

К маркерам future simple относятся: tomorrow, the day after tomorrow, next week I month / year, tonight, soon, in a week / month year и т.д.

ПРИМЕЧАНИЕ

Future simple не употребляется после слов while, before, until, as soon as, after, if и when в придаточных предложениях условия и времени. В таких случаях используется present simple. Например: I'll make a phone call while I wait for you. (А не:... while I will wait for you.) Please phone me when you finish work.

В дополнительных придаточных предложениях после "when" и "if" возможно употребление future simple. Например: I don't know when I if Helen will be back.

He is going to throw the ball.

Be going to употребляется для:

1. выражения заранее принятых планов и намерений на будущее,

Например: Bob is going to drive to Manchester tomorrow morning.

2. предсказаний, когда уже есть доказательства того, что они сбудутся в близком будущем.

Например: Look at that tree. It is going to fall down.

We use the **future continuous**:

a) for an action which will be in progress at a stated for an action which will be future time.

This time next week, we'll be cruising round the islands.

b) for an action which will definitely happen in the future as the result of a routine or arrangement. *Don't call Julie. I'll be seeing her later, so I'll pass the message on.*

c) when we ask politely about someone's plans for the near future (what we want to know is if our wishes fit in with their plans.) *Will you be using the photocopier for long?*

No. Why?

I need to make some photocopies.

We use the **future perfect**:

1. For an action which will be finished before a stated future time. *She will have delivered all the newspapers by 8 o'clock.*

2. The future perfect is used with the following time expressions: before, by, by then, by the time, until/till.

We use the **future perfect continuous**:

1. to emphasize the duration of an action up to a certain time in the future. *By the end of next month, she will have been teaching for twenty years.*

The future perfect continuous is used with: by... for.

Формы выражения будущего времени в придаточных предложениях условия и времени

В придаточных времени с союзами when (когда), after (после), before (перед тем как), as soon as (как только), until (до тех пор пока не), относящихся к будущему времени, а также в придаточных условия, вводимых союзами if (если) и unless (если не), будущее время заменяется формой настоящего времени, но на русский язык переводится будущим, например:

If you help me, I shall do this work on time. - Если ты поможешь мне, я сделаю эту работу вовремя.

As soon as I get free, I shall give you a call. - Как только я освобожусь, я вам позвоню.

We shall not sit to dinner until you come. - Мы не сядем обедать, пока ты не придешь.

Иногда в сложносочиненном предложении словами when и if вводится придаточное дополнительное, а не придаточное времени или условия. В этом случае использование настоящего времени в придаточном будет ошибкой. Чтобы определить, какую форму глагола необходимо использовать, достаточно поставить вопрос к придаточному предложению - «при каком условии?» и «когда?» к придаточным условия и времени и «что?» - к придаточному дополнительному.

We shall sit to dinner (Когда?) when he comes. - Мы сядем обедать, когда он придет.

We will go to the movies if he comes. - Мы пойдем в кино, если он придет.

I want to know (что?) when you will come. - Я хочу знать, когда ты придешь.

I want to know (что?) if you will come. - Я хочу знать, придешь ли ты.

Выполните упражнения для закрепления материала:

1. Put the verbs in brackets into the correct future tense.

- 1 A: Your house is very small.
B: I know. I ...'m going to move... (move) to a bigger house next year.
- 2 A: I have got a new job!
B: Wonderful! I ... (call) Mum and tell her the good news.
- 3 A: .How old is your daughter?
B: She ... (be) fourteen next week.
- 4 A: I must phone Julia.
B: Well, don't phone her now. She ... (sleep).
- 5 A: Have you been living here long?
B: Yes. By next month, I ... (live) here for ten years.
- 6 Are you having a party next weekend?
Yes. I hope I ... (finish) decorating the house by then.
- 7 What are your plans for tonight?
Well, I ... (meet) Steve at eight o'clock.
- 8 I must buy some bread.
You'd better hurry. The shops ... (close) in half an hour.
- 9 Shall I call you at ten o'clock tomorrow?
No. I ... (leave) for work by then.
- 10 Are you coming to the disco on Friday night?
I can't. I ... (study) for my exam then.
- 11 Are you excited about going to California?
Yes! This time tomorrow I ... (fly) across the Atlantic.
- 12 It's seven o'clock.
Yes. John ... (leave) the office by now.
- 13 There's somebody at the door.
Oh. That ... (be) the postman.
- 14 I've left my jacket at home.

- I ... (go) back and get it for you.
- 15 Have you booked a taxi to take you to the airport?
Yes. It ... (come) at eight o'clock in the morning.
- 16 Are you nervous about the interview?
Yes. This time tomorrow, I ... (talk) to the managing director.

2. Fill in the future simple, the present simple or the present perfect.

- A)** My car is being repaired and I don't know when it 1) ...*will be*... (be) ready. I doubt whether I 2) ... (be able to) collect it before the weekend. I wonder if John 3) ... (give) me a lift to the party on Saturday. I'll ask him when he 4) ... (come) home.
- B)** I was calling to ask if you'd like to go out after we 1) (finish) work tomorrow or if you 2) ... (want) to watch a video instead. Call me back as soon as you 3) ... (get) in. I'll wait until I 4) ... (hear) from you.
- C)** I will leave the hotel early in case there 1) ... (be) a lot of traffic. I don't know how long the journey 2) ... (take) or what time the plane 3) ... (land), but I 4) ... (call) you as soon as I 5) ... (arrive) at the airport. Then, I will wait until you 6) ... (come) to collect me.
- D)** Paula is drinking tea as she is waiting for Charles. She wonders if he 1) ... (be) late as usual. She will wait until the clock 2) ... (strike) five and then she will call him in case he 3) ... (forget).

3. Fill in the future simple or be going to.

- 1 A: Have you finished your essay yet?
B: No, but I'm sure I ... *'ll finish*... (finish) it on time.
- 2 A: I have decided what to wear for the party.
B: Really? What ... (you/wear), then?
- 3 A: Why do you need hot soapy water?
B: Because I ... (wash) the car.
- 4 A: Did you post those letters?
B: No, I forgot. I... (post) them this afternoon.
- 5 A: Did you book a table at the restaurant?
B: Yes, but I don't expect it ... (be) busy.
- 6 A: I'm hungry.
B: Me too. I ... (make) us something to eat.
- 7 A: What are you doing this weekend?
B: Oh, I ... (probably/visit) my grandparents.
- 8 A: Look at that dog!
B: Oh yes! It ... (swim) across the river.
- 9 A: Tony is nearly eighteen, isn't he?
B: Yes. He ... (work) for his father when he leaves school.
- 10 A: Are you going into town today?
B: Yes. I ... (give) you a lift if you like.
- 11 A: Your shirt is dirty.
B: Oh dear! I ... (change) into another one.
- 12 A: I hope we ... (not/arrive) late for the meeting.
B: Don't worry. There's plenty of time.
- 13 A: I'm really thirsty after all that hard work.
B: I ... (make) some tea.
- 14 A: Did you give Steve his present?
B: No. I ... (give) it to him tonight at dinner.
- 15 A: Watch out! You ... (bang) your head on the doorframe.
B: Oh! I didn't realise it was so low.

4. Underline the correct tense.

A) Next Saturday, Daisy 1) **is flying/flies** to Paris for a business meeting. Her secretary has already booked the flight. The plane 2) **will leave/leaves** at nine o'clock in the morning and one of her business clients 3) **will have met/will be meeting** her at the airport when the plane lands. She doesn't know how long the meeting will last, but she 4) **will have returned/will have been returning** home by Thursday evening.

B) Florence 1) **is going to become/will be becoming** a doctor when she finishes medical school. She thinks she 2) **will probably work/will have probably worked** in a hospital for most of her career. This time next month, she 3) **will have revised/will be revising** hard for her exams. By the time she gets her degree she 4) **will have been studying/will have studied** medicine for five years. Florence hopes she 5) **will have passed/will pass** all the exams with excellent grades.

WILL/WON'T - SHALL

We use:

◆ will you ...? to give an order or make a request. *e.g. Will you stop talking, please?* (= Please stop talking.)

◆ won't to express unwillingness or an emphatic refusal, even when the subject is not a person. *e.g. I've told him not to do that, but he won't listen.* (= He refuses to listen.) The washing machine won't work.

We use wouldn't to refer to the past. *e.g. I asked him to help me, but he wouldn't.* (= He was unwilling to help me.)

◆ Shall I/we ... ?

a) to make an offer. *e.g. Shall I do the washing-up for you?* (= Do you want me to do the washing-up for you?)

b) to make a suggestion. *e.g. Shall we go out for dinner tonight?* (= Why don't we go out for dinner tonight?)

c) to ask for suggestions or instructions. *e.g. 'Where shall I put the vase?' 'On the table.' 'What shall we do tonight?' 'We could go out'*

5. Replace the words in bold with will/won't or shall I/we, as in the example.

1 Can you buy me some milk, please?

...*Will you buy me some milk, please?*...

2 What **do you want me** to do with this shopping?

3 I've asked Jane to tidy her room, but she **refuses to** do it.

4 **Can you open** the door for me, please?

5 **Do you want me** to walk the dog for you?

6 **Why don't we** go to the theatre, tonight?

7 When **do you want me to** visit next?

8 **Please** be quiet!

9 Ann **is unwilling to** talk to me.

OTHER WAY OF EXPRESSING THE FUTURE

We can also express the future with:

◆ be to + infinitive (formal English). *e.g. The President is to visit Poland next Monday.*

◆ be about to + infinitive/be on the point of + -ing form (to refer to the near future). *e.g. Look! The bus is about to leave. The company is on the point of closing down.*

◆ be due to + infinitive (timetables). *e.g. Their flight is due to arrive at 6:15.*

◆ verbs such as decide, plan, intend, arrange, mean + to -infinitive (for plans or Intentions). *e.g. We intend to buy a bigger flat.*

◆ be sure to/be certain to/be bound to + infinitive (to express certainty about the future). *e.g. This plan is sure to/is bound to succeed.*

The future in the past

We use the following patterns to talk about things we intended to do or plans we had for the future.

a) was going to/was to/was about to/ was due to + infinitive

e.g. *Mr Simon was going to resign, but the manager offered him a better salary.* (So he didn't resign.)

b) was on the point of + -ing form

e.g. *They were on the point of leaving the house when the phone rang.* (So they didn't leave.)

6. Complete each sentence with two to five words, including the word in bold.

1 The Queen will open the new sports centre next week.

is The Queen ...*is to open*... the new sports centre next week.

2 We are planning to go to Spain next summer.

intend We ... Spain next summer.

3 The guests should have arrived at nine, but they were late.

due The guests ... at nine, but they were late.

4 Jane was thinking of looking for a new job, but she changed her mind.

going Jane ... a new job, but she changed her mind.

5 The manager will be angry when he hears the news.

bound The manager ... angry when he hears the news.

6 Hurry up! The bus is going to leave!

about Hurry up! The bus ... leave!

7 Helen will love this present.

sure Helen ... this present.

7. Identify the tenses, then match them to the correct descriptions.

1 I like these shoes. I'll buy them.

2 They will have eaten lunch by two o'clock this afternoon.

3 I'm going to open my own business in the future.

4 This time tomorrow, I'll be taking my driving test.

5 By the time Jack finishes the race, he will have been running for two hours.

6 Everyone believes he will win the competition.

7 I'll tell Paul about the party. I'll be seeing him at work anyway.

8 Will you be speaking to Rob later? I've got a message for him.

9 Look at them! They are going to catch the thieves.

10 Since you're tired, I'll cook dinner tonight.

a) for offers, promises, threats, etc

b) action which will definitely happen in the future as a result of a routine or arrangement

c) for plans, intentions or ambitions we have for the future

d) predictions about the future

e) asking politely about someone's plans for the near future

f) action which will be finished before a stated future time

g) to emphasise the duration of an action up to a certain time in the future

h) action which will be in progress at a stated future time

i) on-the-spot decision

j) predictions when there is evidence that something will happen in the near future

8. A Fill in the gaps with an appropriate tense form.

Next month, Maggie 1) ...*is going*... (go) to Australia to visit her sister, who she hasn't seen for fifteen years. The plane 2) ... (leave) early in the morning and 3) ... (stop off) at Singapore before flying on to Sydney. It 4) ... (be) a very long, tiring journey, but Maggie is very excited because this time next month, she 5) ... (begin) her adventure on the other side of the world. She 6) ... (stay) in Australia for one month. She has booked her flight, so she 7) ... (fly) back to Britain on 31st May. She hopes that she 8) ... (visit) lots of fascinating places and seen many interesting things by the time her holidays are over.

B Which of the tense forms in the text above are used to express:

1 timetables/programmes

- 2 actions which will have finished before a stated
- 3 plans or intentions
- 4 fixed arrangements in the near future time
- 5 predictions based on what we know

9. Put the verbs in brackets into the correct future form.

Dear Lionel,

I'm writing to tell you my exciting news. I have won a competition! I think my life 1) ...will change... (change) a lot now! I 2) ... (meet) the competition organisers next week to get my prize — a cheque for £50,000.

As soon as I 3) ... (have) the money, I 4) ... (buy) a new car, and I 5) ... (also/redecorate) my house. Hopefully, I 6) ... (finish) the whole house by the end of June. Then, on the fifth of July, I 7) ... (fly) to Tahiti for an exotic holiday in the sun. I 8) ... (return) by the end of July and then I 9) ... (throw) a big party for all my friends. I hope you 10) ... (come).

Well, it's almost lunchtime, so I 11) ... (say) goodbye for now. I promise I 12) ... (send) you a postcard from Tahiti.

Best wishes, Emily

10. Fill in the correct present or future forms.

If you 1) ...like... (like) watersports, you 2) ... (love) Aquaworld. As soon as you 3) ... (arrive) at this unique theme park, you 4) ... (be greeted) by visitor hosts who 5) ... (show) you to a luxury chalet. Once you 6) ... (be) in your swimsuit, you 7) ... (be able to) enjoy a wide variety of watersports, from swimming to water-skiing. You 8) ... (find) plenty to do and you 9) ... (have) the chance to try many exciting activities. Aquaworld 10) ... (open) at 9 am every day and 11) ... (close) at 8 pm. There 12) ... (be) special facilities for children and lifeguards 13) ... (supervise) all activities. Visit Aquaworld for an experience you 14) ... (never/forget)!

11. Choose the correct answer.

- 1 'I ...A... about buying a new car recently.'
'Really? What sort of car?'

- A have been thinking
- B have thought
- C thought

- 2 'I haven't seen Mark for weeks.'
'Well, I ... him this afternoon. Why don't you come along?'

- A have met
- B am meeting
- C meet

- 3 'We'd better take a taxi to the station.'
'Yes. The train ... in fifteen minutes.'

- A has left
- B will have left
- C leaves

- 4 'Where is the newspaper?'
'I threw it away. I thought you ... reading it.'

- A have finished
- B finished
- C had finished

- 5 'I feel very tired.'
'How can you be tired? You ... a thing all day.'

- A haven't been doing
- B aren't doing
- C haven't done

- 6 'Cathy doesn't study enough.'
'I know. I'm afraid she ... her exam.'
- A won't pass
B won't be passing
C won't have passed
- 7 'It's bad news about Janet crashing her new car, isn't it?'
'Yes. She ... for months to buy it.'
- A saved
B is saving
C had been saving
- 8 'There's someone here to see you.'
'Oh, that ... my sister. Send her in.'
- A will have been
B was
C will be
- 9 'Whose is this earring?'
'I don't know. I found it when I ... the house.'
- A was cleaning
B had cleaned
C am cleaning
- 10 'I ... to reach Jane on the phone all day.'
'Don't you know? She's gone on holiday.'
- A tried
B have been trying
C have tried
- 11 'I want to visit Katie.'
'Well, don't visit her before five o'clock. She ... '
- A is working
B will be working
C will have worked
- 12 'That ... like Dad's car.'
'It is. He must have finished work early.'
- A sounds
B had sounded
C has sounded
- 13 'Is that a new jumper?'
'No. I ... it from Laura yesterday.'
- A have borrowed
B had borrowed
C borrowed
- 14 ' ... to the library today?'
'Yes. Would you like me to return your books?'
- A Will you have gone
B Will you have been going
C Will you be going
- 15 'How is your grandfather?'
'His condition ... day by day.'
- A improves
B has improved
C is improving
- 16 'When did you speak to Sue?'
'I met her as I ... to work.'
- A had walked

B was walking

C am walking

17 'Shall we go shopping?'

'I can't go until the babysitter ... '

A arrives

B will arrive

C arrived

18 'I've invited Sam to my party.'

'I doubt if he He's studying for an exam.'

A comes

B will come

C is coming

19 'I'm sorry I'm late.'

'I ... here for over an hour.'

A have been waiting

B have waited

C was waiting

20 'I'm having trouble with the car.'

'I'm sure John ... you fix it if you ask him.'

A is going to help

B helps

C will help

21 'How long ... James?'

'Since we were children.'

A have you known

B do you know

C did you know

22 'You ... a good teacher one day.'

'Do you really think so?'

A were

B will be

C are being

Тема 2: Деловая переписка

2.1 Запомните слова и выражения, необходимые для освоения темы курса:

1. Обращение

Dear Sirs, Dear Sir or Madam

Dear Mr, Mrs, Miss or Ms

Dear Frank,

2. Вступление, предыдущее общение.

Thank you for your e-mail of (date)...

Further to your last e-mail...

I apologise for not getting in contact with you before now...

Thank you for your letter of the 5th of March.

With reference to your letter of 23rd March

With reference to your advertisement in «The Times»

3. Указание причин написания письма

I am writing to enquire about

I am writing to apologise for

I am writing to confirm

I am writing in connection with

We would like to point out that...

4. Просьба

Could you possibly...

I would be grateful if you could ...

I would like to receive

Please could you send me...

5. Соглашение с условиями.

I would be delighted to ...

I would be happy to

I would be glad to

6. Сообщение плохих новостей

Unfortunately ...

I am afraid that ...

I am sorry to inform you that

We regret to inform you that...

7. Приложение к письму дополнительных материалов

We are pleased to enclose ...

Attached you will find ...

We enclose ...

Please find attached (for e-mails)

8. Высказывание благодарности за проявленный интерес.

Thank you for your letter of

Thank you for enquiring

We would like to thank you for your letter of ...

9. Переход к другой теме.

We would also like to inform you ...

Regarding your question about ...

(если вам не известно имя адресата)

(если вам известно имя адресата; в том случае когда вы не знаете семейное положение женщины следует писать Ms, грубой ошибкой является использование фразы “Mrs or Miss”)
(В обращении к знакомому человеку)

Спасибо за ваше письмо от (числа)

Отвечая на ваше письмо...

Я прошу прощения, что до сих пор не написал вам...

Спасибо за ваше письмо от 5 Марта

Относительно вашего письма от 23 Марта

Относительно вашей рекламы в Таймс

Я пишу вам, чтобы узнать...

Я пишу вам, чтобы извиниться за...

Я пишу вам, что бы подтвердить...

Я пишу вам в связи с ...

Мы хотели бы обратить ваше внимание на ...

Не могли бы вы...

Я был бы признателен вам, если бы вы ...

Я бы хотел получить.....

Не могли бы вы выслать мне...

Я был бы рад ...

Я был бы счастлив...

Я был бы рад...

К сожалению...

Боюсь, что...

Мне тяжело сообщать вам, но ...

К сожалению, мы вынуждены сообщить вам о...

Мы с удовольствием вкладываем...

В прикрепленном файле вы найдете...

Мы прилагаем...

Вы найдете прикрепленный файл...

Спасибо за ваше письмо

Спасибо за проявленный интерес...

Мы хотели бы поблагодарить вас за...

Мы так же хотели бы сообщить вам о...

Относительно вашего вопроса о...

In answer to your question (enquiry) about ...
I also wonder if...

В ответ на ваш вопрос о...
Меня также интересует...

10. Дополнительные вопросы.

I am a little unsure about...
I do not fully understand what...
Could you possibly explain...

Я немного не уверен в ...
Я не до конца понял...
Не могли бы вы объяснить...

11. Передача информации

I'm writing to let you know that...
We are able to confirm to you...
I am delighted to tell you that...

Я пишу, чтобы сообщить о ...
Мы можем подтвердить ...
Мы с удовольствием сообщаем о ...
К сожалению, мы вынуждены сообщить вам
о...

We regret to inform you that...

12. Предложение своей помощи

Would you like me to...?
If you wish, I would be happy to...
Let me know whether you would like me to...

Могу ли я (сделать)...?
Если хотите, я с радостью...
Сообщите, если вам понадобится моя помощь.

13. Напоминание о намеченной встрече или ожидание ответа

I look forward to ...
hearing from you soon
meeting you next Tuesday
seeing you next Thursday

Я с нетерпением жду,
когда смогу снова услышать вас
встречи с вами в следующий Вторник
встречи с вами в Четверг

14. Подпись

Kind regards,
Yours faithfully,
Yours sincerely,

С уважением...
Искренне Ваш (если имя человека Вам не
известно)
(если имя Вам известно)

2.2 Подготовьте устный рассказ по теме на основе предложенного:

We can't imagine business without communication. Business is made through communication. It can be face-to-face conversation organized in the office or at the restaurant or business correspondence. It can be held with the help of regular mail or E-mail.

A business letter is the principal means used by a business firm to keep in touch with its customers. According to the purpose of the letter there may be different kinds, e.g. a letter of request, a memo (memorandum), a letter of advice, an invitation letter, a congratulation letter, a letter of thanks (gratitude), a letter of apology, an enquiry letter, a letter of guarantee, a letter of complaint, a letter of claim, an order letter, etc.

There are special rules to organize a business letter in a right way. The business letter consists of several parts.

First you should write your own name and address (in the right up corner), telephone numbers, and then write down the title, name and address of the recipient.

Always type the date, in the logical order of day, month, year (10th November 20...).

It is important to use the correct title of the person you are addressing to:

Dr. – means doctor (a person, who has Doctor's degree or PhD);

Professor – if you are addressing the professor;

Mr. / Sir – if you are addressing a male, but is not sure in his title;

Mrs. – if you are addressing a female (married);

Miss – if you are addressing a female (single);

Ms – if you are addressing a female (married or unmarried businesswoman);

Madam – addressing a female if you are not sure in her family status.

The salutation is the greeting with which every letter begins. Opening salutation is typed in the left-hand corner. There are several types of opening salutation:

Dear Sirs – to a company;

Dear Sir – to a man if you do not know his name;

Dear Madam – to a woman if you do not know her name;

Dear Sir or Madam – to a person if you know neither the name, nor sex;

Gentlemen – the most common salutation in the United States.

If your correspondent is known to you personally the warmer and more friendly greeting, *Dear Mr ...* is preferred.

The message forms the body of the letter and is the part that really matters. Some letters are very short and may consist of only one paragraph. Many others have three paragraphs: Introduction (why are you writing?), Details (facts, information, instructions), Action (what action will you take?).

Finishing the letter is a polite way of bringing a letter to a close and you should write one of the following phrases:

Yours sincerely; Truly yours, Yours faithfully sign the letter and put your (title), name and surname.

Business letters have to be written (typed) accurately in plain language.

Email and Fax Communication

E-mail writing has become a large part of modern communication, particularly in business. The world has become much smaller now that we have the ability to send and receive e-mail messages over great distances at an incredible speed. However e-mail was originally used as an informal means of communication. Therefore business e-mail letters are less formal in style than ordinary business letters.

E-mail is short for electronic mail. E-mail correspondence gets from one place to another in a matter of minutes. Connecting to the Internet provides you with e-mail services and an e-mail address which looks like this: *nickname@someplace.com* (@ means *at*, and *com* indicates the domain, in this case, a company). The Internet is a communication network that links computers all around the world via modems. Companies send documents from one place to another in minutes. E-mail is an up-to-date method of transmitting data, text files, and digital photos from one computer to another over the Internet. And now e-mails have become one of the most widely used forms of business and personal communication. E-mails are quick, so they are good for chatting, inviting people out, keeping in touch and doing business.

E-mails do not necessarily contain all the elements important for business letters. So e-mails are usually shorter and it takes less time to compile and send them. The e-mail language is much closer to spoken English than traditional business correspondence style.

Information about the sender and the receiver (addressee) appears at the top in a special frame – so the writer doesn't have to use traditional greetings. *Mr Black, Dear Peter, Peter* are all acceptable ways of starting an e-mail.

As e-mails are designed for speed, they usually avoid the formal expressions used in letters, and people often do not write in complete sentences using abbreviations. A message should be short to fit on one screen, whenever possible, thus keeping all important information visible at once. Be sure your message is easy to answer.

You can end your e-mail with:

Best wishes

All best wishes

Best regards

Regards

Yours

To people you know well, you can end with:

All the best

Best

People often sign e-mail with their first name.

There are a few important points to remember when composing e-mail, particularly when the e-mail's recipient is someone who does not know you.

- Include a meaningful subject line; this helps clarify what your message is about.
- Open your e-mail with a greeting like *Dear Dr. Jones, or Ms. Smith.*

- Use standard spelling and punctuation.
- Don't write unnecessarily long e-mails (4 or 5 paragraphs). Write clear, short paragraphs.
- In business e-mails, try not to use abbreviations such as PLS (please) and BTW (by the way).
- Finish with a closing decision, hope or apology.
- Include a Signature Block in every e-mail – your name, title, business address, telephone number, fax numbers, e-mail address and website address.

Be polite and give as many contact details as possible so that the reader can contact you in different ways.

Even in today's modern age of the Internet, it is still necessary to send and receive faxes. Most companies, large or small, have a fax machine. This allows them to send facsimiles of any document. A fax message is the message that is sent or received over a fax machine (phone lines are used) or online fax service. The word *fax* comes from the word *facsimile* standing for *perfect copy*.

The original document is scanned with a fax machine; the information is then transmitted as electrical signals through the telephone system. A fax message is often sent when particular official correspondence needs to be sent or received urgently and it is not possible to send the documents via email.

1.3 Систематизация грамматического материала:

Категория страдательного залога английского глагола. Образование форм. Passive Voice

образуется при помощи вспомогательного глагола *to be* в соответствующем времени, лице и числе и причастия прошедшего времени смысл. глагола – Participle II (III –я форма или *ed*-форма).

В страдательном залоге не употребляются:

1) Непереходные глаголы, т.к. при них нет объекта, который испытывал бы воздействие, то есть нет прямых дополнений которые могли бы стать подлежащими при глаголе в форме *Passive*.

Переходными в англ. языке называются глаголы, после которых в действительном залоге следует прямое дополнение; в русском языке это дополнение, отвечающее на вопросы винительного падежа – кого? что?: *to build* строить, *to see* видеть, *to take* брать, *to open* открывать и т.п.

Непереходными глаголами называются такие глаголы, которые не требуют после себя прямого дополнения: *to live* жить, *to come* приходить, *to fly* летать, *to cry* плакать и др.

2) Глаголы-связки: *be* – быть, *become* – становиться/стать.

3) Модальные глаголы.

4) Некоторые переходные глаголы не могут использоваться в страдательном залоге. В большинстве случаев это глаголы состояния, такие как:

to fit годиться, быть впору *to have* иметь *to lack* не хватать, недоставать *to like* нравиться
to resemble напоминать, быть похожим *to suit* годиться, подходить и др.

При изменении глагола из действительного в страдательный залог меняется вся конструкция предложения:

- дополнение предложения в *Active* становится подлежащим предложения в *Passive*;
- подлежащее предложения в *Active* становится предложным дополнением, которое вводится предлогом *by* или вовсе опускается;
- сказуемое в форме *Active* становится сказуемым в форме *Passive*.

Особенности употребления форм *Passive*:

1. Форма *Future Continuous* не употребляется в *Passive*, вместо нее употребляется *Future Indefinite*:

At ten o'clock this morning Nick will be writing the letter. – At ten o'clock this morning the letter will be written by Nick.

2. В Passive нет форм Perfect Continuous, поэтому в тех случаях, когда нужно передать в Passive действие, начавшееся до какого-то момента и продолжающееся вплоть до этого момента, употребляются формы Perfect:

He has been writing the story for three months. The story has been written by him for three months.

3. Для краткости, во избежание сложных форм, формы Indefinite (Present, Past, Future) часто употребляются вместо форм Perfect и Continuous, как в повседневной речи так и в художественной литературе. Формы Perfect и Continuous чаще употребляются в научной литературе и технических инструкциях.

This letter has been written by Bill. (Present Perfect)

This letter is written by Bill. (Present Indefinite – более употребительно)

Apples are being sold in this shop. (Present Continuous)

Apples are sold in this shop. (Present Indefinite – более употребительно)

4. Если несколько однотипных действий относятся к одному подлежащему, то вспомогательные глаголы обычно употребляются только перед первым действием, например: The new course will be sold in shops and ordered by post.

Прямой пассив (The Direct Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует прямому дополнению предложения в Active. Прямой пассив образуется от большинства переходных глаголов.

I gave him a book. Я дал ему книгу. A book was given to him. Ему дали книгу. (или Книга была дана ему)

The thief stole my watch yesterday. Вор украл мои часы вчера.

My watch was stolen yesterday. Мои часы были украдены вчера.

В английском языке имеется ряд переходных глаголов, которые соответствуют непереходным глаголам в русском языке. В английском они могут употребляться в прямом пассиве, а в русском – нет. Это: to answer отвечать кому-л.

to believe верить кому-л. to enter входить (в) to follow следовать (за) to help помогать кому-л.

to influence влиять (на) to join присоединяться to need нуждаться to watch наблюдать (за)

Так как соответствующие русские глаголы, являясь непереходными, не могут употребляться в страдательном залоге, то они переводятся на русский язык глаголами в действительном залоге:

Winter is followed by spring.

А при отсутствии дополнения с предлогом by переводятся неопределенно-личными предложениями: Your help is needed.

Косвенный пассив (The Indirect Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует косвенному дополнению предложения в Active. Она возможна только с глаголами, которые могут иметь и прямое и косвенное дополнения в действительном залоге. Прямое дополнение обычно означает предмет (что?), а косвенное – лицо (кому?).

С такими глаголами в действительном залоге можно образовать две конструкции:

а) глагол + косвенное дополнение + прямое дополнение;

б) глагол + прямое дополнение + предлог + косвенное дополнение:

а) They sent Ann an invitation.- Они послали Анне приглашение.

б) They sent an invitation to Ann. - Они послали приглашение Анне.

В страдательном залоге с ними также можно образовать две конструкции – прямой и косвенный пассив, в зависимости от того, какое дополнение становится подлежащим предложения в Passive. К этим глаголам относятся: to bring приносить

to buy покупать to give давать to invite приглашать to leave оставлять

to lend одалживать to offer предлагать to order приказывать to pay платить
to promise обещать to sell продавать to send посылать to show показывать
to teach учить to tell сказать и др.

Например: Tom gave Mary a book. Том дал Мэри книгу.

Mary was given a book. Мэри дали книгу. (косвенный пассив – более употребителен)

A book was given to Mary. Книгу дали Мэри. (прямой пассив – менее употребителен)

Выбор между прямым или косвенным пассивом зависит от смыслового акцента, вкладываемого в последние, наиболее значимые, слова фразы:

John was offered a good job. (косвенный пассив) Джону предложили хорошую работу.

The job was offered to John. (прямой пассив) Работу предложили Джону.

Глагол to ask спрашивать образует только одну пассивную конструкцию – ту, в которой подлежащим является дополнение, обозначающее лицо (косвенный пассив):

He was asked a lot of questions. Ему задали много вопросов.

Косвенный пассив невозможен с некоторыми глаголами, требующими косвенного дополнения (кому?) с предлогом to. Такое косвенное дополнение не может быть подлежащим в Passive, поэтому в страдательном залоге возможна только одна конструкция – прямой пассив, то есть вариант: Что? объяснили, предложили, повторили...Кому? Это глаголы: to address адресовать

to describe описывать to dictate диктовать to explain объяснять to mention упоминать

to propose предлагать to repeat повторять to suggest предлагать to write писать и др.

Например: The teacher explained the rule to the pupils. – Учитель объяснил правило ученикам. The rule was explained to the pupils. – Правило объяснили ученикам. (Not: The pupils was explained...)

Употребление Страдательного залога

В английском языке, как и в русском, страдательный залог употр. для того чтобы:

1. Обойтись без упоминания исполнителя действия (70% случаев употребления Passive) в тех случаях когда:

а) Исполнитель неизвестен или его не хотят упоминать:

He was killed in the war. Он был убит на войне.

б) Исполнитель не важен, а интерес представляет лишь объект воздействия и сопутствующие обстоятельства:

The window was broken last night. Окно было разбито прошлой ночью.

в) Исполнитель действия не называется, поскольку он ясен из ситуации или контекста:

The boy was operated on the next day. Мальчика оперировали на следующий день.

г) Безличные пассивные конструкции постоянно используются в научной и учебной литературе, в различных руководствах: The contents of the container should be kept in a cool dry place. Содержимое упаковки следует хранить в сухом прохладном месте.

2. Для того, чтобы специально привлечь внимание к тому, кем или чем осуществлялось действие. В этом случае существительное (одушевленное или неодушевленное.) или местоимение (в объектном падеже) вводится предлогом by после сказуемого в Passive.

В английском языке, как и в русском, смысловой акцент приходится на последнюю часть фразы. He quickly dressed. Он быстро оделся.

Поэтому, если нужно подчеркнуть исполнителя действия, то о нем следует сказать в конце предложения. Из-за строгого порядка слов английского предложения это можно осуществить лишь прибегнув к страдательному залогу. Сравните:

The flood broke the dam. (Active) Наводнение разрушило плотину. (Наводнение разрушило что? – плотину)

The dam was broken by the flood. (Passive) Плотина была разрушена наводнением. (Плотина разрушена чем? – наводнением)

Чаще всего используется, когда речь идет об авторстве:

The letter was written by my brother. Это письмо было написано моим братом.

И когда исполнитель действия является причиной последующего состояния:

The house was damaged by a storm. Дом был поврежден грозой.

Примечание: Если действие совершается с помощью какого-то предмета, то употребляется предлог with, например:

He was shot with a revolver. Он был убит из револьвера.

Перевод глаголов в форме Passive

В русском языке есть три способа выражения страдательного залога:

1. При помощи глагола "быть" и краткой формы страдательного причастия, причем в настоящем времени "быть" опускается:

I am invited to a party.

Я приглашён на вечеринку.

Иногда при переводе используется обратный порядок слов, когда русское предложение начинается со сказуемого: New technique has been developed. Была разработана новая методика.

2. Глагол в страдательном залоге переводится русским глаголом, оканчивающимся на –ся(-сь):

Bread is made from flour. Хлеб делается из муки.

Answers are given in the written form. Ответы даются в письменном виде.

3. Неопределенно-личным предложением (подлежащее в переводе отсутствует; сказуемое стоит в 3-м лице множественного числа действительного залога). Этот способ перевода возможен только при отсутствии дополнения с предлогом by (производитель действия не упомянут):

The book is much spoken about. Об этой книге много говорят.

I was told that you're ill. Мне сказали, что ты болен.

4. Если в предложении указан субъект действия, то его можно перевести личным предложением с глаголом в действительном залоге (дополнение с by при переводе становится подлежащим). Выбор того или иного способа перевода зависит от значения глагола и всего предложения в целом (от контекста):

They were invited by my friend. Их пригласил мой друг.(или Они были приглашены моим другом.)

Примечание 1: Иногда страдательный оборот можно перевести двумя или даже тремя способами, в зависимости от соответствующего русского глагола и контекста:

The experiments were made last year.

1) Опыты были проведены в прошлом году.

2) Опыты проводились в прошлом году.

3) Опыты проводили в прошлом году.

Примечание 2: При переводе нужно учитывать, что в английском языке, в отличие от русского, при изменении залога не происходит изменение падежа слова, стоящего перед глаголом (например в английском she и she, а переводим на русский - она и ей):

Примечание 3: Обороты, состоящие из местоимения it с глаголом в страдательном залоге переводятся неопределенно-личными оборотами:

It is said... Говорят... It was said... Говорили...

It is known... Известно... It was thought... Думали, полагали...

It is reported... Сообщают... It was reported... Сообщали... и т.п.

В таких оборотах it играет роль формального подлежащего и не имеет самостоятельного значения: It was expected that he would return soon. Ожидали, что он скоро вернется.

Выполните упражнения для закрепления материала:

1. What happens in Luigi's restaurant before it opens for the evening? Look at the prompts and make sentences using the present simple passive, as in the example.

1 the carpets/vacuum

... The carpets are vacuumed....

2 the tables/wipe

- 3 the cutlery/polish
- 4 the places/set
- 5 the menu/check
- 6 the food/prepare
- 7 the ovens/heat
- 8 the flowers/arrange/in vases
- 9 the salt and pepper pots/fill
- 10 the candles/light

2. Put the verbs in brackets into the correct passive tense.

- 1 A: That's a lovely shirt. Is it new?
B: Yes. It ...*was bought*... (buy) for me by my grandmother.
- 2 A: When do you have to have this report ready?
B: Well, it ... (must/hand in) by Tuesday.
- 3 A: Did you read the newspaper this morning?
B: No. It ... (not/deliver) by the time I left for work.
- 4 A: Where is your car?
B: At the garage. It ... (repair).
- 5 A: Do you know your exam results yet?
B: No. They ... (not/announce) yet.
- 6 A: Are you going to make dinner tonight?
B: No. It ... (make) by Simon. He promised to do it.
- 7 A: Have you finished your homework yet?
B: No, but it ... (finish) by eight o'clock.
- 8 A: Who waters your plants for you when you're away?
B: They ... (water) by my neighbour.

3. Put the verbs in brackets into the correct passive tense.

The Academy Awards Presentation 1) ...*was first organised*... (first/organise) in 1929 and since then, it 2) ... (hold) every year. The presentation 3) ... (attend) by those at the top of the film industry and 4) ... (watch) on TV by millions of viewers who want to see who 5) ... (present) with the golden statue which 6) ... (desire) by everyone in the motion picture world. The voting for the Academy Awards 7) ... (conduct) secretly and the results 8) ... (not/reveal) to anyone until the envelope 9) ... (open) on stage in front of the audience. Awards 10) ... (give) for the best individual or collective work and 11) ... (separate) into different categories. Up to five nominations 12) ... (make) in each category. The awards, which 13) ... (know) as Oscars, 14) ... (consider) to be the highest honour anyone in the film industry can 15) ... (give).

4. Rewrite the sentences in the passive, where possible.

- 1 Her mother drives her to school every day.
... *She is driven to school by her mother every day*...
- 2 Paul drives to work every day.
...*it cannot be changed*...
- 3 I woke up late on Sunday morning.
- 4 Her mother woke her up at seven o'clock.
- 5 Sue asked the waiter to bring some water.
- 6 David asked for some help.
- 7 Simon is moving house next month.
- 8 Michael moved the boxes out of the way.
- 9 Sandra walks on the beach regularly.
- 10 The boys walk the dog every day.

5. Fill in by or with.

- 1 She was woken up ...*by*... a loud noise.
- 2 The parcel was tied up ... string.
- 3 John was told off ... his mother.
- 4 This picture was painted ... a famous artist.
- 5 The chair was covered ... a woollen blanket.
- 6 The walls were decorated ... posters.
- 7 My car was repaired ... my father.
- 8 This dessert was made ... fresh cream.

6. Rewrite the sentences in the passive. Omit the agent where possible.

- 1 Do they sell clothes in this shop?
...Are clothes sold In this shop?...
- 2 Someone is cleaning the windows.
- 3 She tapped him on the hand with her pen.
- 4 I don't like people laughing at me.
- 5 People spend a lot of money on food.
- 6 Is Sue washing the car?
- 7 Who made this mess?
- 8 Grandfather is going to tell the children a story.
- 9 They will open the new sports centre soon.
- 10 They made him confess to the robbery.
- 11 Liz showed me some holiday pictures.
- 12 Sam remembers his friend telling him about the party.
- 13 They heard him calling for help.
- 14 Who broke this mug?
- 15 The jury will have reached a verdict by the morning.
- 16 The teacher will mark the essays.
- 17 People make jam from fruit.
- 18 They sent for the doctor.
- 19 Clive hasn't cut the grass yet.
- 20 They may not repair the car this week.

7. Complete the sentences, as in the example.

- 1 It is said that this orchestra is the best in the world.
This orchestra ...*is said to be the best in the world.*
- 2 It is believed that the thieves have left the country.
The thieves
- 3 The fire is reported to have started by accident.
It
- 4 He is known to be making a lot of money.
It
- 5 It is expected that they will arrive in time for dinner.
They
- 6 She is said to know a lot about gardening.
It
- 7 It is thought that he will be attending the meeting.
He
- 8 It is believed that we are able to win the competition.
We
- 9 The company is thought to be making a big profit.
It
- 10 It is reported that the government has reached a decision.
The government

- 11 It is said that they were responsible for the damage.
They
- 12 She is expected to break the world record.
It
- 13 He is known to have several foreign bank accounts.
It
- 14 They are reported to have financial problems.
It

8. Underline the correct answer.

A large amount of valuable jewellery 1) **has stolen/has been stolen** from Forest Manor. A man 2) **arrested/was arrested** yesterday and 3) **is questioned/is being questioned** by the police at the moment. He 4) **thought/is thought** to 5) **have committed/ have been committed** the crime, although so far no proof 6) **has found/has been found**. The robbery 7) **believed/is believed** to 8) **have carried out/have been carried out** by two men, but so far no clue 9) **has discovered/has been discovered** as to the second man's identity. The police say that he may 10) **have left/have been left** the country.

9. Rewrite the following passages in the passive.

A) Yesterday afternoon, the school held a sports day. John's teacher entered him for the 100m race because people thought John was the fastest runner in the school. John's teacher blew the whistle and the race started. Loud cheers filled the air as John's friends cheered him on. John overtook all the other runners and, as people had expected, John won the race. The headmaster gave him a trophy as a prize.

B) Do you think that people will ever use electric cars? Someone has already invented the electric car, but at the moment they are too expensive for most people to buy. Also, you have to recharge their batteries frequently. However, if people drove electric cars instead of the cars we use today, the air we breathe would be cleaner, as they would not pump exhaust fumes into the atmosphere.

C) Last week, the Prime Minister visited Dawston. The Mayor of the town greeted him when he arrived and gave him a tour. He introduced the Prime Minister to some important businessmen and took him to lunch in a local restaurant. In the afternoon, the Mayor held a meeting and the Prime Minister addressed the citizens of Dawston. He told them that he had enjoyed his visit very much.

10. Rewrite the sentences in the active.

- 1 Her excuse may not be believed by her parents.
...Her parents may not believe her excuse....
- 2 The painting has been valued by an expert.
- 3 He likes being given presents.
- 4 The bill must be paid immediately.
- 5 Hot water is provided by the hotel 24 hours a day.
- 6 Our newspaper is delivered by a boy every morning.
- 7 Her wedding dress will be made by a designer in Paris
- 8 The meeting was attended by several important art critics,
- 9 Preparations are being made by the event organizers.
- 10 An interesting book has been published by the company.

11. Put the verbs in brackets into the correct passive or active tense.

Coffee 1) *...is said...* (say) to originate from Kaffa in Ethiopia and most species of coffee plant 2) ... (find) in the tropics of the Eastern Hemisphere. The species which 3) ... (think) to be the earliest coffee plant 4) ... (ever/cultivate) by man is *Coffea arabica*. Today it 5) ... (grow) mostly in Latin America.

The coffee shrub 6) ... (reach) a height of 8-10 metres and 7) ... (have) white scented flowers. It 8) ... (produce) a red fruit which 9) ... (call) a cherry. The cherry 10) ... (contain) two seeds which

11) (join) together. These seeds, which 12) ... (also/know) as beans, 13) ... (first/roast) I and then they 14) ... (grind) to make coffee.

The grounds 15) ... (then/process) in a variety of different ways. Sometimes they 16) ... (filter) and sometimes they 17) ... (soak) in water to make the drink which is popular with so many people. Coffee is available as grounds or as instant coffee powder and 18) ... (drink) by one third of the world's population.

12. Read the situations, then write sentences using have something done.

1 John's suit is dirty. It has to be dry-cleaned. What should he do?

...He should have his suit dry-cleaned...

2 All Linda's clothes are made specially for her. What does she do?

3 They arranged for their house to be painted last week. Now it has been done. What have they done?

4 Malcolm's car was broken into last night. What happened to him?

5 Her bag was stolen yesterday. What happened to her?

6 A printer has printed party invitations for Emma. What has Emma done?

7 Diana is at the hairdresser's. The hairdresser is cutting her hair. What is Diana doing?

8 Robert is taking his car to the garage for a service tomorrow. What's he going to do?

9 Their roof has a hole in it. What should they do?

10 Tracey's bicycle has got a puncture. What should she do?

13. Complete the following conversation using have something done.

A: I 1) ...'m having an extension built... (an extension/build) on my house this week.

B: That's nice. When it's finished, 2) ... (it/decorate)?

A: No, I'm going to do that myself. First, though, I 3) ... (double glazing/fit).

A: 4) ... (carpets/lay)?

B: I'm not sure yet. How about you? 5) ... (you/your curtains/deliver) last week?

A: Yes. They're really nice. I also 6) ... (the carpets/clean), so everything looks lovely now.

14. Rewrite the sentences using have something done.

1 His teeth are checked twice a year.

...He has his teeth checked twice a year....

2 Her skirt is being cleaned at the moment.

3 My hair is trimmed once a month.

4 Central heating is going to be installed in our house next month.

5 Sam's burglar alarm was fitted last week.

6 My car is being repaired at the moment.

7 The band's new single has just been recorded.

8 Our new furniture is going to be delivered tomorrow.

9 Their new house is being decorated at the moment.

10 The windows will be cleaned.

11 A new jumper has been knitted for me.

12 The lock has to be fixed.

13 A new pair of glasses is going to be made for him.

15. Rewrite the sentences using have something done.

1 Their windows need to be cleaned.

...They need to have their windows cleaned....

2 The hairdresser was styling Mrs Brown's hair.

3 She told her son to carry the shopping to the house.

4 Dad is going to arrange for someone to cut the grass.

5 They used to employ a cleaner who cleaned the house.

6 Did the mechanic repair Paul's motorbike?

- 7 The boss asked his assistant to type the letter.
- 8 A plumber fixed the dripping tap for Joe.
- 9 Have you told the secretary to make some photo-copies?
- 10 The chef was cooking Tom's lunch.
- 11 Did you tell the shop to deliver the sofa to you?
- 12 My purse was stolen last Friday.
- 13 Did you employ a painter to decorate your house?
- 14 The builders are putting a new roof on Adam's house at the moment.
- 15 She asked the maid to polish the silver.
- 16 The man had asked the porter to take his luggage to his room.
- 17 Did you ask Jenny to arrange the flowers for you?
- 18 When will your glasses be made?
- 19 I hired a professional to cater for my party.
- 20 Did you ask anyone to sweep the chimney?
- 21 She asked him to do the shopping.
- 22 Their house was burgled last night.
- 23 He employed a carpenter to build the fence.
- 24 Julie's housekeeper irons all her clothes.
- 25 His shop's windows were smashed in the not.

Тема 3: Наука и образование

3.1 Запомните слова и выражения, необходимые для освоения темы курса:

- analysis - анализ, исследование;
critical analysis — критический анализ;
advanced research — перспективные исследования;
basic research — фундаментальные исследования;
to be engaged in research — заниматься научно-исследовательской работой;
This researches cover a wide field — исследования охватывают широкую область;
after the study of the matter — после изучения этого вопроса;
humane studies — гуманитарные науки;
history and allied studies — история и родственные ей предметы;
a new study of Shakespeare — новая работа /книга/ о Шекспире;
pilot study - предварительное, экспериментальное исследование
desk study - чисто теоретическое исследование;
thorough examination — а) всестороннее исследование; б) тщательное изучение (материала);
to carry on an investigation — проводить исследовательскую работу;
the scientific method of inquiry — научный метод исследования;
we must apply to find a solution — мы должны применить....., чтобы решить;
comparative [experimental] method of investigation — сравнительный [экспериментальный] метод исследования;
his method is to compare different versions — его метод состоит в сопоставлении разных вариантов;
there are several methods of doing this — существует несколько способов сделать это;
ampliative inference — индуктивный метод;
a method that is attended by some risk — метод, связанный с некоторым риском;
convenient method — подходящий метод;
to approximate to a solution of the problem — подходить к решению задачи;
to use ... approach(to) - подход interdisciplinary approach — подход с точки зрения различных наук;
we began the work by collecting material — Мы начали работу со сбора материала;
we have two problems before us — перед нами две задачи;
data for study — материал исследования;
laboratory data — данные лабораторных исследований;
adequacy of data — достоверность данных;
acceptance of a theory — согласие с какой-л. теорией;
application of a theory in actual practice — применение теории в практической деятельности;
the backbone of a theory — основа теории;
to back up a theory with facts — подкрепить теорию фактами;
to construct a theory — создать теорию;
the results of the experiment contradicted this theory/agreed with the theory — результаты опыта шли вразрез с этой теорией/согласовывались с теорией;
- professor – профессор;
lecturer – лектор;
researcher – исследователь;
research – исследование;
graduate - имеющий учёную степень; выпускник;
post-graduate или post-graduate student – аспирант;
masters student – магистрант;
PhD student – докторант;

master's degree - степень магистра;
bachelor's degree - бакалаврская степень;
degree – степень;
thesis - диссертация; исследовательская работа;
dissertation – диссертация;
lecture – лекция;
higher education - высшее образование;
semester – семестр;
student union - студенческий союз;
tuition fees - плата за обучение;
university campus - университетский район; кампус;

3.2 Подготовьте устный рассказ по теме на основе предложенного:

Science is important to world peace in many ways. On one hand, scientists have helped to develop many of the modern tools of war. On the other hand, they have also helped to keep the peace through research which has improved life for people. Scientists have helped us understand the problem of supplying the world with enough energy; they have begun to develop a number of solutions to the energy problem - for example, using energy from the sun and from the atom. Scientists have also analyzed the world's resources. We can begin to learn to share the resources with the knowledge provided to us by science. Science studies the Universe and how to use its possibilities for the benefit of men.

Science is also important to everyone who is affected by modern technology. Many of the things that make our lives easier and better are the results of advances in technology and, if the present patterns continue, technology will affect us even more in the future than it does now. In some cases, such as technology for taking salt out of ocean water, technology may be essential for our lives on Earth.

The study of science also provides people with an understanding of natural world. Scientists are learning to predict earthquakes, are continuing to study many other natural events such as storms. Scientists are also studying various aspects of human biology and the origin and developments of the human race. The study of the natural world may help to improve life for many people all over the world.

A basic knowledge of science is essential for everyone. It helps people find their way in the changing world.

An Academic Conference

The best way to exchange ideas, learn new things and expand your network is to become involved in groups relevant to your craft. This can be through user groups for a particular software environment you work with, or professional associations.

There are plenty of websites and forums that enable professionals to engage with one another online, but nothing seals a bond like face-to-face activities.

The ability to communicate your ideas to audiences will raise your profile to new levels.

The Academic Conference presents a challenge to interaction with other scientists. They regularly take part in conferences and discussions around the world.

A researcher receives an email about the opportunity to submit a proposal to be a presenter at the conference.

An academic conference or symposium is a conference for scholars and scientists to present and discuss their work. Together with academic or scientific journals, conferences provide an important channel for exchange of information among researchers.

Conferences are usually composed of various presentations. They tend to be short and concise, with a time span of about 10 to 30 minutes. The work may be bundled in written form as academic papers and published as the conference proceedings. They are published to inform a wider audience of the material presented at the conference.

A conference usually includes a keynote speaker (основной докладчик). The keynote lecture is longer, lasting up to an hour and a half. Conferences also feature panel discussions, round tables on various issues and workshops.

Prospective presenters are usually asked to submit a short abstract of their presentation. Nowadays, presenters usually base their talk around a visual presentation that displays key figures and research results.

At some conferences, social or entertainment activities such as tours and receptions can be part of the programme. Business meetings for learned societies (научное общество) or interest groups can also be part of the conference activities.

Academic publishing houses may set up displays at large conferences. Academic conferences fall into three categories:

- a) the themed conference, a small conference organised around a particular topic;
- b) the general conference, a conference with sessions on a wide variety of topics, often organised by regional, national, or international learned societies, and held annually or on some other regular basis;
- c) the professional conference, large conferences not limited to academics (научные работники) but with academically related issues.

Traditional conferences mean participants have to travel and stay in a particular place. This takes time. And an online conference uses the Internet, and participants can access the conference from anywhere in the world and can do this at any time, using browser software. Participants are given a password to access the conference and seminar groups.

The conference is announced by way of a Call for Abstracts, which lists the topics of the meeting and tells prospective presenters how to submit their abstracts.

Submissions take place online. An abstract is a brief summary of a research article, and is often used to help the reader quickly ascertain the purpose of the paper.

An academic abstract typically outlines four elements of the work:

- a) the research focus (statement of the problem) – an opening sentence placing the work in context, and one or two sentences giving the purpose of the work ;
 - b) the research methods used – one or two sentences explaining what was (or will) be done;
 - c) the results of the research – one or two sentences indicating the main findings;
 - d) the main conclusions – one sentence giving the most important consequence of the work.
- The typical abstract length ranges from 100 to 500 words.

3.3 Систематизация грамматического материала:

Модальные глаголы

| <u>Глаголы</u> | <u>Значение</u> | <u>Примеры</u> |
|----------------|--|---|
| CAN | физическая или умственная возможность/умение | I can swim very well. – Я очень хорошо умею плавать. |
| | возможность | You can go now. — Ты можешь идти сейчас. You cannot play football in the street. – На улице нельзя играть в футбол. |
| | вероятность | They can arrive any time. – Они могут приехать в любой момент. |
| | удивление | Can he have said that? – Неужели он это сказал? |
| | сомнение, недоверчивость | She can't be waiting for us now. – Не может быть, чтобы она сейчас нас ждала. |
| | разрешение | Can we go home? — Нам можно пойти домой? |
| | вежливая просьба | Could you <u>tell me</u> what time it is now? – Не могли бы вы подсказать, который сейчас час? |
| MAY | разрешение | May I borrow your book? – Я могу одолжить у тебя книгу? |
| | предположение | She may not come. – Она, возможно, не придет. |
| | возможность | In the museum you may see many interesting things. – В музее вы можете увидеть много интересных вещей. |

| | | |
|------------------------|---|--|
| | упрек – только MIGHT (+ perfect infinitive) | You might have told me that. – Ты мог бы мне это сказать. |
| MUST | обязательство, необходимость | He must work. He must earn money. – Он должен работать. Он должен зарабатывать деньги. |
| | вероятность (сильная степень) | He must be sick. — Он, должно быть, заболел. |
| | запрет | Tourists must not feed animals in the zoo. — Туристы не должны кормить животных в зоопарке. |
| SHOULD OUGHT TO | моральное долженствование | You ought to be polite. – Вы должны быть любезными. |
| | совет | You should see a doctor. – Вам следует сходить к врачу. |
| | упрек, запрет | You should have taken the umbrella. – Тебе следовало взять с собой <u>зонт</u> . |
| SHALL | указ, обязанность | These rules shall apply in all circumstances. – Эти правила будут действовать при любых обстоятельствах. |
| | угроза | You shall suffer. — Ты будешь страдать. |
| | просьба об указании | Shall I open the window? – Мне открыть окно? |
| WILL | готовность, нежелание/отказ | The door won't open. — Дверь не открывается. |
| | вежливая просьба | Will you go with me? – Ты сможешь пойти со мной? |
| WOULD | готовность, нежелание/отказ | He would not answer this question. – Он не будет отвечать на этот вопрос. |
| | вежливая просьба | Would you please come with me? — Не могли бы вы пройти со мной. |
| | повторяющееся/привычное действие | We would talk for hours. – Мы беседовали часами. |
| NEED | необходимость | Do you need to work so hard? – Тебе надо столько работать? |
| NEEDN'T | отсутствие необходимости | She needn't go there. — Ей не нужно туда идти. |
| DARE | Посметь | How dare you say that? – Как ты смеешь такое говорить? |

| Модальные единицы эквивалентного типа | | |
|--|--|---|
| to be able (to) = can | Возможность соверш-я конкрет-го дей-ия в опред. момент | She was able to change the situation then. (Она тогда была в состоянии (могла) изменить ситуацию). |
| to be allowed (to) = may | Возмож-ть совер-ия дей-ия в наст.-м, прош-ом или буд-ем + оттенок разрешения | My sister is allowed to play outdoors. (Моей сестре разрешается играть на улице). |
| to have (to)= ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом или буд-ем при опред-х об-вах | They will have to set up in business soon. (Им вскоре придется открыть свое дело). |
| to be (to)= ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом при наличии опред. планов, распис-ий и т.д. | We are to send Nick about his business. (Мы должны (= планируем) выпроводить Ника) |

Выполните упражнения для закрепления материала:

1. Fill in the gaps with can, can't, could, couldn't or was/wasn't able to.

- 1 I had my hands full, so I ...*couldn't/wasn't able to*... open the door.
2 When I was young, I ... stand on my head.
3 Although he felt ill, he ... finish all the paperwork.
4 Tony is clever. He ... speak three languages.
5 I ... afford that bag. It's too expensive.
6 Although it was dark, he ... find his way through the woods.
7 I heard his voice calling me, but I ... see him.
8 We're busy tonight, so we ... come to the party.
9 When I entered the house, I ... smell fresh bread baking.
10 I ... drive a car. I learnt when I was eighteen.

2. Fill in the gaps with must, mustn't or needn't/don't have to.

- 1 A: You ...*must*... study hard to pass the exams.
B: I know. I study every evening.
2 A: You ... be late for your job interview.
B: I know. I'll leave early so as to get there on time.
3 A: Shall I collect the children from the party?
B: No, you ... collect them. Mrs Shaw is giving them a lift home.
4 A: Do you want me to wait for you after work?
B: No, you ... wait. I can walk home by myself.
5 A: You ... interrupt while people are talking.
B: No. It's very bad manners to do that.
6 A: My dog has been ill all week.
B: Oh dear! You ... take him to the vet.
7 A: It's Sally's birthday on Wednesday.
B: I know. I ... remember to buy her a present.
8 A: Shall I wash the dishes for you?
B: No, you ... do that. I'll do them later.

3. Fill the gaps with needn't have or didn't need to and the correct form of the verb in brackets.

- 1 I ran all the way to work, but I ...*needn't have hurried*... (hurry) because I was the first person to arrive.
2 We ... (hurry), so we stopped to have lunch on the way.
3 I went to college today, but I ... (go) as all the lectures were cancelled.
4 I ... (ask) the way to Lewes, since I'd been there before.
5 I ... (buy) any food, so I didn't go to the supermarket.
6 I ... (buy) any food after all, because we had plenty at home.
7 I ... (pack) my shorts, as it rained all week.
8 We ... (pack) many things, as we would only be away for one night.

4. Complete the sentences using must or can't, as in the example.

- 1 I'm sure she has gone on holiday. She ...*must have gone on holiday*...
2 I'm certain he doesn't know the secret. He ...
3 I'm certain Mike hasn't got a new car. Mike ...
4 I'm sure Susan has paid the phone bill. Susan ...
5 I'm sure they don't live here. They ...
6 I'm sure they left the party early. They ...
7 I'm certain he didn't call me. He...
8 I'm certain Marie sent you a birthday card. Marie ...
9 I'm sure she has been keeping secrets from me. She...
10 I'm certain she is looking for a new job. She ...
11 I'm sure David didn't go to the supermarket. David ...

12 I'm certain he is working at the library. He ...

5. Rephrase the following sentences in as many ways as possible.

1 It's likely she has forgotten about the meeting.

She ...*may/might/could have forgotten about the meeting...*

2 Perhaps he will be home soon. He ...

3 Perhaps we won't stay in a hotel. We ...

4 It's possible she has been delayed in traffic. She ...

5 It's likely they have gone to the cinema. They ...

6 Perhaps they are asleep already. They ...

7 It's likely he hasn't been promoted. He ...

8 It's possible she called while we were out. She ...

9 It's likely we will go shopping this afternoon. We ...

10 Perhaps he is outside in the garden. He ...

11 It's possible they didn't receive our message. They ...

12 Perhaps she is visiting a friend. She ...

6. Fill in *can, can't, must, mustn't, needn't or have to*.

1 A: Is Jason at work today?

B: He ...*can't...* be. His car isn't in the car park.

2 A: I can't do my German homework. It's too difficult.

B: I'll help you. I ... speak German.

3 A: I'm going to watch television.

B: Alright, but you ... stay up too late.

4 A: We ... book a taxi to take us to the airport.

B: I'll do it now.

5 A: I didn't know Rachel was in the choir.

B: Oh yes. She ... sing beautifully.

6 A: Shall I cook dinner tonight?

B: No, youWe're going to a restaurant.

7 A: Has Tim bought a car yet?

B: He ... have. I saw him on the bus yesterday.

8 A: She ... be very rich.

B: Yes. She's got a huge house and an expensive car.

9 A: I did the washing-up for you.

B: Oh, you ... have, but it was kind of you.

10 A: Would you like to come to my party on Saturday night?

B: I'd like to, but Mum says I ... visit my grandparents.

7. Fill in the gaps with *could or was/were allowed to*.

1. The children ...*were allowed to...* go to the cinema on their own yesterday.

2. When I was young, we ... wear whatever we liked to school.

3. Peter ... watch a concert on TV last night, although it was on quite late.

4. When we were children, we ... play outside until it got dark.

5. Yesterday, we ... bring our favourite toys to school.

6. When Dennis lived with his parents, he ... come in at whatever time he liked.

8. Underline the correct word(s).

1 A: Could I sleep at my friend's house tonight?

B: Yes, of course you **could/can**.

2 A: I **could/was allowed to** go to the disco last night.

B: Was it good fun?

3 A: **Can/Might** I have a biscuit please, Mum?

B: Of course. Help yourself.

4 A: Excuse me, sir. **May I/Am I allowed to** leave the room?

B: Yes, but don't be too long.

5 A: **Must/Might** I borrow these files for a moment, sir?

B: Certainly. Take whatever you need.

6 A: Might I use your pen?

B: Of course you **may/might**.

7 A: **May I/Am I allowed to** park in the company car park?

B: Of course you are!

9. Fill in shall or will.

1 A: ...*Shall*... I help you with the washing-up?

B: No, I can manage by myself.

2 A: ... we have pizza for dinner tonight?

B: I'd rather have steak.

3 A: ... you carry this for me, please?

B: Certainly. It looks heavy.

4 A: What ... we buy for Bob's birthday?

B: I think he'd like a book.

5 A: ... you answer the phone, please?

B: Of course.

6 A: Where ... we sit in the classroom?

B: Next to the window.

7 A: ... you take the rubbish outside for me, please?

B: Yes, in a minute.

8 A: ... we have a barbecue next weekend?

B: Yes, if the weather's fine.

9 A: ... you babysit for me tonight?

B: I'm sorry, but I can't.

10 A: ... we try this new recipe tonight?

B: Yes. We've got all the ingredients.

10. Read the situations and complete the sentences with *should/shouldn't, ought to/ought not to* and the correct tense of the infinitive.

1 Your friend didn't see a film on TV last night. You saw it and it was very good.
You ...*should/ought to have seen*... (see) the film.

2 Liz bought an expensive jacket yesterday and now she hasn't got enough money for the rest of the week. She ... (buy) such an expensive jacket.

3 Your sister eats a lot of junk food which is bad for her health. You ... (eat) so much junk food.

4 Mr Jackson had a stiff back. He lifted some heavy boxes and now his back is worse. He ... (lift) those heavy boxes.

5 Tony always drives too fast. Yesterday, he was arrested for speeding. He ... (drive) more slowly.

6 Sally is clumsy. She is always breaking things. She ... (be) more careful.

7 Paul didn't do his homework. The teacher punished him. He ... (do) his homework.

8 Amy borrowed her brother's car without asking. He was very angry. She ... (borrow) his car without asking.

11. Underline the correct word(s) in bold.

1 A: I found a briefcase on the train.

B: You **ought to/can** take it to the police station as soon as possible.

2 A: Did you get some money from the bank?

B: No, I **didn't need to/needn't**. I had enough in my wallet.

3 A: Sorry I'm late again.

- B: You **should/might** wear a watch.
- 4 A: **Couldn't/May** I speak to Claire, please?
B: Just a moment, please. I'll call her.
- 5 A: We **could/must** go out for a meal this evening, if you like.
B: Oh, yes. That would be nice.
- 6 A: I wonder if Paul and Jim have got lost.
B: They **can't/mustn't** have got lost because I gave them a map.
- 7 A: **Could/Would** I use your telephone, please?
B: Yes, of course.
- 8 A: Was the exam very difficult?
B: Yes, but I **can/was able to** answer all the questions.
- 9 A: We **mustn't/needn't** go shopping this week. We've got plenty of food.
B: Alright. We'll go next week instead.
- 10 A: **Should/May** I sit down, please?
B: Yes, of course. Make yourself at home.
- 11 A: When **will/shall** I visit you next?
B: You **can/must** call in tomorrow, if you like.
- 12 A: Helen should be here by now.
B: She **ought to/could** have missed the train.

12. Match the items in column A to their synonyms in column B.

A

- 1 You mustn't...
- 2 You can't be ...
- 3 You needn't...
- 4 They ought to ...
- 5 She didn't need to
- 6 You should ...
- 7 May I ...?
- 8 We needn't have ...
- 9 He was able to ...
- 10 Shall we ...?
- 11 You must...
- 12 They must be ...

B

- a You are supposed to ...
- b It wasn't necessary for us to ... (but we did)
- c Let's ...
- d He managed to ...
- e They had better...
- f It is forbidden ...
- g I'm sure they are ...
- h Do you mind if I ...?
- i You are to...
- j It isn't necessary for you to ...
- k I'm certain you aren't ...
- l It wasn't necessary for her to ...

13. Rephrase the following sentences in as many ways as possible.

- 1 **It is possible that Sue will** be late this evening.
Sue may/might/could be late this evening./Sue is likely to be late this evening.
- 2 **I'm sure David isn't** going to the party tonight.
- 3 **The guests are supposed** to arrive at 8 o'clock.

- 4 **It wasn't necessary for Toby to** go to school today.
 5 **I advise you to** book a table in advance.
 6 **They are obliged to** wear helmets at work.
 7 **You are to** wait here until the manager arrives.
 8 **Steve managed to** repair the bike after trying for two hours.
 9 **Perhaps we will** go to Italy for a holiday next summer.
 10 **We are obliged to** wear a uniform for school.
 11 **You aren't allowed to** run in the corridors.
 12 **How about** inviting some friends over to dinner?
 13 **It isn't necessary for you to** buy me a present.
 14 **Do you mind if** I use your telephone?
 15 **Would you like me to** clean the windows for you?
 16 **How about** going for a walk this afternoon?

14. Rephrase the following sentences in as many ways as possible.

- 1 You had better ask your teacher to help you with your studies.
 ...*You ought to/should ask your teacher to help you with your studies...*
 2 Can you hold this bag for me, please?
 3 Why don't we go for a picnic this weekend?
 4 It wasn't necessary for John to go to work because it was Sunday.
 5 We managed to do the puzzle, although it was difficult.
 6 You are to report to the manager as soon as you reach Manchester.
 7 You are forbidden to enter this area.
 8 Do you mind if I take this chair?
 9 You don't need to feed the dog. I've already done it.
 10 You ought to have locked the doors when you went out.
 11 I strongly advise you to take legal action.
 12 We are supposed to obey the law.

15. Choose the correct answer.

- 1 Shall I make you a cup of tea?
 A) Yes, please. B No, you won't.
 2 Would you help me please? My car won't start.
 A I'd be happy to. B Yes, I would.
 3 Could you open the door for me, please?
 A Yes, I could. B Of course.
 4 Can you do the washing-up for me, please?
 A No, I may not. B No problem.
 5 We could go for a walk this afternoon.
 A That's a nice idea. B No, we might not.
 6 Could I sit down for a minute, please?
 A Yes, of course. B No, you couldn't.
 7 Can I get you anything, madam?
 A No, you can't. B No, thank you. I'm just looking.
 8 Can I go and play football now, please?
 A Not at all. B Yes, if you like.
 9 Shall I pick you up from work this evening?
 A Yes, please. B No, you won't.
 10 Will you hold this box for me, please?
 A Yes, I may. B Certainly.

16. Complete the sentences, as in the example. Sometimes more than one answer is possible.

Modal Use

- | | | |
|----|---|--|
| 1 | You ...can... go to the cinema. | giving permission |
| 2 | You ... have any sweets. | refusing permission |
| 3 | ... we go for a walk? | making a suggestion |
| 4 | ... I stay at Paul's house tonight, please? | asking for permission |
| 5 | You ...have worked harder. | expressing criticism |
| 6 | You .. talk in the library. | expressing prohibition |
| 7 | Sally .. invite us to her party. | expressing possibility |
| 8 | They ... be lost. | expressing a positive logical assumption |
| 9 | You ... do your homework before you go out. | expressing obligation |
| 10 | She ... be older than me. | expressing a negative logical assumption |
| 11 | Steve ... walk. He's broken his leg. | expressing lack of ability |
| 12 | I paint the fence for you? | making an offer |

17. Rephrase the following sentences in as many ways as possible.

- 1 Why don't we go to Spain on holiday this year?
...we can/could go to Spain on holiday this year...
- 2 Perhaps Tony has gone to work early.
- 3 Policemen are obliged to wear a uniform while on duty.
- 4 Simon managed to climb the mountain, although it was steep.
- 5 It is forbidden to sound the alarm for no reason.
- 6 How about watching a video this evening?
- 7 I'm certain Martin heard me calling him.
- 8 I'm sure Paul isn't an engineer.

18. Choose the correct answer.

- 1 ...B... I borrow your pen? Mine doesn't work.
 A Needn't B Can C Ought
- 2 I ... go to the bank. I haven't got any money.
 A must B mustn't C may
- 3 Lizzie ... spell her name before she was three.
 A might B could C must
- 4 ... you help me with the shopping, please?
 A Must B Shall C Will
- 5 You ... go to the post office. I'll go later.
 A needn't B might C must
- 6 You ... to study hard for your exams.
 A need B can't C shall
- 7 You ... to be at work by nine o'clock.
 A must B should C are
- 8 No reporters ... approach the scene of the accident.
 A might have B were allowed to C needn't
- 9 We ...phone Mary. It's her birthday today.
 A needn't B ought to C are able to
- 10 What time ... I pick you up from work?
 A mustn't B will C shall

19. Choose the correct answer.

- 1 'You ...C... pay the bills today.'
 'I know. I promise I won't forget.'
 A would B shall C must
- 2 '...we go to the beach tomorrow?'
 'Yes. That's a great idea.'
 A Shall B Mustn't C Would

- 3 'I'm going to the cinema. Do you want to come with me?'
'No, thank you. I ... do my homework.'
- A could B would C have to
- 4 'You ... put that shirt in the washing machine.'
'I know. It has to be dry-cleaned.'
- A must B mustn't C couldn't
- 5 'Was your suitcase very heavy?'
'Yes, but I ... carry it by myself.'
- A was able to B can't C ought
- 6 '... you drive?'
'Yes, but I haven't got my own car.'
- A Might B Should C Can
- 7 'I ... ride a bicycle until I was eight.'
'Neither could I.'
- A couldn't B could C can't
- 8 '... you open the door for me, please?'
'Yes, certainly.'
- A Shall B Must C Would
- 9 'Ben had a hard time trying to find the leak in the pipe.'
'But he ... stop it, wasn't he?'
- A was allowed to B was able to C could
- 10 'I saw Tina in town last night.'
'You ... have seen her. She's on holiday in Spain.'
- A would B could C can't
- 11 'Where's Colin?'
'I'm not sure. He ... be in the study.'
- A might B will C ought
- 12 'I feel very tired today.'
'You ... have stayed up so late last night.'
- A shouldn't B could C might
- 13 'Did you phone Alan yesterday?'
'No, IHe came round to see me.'
- A didn't need to B needn't C have to
- 14 '... you give me a lift to work tomorrow?'
'Yes. I'll pick you up at eight o'clock.'
- A May B Shall C Will
- 15 '... I help you, madam?'
'Yes, I'm looking for the manager.'
- A Would B Must C May

Тема 4: Чтение и перевод научной литературы по направлению исследования

4.1 Запомните слова и выражения, необходимые для освоения темы курса:

КОМПЬЮТЕРНОЕ ОБОРУДОВАНИЕ

laptop - лэптоп; ноутбук; портативный компьютер;
desktop computer (часто используется сокращение desktop) - персональный компьютер;
tablet computer (часто используется сокращение tablet) – планшет;
PC (сокращённо от personal computer) - персональный компьютер;
screen – экран;
keyboard – клавиатура;
mouse – мышка;
monitor – монитор;
printer – принтер;
wireless router - беспроводной роутер; маршрутизатор;
cable – кабель;
hard drive - жёсткий диск;
speakers – громкоговорители;
power cable - кабель питания;

ЭЛЕКТРОННАЯ ПОЧТА

Email - электронная почта;
to email - посылать письма по электронной почте;
to send an email – послать;
email address - адрес электронной почты, email;
username - имя пользователя;
password – пароль;
to reply – ответить;
to forward – переслать;
new message - новое сообщение;
attachment – приложение;

ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРА

to plug in - подключить что-либо к компьютеру;
to unplug - отсоединить; вытащить из розетки;
to switch on или to turn on – включить;
to switch off или to turn off – выключить;
to start up - запустить систему;
to shut down - выключить систему;
to restart – перезагрузить;

ИНТЕРНЕТ

the Internet – интернет;
website – сайт;
ISP (сокращённо от internet service provider) - поставщик услуг интернета;
Firewall - система защиты доступа; средство сетевой защиты;
web hosting - Web-хостинг;
wireless internet или WiFi – беспроводной;
to download – скачивать;
to browse the Internet - плавать в интернете;

file – файл;
folder – папка;
document – документ;
hardware - элементы электронных устройств; жарг. железо;
software - программное обеспечение;

network – сеть;
to scroll up - прокрутить вверх;
to scroll down - прокрутить вниз;
to log on – войти;
to log off – выйти;
space bar - клавиша для пробела;
virus – вирус;
antivirus software - антивирусная программа;
processor speed - скорость процессора;
memory – память;
word processor - текстовый процессор;
database - база данных;
spreadsheet - электронная таблица;
to print – распечатать;
to type – печатать;
lower case letter - нижний регистр (клавиатуры);
upper case letter или capital letter - заглавные буквы;

4.2 Подготовьте устный рассказ по теме на основе предложенного:

Electromagnetism is everywhere. It is a field that exists throughout space. When particles are electrically charged, the electromagnetic field exerts a force on them. These particles then move and exert a force on the electromagnetic field. By generating these fields when and where we want them and by controlling these forces we have electricity. This gives us the power we use in the modern world. All our TVs, phones, street lights and cars depend on electromagnetism.

So what is electromagnetism? Actually, it is two things, but they are so closely connected that it is convenient for us to think of them as one, as two sides of the same coin. There are two types of field: electric and magnetic. Electrically-charged particles result in an electric field, static electricity. When there is a conductor, a material which will allow electric field to pass through it, then we can create an electric current. In our homes, the conductors are the wires that run through our house to the light bulbs or the TV. A magnetic field results from the motion of an electric current and is used to generate the electricity we use.

In the 19th century, James Clerk Maxwell, the Scottish physicist, produced the equations that proved the two forces acted as one. One effect of this was for physicists all over the world to hurry back to their libraries and laboratories to rewrite the theories on the motion of objects. Maxwell's equations showed that what physicists had believed for centuries was in fact not correct. It was not until Einstein, in the 20th century, that the theory of motion was put right - at least for now.

How do we know the two things are one? Well, sailors had known for centuries that lightning affected the magnetic compasses on their ships. No one, however, made the connection between lightning and electricity until Benjamin Franklin, the American politician and scientist, flew a kite in a thunderstorm to attract the lightning. In other parts of the world, physicists were experimenting with magnets and electricity. Most passed a current across a magnetic needle and watched it move. The Frenchman, Andre Marie Ampere eventually applied mathematics to electromagnetism. It is from his work that we have our modern understanding of electromagnetism.

One piece of the jigsaw remained. No one had discovered a way of generating electricity. True, there were batteries, Alessandro Volta invented the Voltaic pile in 1800, but it was of limited use. Certainly no battery could provide enough electrical power to operate a machine. For that the world would have to wait for Michael Faraday to find a way of creating an electrical current, when and where it was needed.

Innovation

The term innovation derives from the Latin word *innovatus* (to renew or change). Although the term is broadly used, innovation generally refers to the creation of better or more effective products, processes, technologies, or ideas that are accepted by markets, governments, and society. Innovation

differs from invention or renovation in that innovation generally signifies a substantial positive change compared to incremental changes.

Inter-Disciplinary Views. Due to its widespread effect, innovation is an important topic in the study of economics, business, entrepreneurship, design, technology, sociology, and engineering. In society, innovation aids in comfort, convenience, and efficiency in everyday life. For instance, the benchmarks in railroad equipment and infrastructure added to greater safety, maintenance, speed, and weight capacity for passenger services. These innovations included changing from wood to steel cars, from iron to steel rails, stove-heated to steam-heated cars, gas lighting to electric lighting, diesel-powered to electric-diesel locomotives. By mid-20th century, trains were making longer, more comfortable, and faster trips at lower costs for passengers. Other areas that add to everyday quality of life include: the innovations to the light bulb from incandescent to compact fluorescent and LEDs which offer longer-lasting, less energy-intensive, brighter technology; adoption of modems to cellular phones, paving the way to smart phones which meets anyone's internet needs at any time or place; cathode-ray tube to flat-screen LCD televisions and others.

Business and Economics. In business and economics, innovation is the catalyst to growth. With rapid advancements in transportation and communications over the past few decades, the old world concepts of factor endowments and comparative advantage which focused on an area's unique inputs are outmoded for today's global economy. Now, as Harvard economist Michael Porter points out competitive advantage, or the productive use of any inputs, which requires continual innovation, is paramount for any specialized firm to succeed. Economist Joseph Schumpeter, who contributed greatly to the study of innovation, argued that industries must incessantly revolutionize the economic structure from within, that is innovate with better or more effective processes and products, such as the shift from the craft shop to factory. In addition, entrepreneurs continuously look for better ways to satisfy their consumer base with improved quality, durability, service, and price which come to fruition in innovation with advanced technologies and organizational strategies.

One prime example is the explosive boom of Silicon startups out of the Stanford Industrial Park. In 1957, dissatisfied employees of Shockley Semiconductor, the company of Nobel laureate and co-inventor of the transistor William Shockley, left to form an independent firm, Fairchild Semiconductor. After several years, Fairchild developed into a formidable presence in the sector.

Eventually, these founders left to start their own companies based on their own, unique, latest ideas, and then leading employees started their own firms. Over the next 20 years, this snowball process launched the momentous startup company explosion of information technology firms. Essentially, Silicon Valley began as 65 new enterprises born out of Shockley's eight former employees.

Organizations. In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share, and others. All organizations can innovate, including for example hospitals, universities, and local governments. For instance, former Mayor Martin O'Malley pushed the City of Baltimore to use CitiStat, a performance-measurement data and management system that allows city officials to maintain statistics on crime trends to condition of potholes. This system aids in better evaluation of policies and procedures with accountability and efficiency in terms of time and money. In its first year, CitiStat saved the city \$13.2 million. Even mass transit systems have innovated with hybrid bus fleets to real-time tracking at bus stands. In addition, the growing use of mobile data terminals in vehicles that serves as communication hubs between vehicles and control center automatically send data on location, passenger counts, engine performance, mileage and other information. This tool helps to deliver and manage transportation systems.

Sources of Innovation. There are several sources of innovation. General sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc. These also include internet research, developing of people skills, language development, cultural background, Skype, Facebook, etc. In the simplest linear model of innovation the traditionally recognized source is manufacturer innovation. This is where an agent (person or business) innovates in order to sell the innovation. Another source of innovation, only now becoming widely recognized, is end-user innovation. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. End-user innovation is,

by far, the most important and critical source of innovation. In addition, the famous robotics engineer Joseph F. Engelberger asserts that innovations require only three things: 1) a recognized need; 2) competent people with relevant technology; and 3) financial support.

Innovation by businesses is achieved in many ways, with much attention now given to formal research and development (R&D)¹⁴ for "breakthrough innovations. "R&D help spur on patents and other scientific innovations that leads to productive growth in such areas as industry, medicine, engineering, and government. Yet, innovations can be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes. The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice – but there are many exceptions to each of these trends.

An important innovation factor includes customers buying products or using services. As a result, firms may incorporate users in focus groups (user centred approach), work closely with so called lead users (lead user approach) or users might adapt their products themselves. Regarding this user innovation, a great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities. In most of the times user innovators have some personal record motivating them. Sometimes user-innovators may become entrepreneurs, selling their product, they may choose to trade their innovation in exchange for other innovations, or they may be adopted by their suppliers.

Nowadays, they may also choose to freely reveal their innovations, using methods like open source. In such networks of innovation the users or communities of users can further develop technologies and reinvent their social meaning.

4.3 Систематизация грамматического материала:

Сослагательное наклонение. Три типа условных предложений

Conditionals are clauses introduced with *if*. There are three types of conditional clause: Type 1, Type 2 and Type 3. There is also another common type, Type 0.

Type 0 Conditionals: They are used to express something which is always true. We can use *when* (whenever) instead of *if*. *If/When the sun shines, snow melts.*

Type 1 Conditionals: They are used to express real or very probable situations in the present or future. *If he doesn't study hard, he won't pass his exam.*

Type 2 Conditionals: They are used to express imaginary situations which are contrary to facts in the present and, therefore, are unlikely to happen in the present or future. *Bob is daydreaming. If I won the lottery, I would buy an expensive car and I would go on holiday to a tropical island next summer.*

Type 3 Conditionals: They are used to express imaginary situations which are contrary to facts in the past. They are also used to express regrets or criticism. *John got up late, so he missed the bus. If John hadn't got up late, he wouldn't have missed the bus.*

| | If-clause (hypothesis) | Main clause (result) | Use |
|--------------------------|--|--|--|
| Type 0 general truth | if + present simple | present simple | something which is always true |
| | If the temperature falls below 0 °C, water turns into ice. | | |
| Type 1 real present | if + present simple, present continuous, present perfect or present perfect continuous | future/imperative can/may/might/must/should/ could + bare infinitive | real - likely to happen in the present or future |
| | If he doesn't pay the fine, he will go to prison. If you need help, come and see me. If you have finished your work, we can have a break. If you're ever in the area, you should come and visit us. | | |
| Type 2 unreal present | if + past simple or past continuous | would/could/might + bare infinitive | imaginary situation contrary to facts in |

| | | | |
|--------------------|---|--|--|
| | | | the present; also used to give advice |
| | If I had time, I would take up a sport. (but I don't have time - untrue in the present) If I were you, I would talk to my parents about it. (giving advice) | | |
| Type 3 unreal past | if + past perfect or past perfect continuous | would/could/might + have + past participle | imaginary situation contrary to facts in the past; also used to express regrets or criticism |
| | If she had studied harder, she would have passed the test. If he hadn't been acting so foolishly, he wouldn't have been punished. | | |

Conditional clauses consist of two parts: the if -clause (hypothesis) and the main clause (result). When the if - clause comes before the main clause, the two clauses are separated with a comma. When the main clause comes before the if - clause, then no comma is necessary.

e.g. a) If I see Tim, I'll give him his book.

b) I'll give Tim his book if I see him.

We do not normally use will, would or should in an if - clause. However, we can use will or would after if to make a polite request or express insistence or uncertainty (usually with expressions such as / don't know, I doubt, I wonder, etc.).

We can use should after if to talk about something which is possible, but not very likely to happen.

e.g. a) If the weather is fine tomorrow, will go camping. (NOT: If the weather will be fine...)

b) If you will fill in this form, I'll process your application. (Will you please fill in... - polite request)

c) If you will not stop shouting, you'll have to leave. (If you insist on shouting... - insistence)

d) I don't know if he will pass his exams, (uncertainty)

e) If Tom should call, tell him I'll be late. (We do not think that Tom is very likely to call.)

We can use unless instead of if... not in the if -clause of Type 1 conditionals. The verb is always in the affirmative after unless.

e.g. Unless you leave now, you'll miss the bus. (If you don't leave now, you'll miss the bus.)

(NOT: Unless you don't leave now, ...)

We can use were instead of was for all persons in the if - clause of Type 2 conditionals.

e.g. If Rick was/were here, we could have a party.

We use If I were you ... when we want to give advice.

e.g. If I were you, I wouldn't complain about it.

The following expressions can be used instead of if: provided/providing that, as long as, suppose/supposing, etc.

e.g. a) You can see Mr. Carter provided you have an appointment. (If you have an appointment...)

b) We will all have dinner together providing Mary comes on time. (... if Mary comes ...)

c) Suppose/Supposing the boss came now, ...

We can omit if in the if - clause. When if is omitted, should (Type 1), were (Type 2), had (Type 3) and the subject are inverted.

e.g. a) Should Peter come, tell him to wait. (If Peter should come,...)

b) Were I you, I wouldn't trust him. (If I were you, ...)

c) Had he known, he would have called. (If he had known, ...)

1. Look at the prompts and make Type 1 conditional sentences, as in the example.

e.g. If we cut down all the forests, the world's climate will change.

1 cut down/ all forests / world's climate / change

2 not stop/use / aerosols /destroy / ozone layer

3 find / alternative sources of energy / solve / some of our environmental problems

- 4 temperatures / go up / by a few degrees / sea levels / rise
- 5 recycle / waste / save / natural resources
- 6 population / continue to increase / not be enough food for everyone

2. Lisa is trying to decide where to go on holiday. She would like to go to one of these places.

In pairs, ask and answer questions using the prompts below, as in the example.

A) SPAIN FOR A WEEK

£180 Inclusive!!

2-star hotel beach

Free water sports

B) A TWO WEEK CAMPING HOLIDAY IN THE SOUTH OF FRANCE

ONLY £280 per person

Self-catering

1. How long / be away / choose / Spain?

SA: *How long will she be away if she chooses Spain?*

SB: *If she chooses Spain, she'll be away for a week.*

2. Where / go / like / camping?

3. How much / pay / go to / France?

4. What / do / go to / Spain?

5. Where / go / want / cheap holiday?

3. Study the situations, then make Type 2 conditional sentences, as in the example.

I don't have a car, so I have to wait for the bus every day.

1. If I ...*had*... (have) a car, I ...*wouldn't have to*... (not/have to) wait for the bus every day.

I never do my homework, so my teacher always gets angry with me.

2. If I ... (do) my homework, my teacher ... (not/get) angry with me.

I live in a small house, so I can't invite friends over.

3. If I ... (live) in a bigger house, I ... (be able to) invite friends over.

I never get up early, so I y am always late for school.

4. If I ... (get up) earlier, I ... (not/be) late for school.

4. Complete the sentences to make Type 3 conditional sentences, as in the example.

1. If he ...*hadn't noticed*... (not/notice) the mould in one of his glass dishes, Alexander Fleming ...*would never have discovered*... (never/discover) penicillin.

2. If he ... (sell) some of his paintings, Van Gogh ... (get) some recognition during his lifetime.

3. If Barbara Streisand ... (change) the shape of her nose, her career ... (never/be) the same.

4. If Anne Sullivan ... (not/teach) her, Helen Keller ... (not/be able to) communicate.

5. If Naomi Campbell ... (not/be) so beautiful, she ... (never/become) a supermodel.

5. Read the story below and make Type 3 conditional sentences, as in the example.

e.g. 1) ...if Sally hadn't been in a hurry, she would have left some important notes at home....

Sally had a terrible day yesterday. She was in a hurry, so she left some important notes at home.

She wasn't prepared for her meeting with a new client, so the meeting was a disaster. The client was disappointed, and as a result he refused to do business with the company. The boss shouted at Sally, so she got upset.

6. Match the items in column A with those in column B in order to make correct Type 0 conditional sentences, as in the example.

e.g. 1 - c ...if you add sugar to a cup of coffee, the coffee tastes sweeter...

A

1. Add sugar to a cup of coffee.

2. Throw salt onto snow.
3. Put an apple in a bowl of water.
4. Water plants regularly.
5. Lie in the sun too long.
6. Take regular exercise.

B

- a The apple floats.
- b Your skin turns red.
- c The coffee tastes sweeter.
- d You feel healthy.
- e The plants grow.
- f The snow melts.

7. Put the verbs in brackets into the correct tense.

- 1 A: What time will you be home tonight?
B: I'm not sure. If I ...*have to*... (have to) work late. I ... *'ll call*... (call) you.
- 2 A: I felt very tired at work today.
B: Well, if you ... (not/watch) the late film, you ... (not/feel) so tired
- 3 A: Should I buy that car?
B: Why not? If I ... (have) the money, I ... (buy) it myself.
- 4 A: If you ... (pass) a chemist's, ... (you/get) me some cough medicine?
B: Yes, certainly.
- 5 A: My sister seems very upset at the moment.
B: Were I you, I ... (talk) to her about it.
- 6 A: Unless you ... (hurry), you ... (be) late again.
B: No, I won't. There's plenty of time.
- 7 A: Oh! I forgot to ask Sarah over for dinner.
B: If I ... (speak) to her today, I ... (ask) her for you.
- 8 A: May I join the club, please?
B: Provided you ... (be) over eighteen, you can join the club.
- 9 A: What a lovely restaurant! I'm glad we came here.
B: If you ... (not/burn) the dinner, we ... (not/come) here!
- 10 A: Just think. If I ... (not/move) to York, I ... (never/meet) you.
B: I know, wasn't it lucky?
- 11 A: Jo doesn't spend enough time with me.
B: Well, if she ... (have) the time, I'm sure she ... (try), but she's very busy.
- 12 A: Did you give Bill the message?
B: No, but when I ... (see) him, I ... (tell) him the news.

8. Choose the correct answer.

- 1 'If you ...*C*... that plate, you'll burn your fingers.'
'Why? Has it been in the oven?'

- A would touch
- B will touch
- C touch

- 2 ' ... you're busy, we'll talk now.'
'That's fine. I'm not busy at the moment.'

- A If
- B Provided
- C Unless

- 3 'If you watch the news, you ... a lot.'
'I know. I watch it every day.'

- A learn

B were learning

C would learn

4 '... you wear warm clothes, you won't get cold.'
'I'll wear an extra jumper.'

A Unless

B Providing

C Supposing

5 'Shall I invite John to the party?'
'Well, were I you, I ... him.'

A would invite

B will invite

C am inviting

6 '... the teacher comes back now, what will you do?'
'I don't know.'

A When

B Providing

C Supposing

7 'Could I see the menu, please?'
'Yes, sir. If you ... a seat, I will fetch it for you.'

A take

B had taken

C have taken

8 'Don't cry. Everything will be alright.'
'Yes, but if I ... the bus, I wouldn't have been late for school.'

A didn't miss

B hadn't missed

C don't miss

9 'When water boils, it ... steam.'
'Yes, I know; and the steam is hot, too.'

A would produce

B produce

C produces

10 'Can you help me, please?'
'Well, if I wasn't studying, I ... you.'

A would help

B help

C will help

11 'John crashed his car yesterday.'
'I know, but if he hadn't been changing the cassette, he ...'

A won't crash

B wouldn't crash

C wouldn't have crashed

12 'Can I have some chocolate, please?'
'If you behave yourself, I ... you some later.'

A would buy

B might buy

C buy

13 'Should you see Colin ... and tell me.'
'I will.'

A come

B to come

C will come

14 'If we were rich, we ... expensive clothes.'

'Well, unfortunately we aren't rich!'

A could afford

B can afford

C afford

9. Put the verbs in brackets into the correct tense.

- 1 If I ...*were*... (be) you, I wouldn't drive in the snow.
- 2 Peter ... (be able to) help you if he was here.
- 3 If I had closed the window, the cat ... (not/jump) out.
- 4 I ... (call) for help if I got stuck in a lift.
- 5 Had I known him, I ... (talk) to him.
- 6 John ... (may/lose) his job if he is rude to the boss.
- 7 If you ... (save) some money, you would have been able to go on holiday last year.
- 8 You may win if you ... (take) part in the contest.
- 9 If I had toothache, I ... (go) to the dentist.
- 10 They would have helped us move house if we ... (ask) them.
- 11 If Jane ... (be) older, she could live by herself.
- 12 We would have changed our plans if we ... (hear) the weather forecast.
- 13 Emma ... (send) a card if she had remembered it was their anniversary.
- 14 Robert ... (feel) better if you talked to him.
- 15 If Sam was still living nearby, you ... (can/invite) him for dinner.
- 16 If you ... (put) your money in your wallet, you will not lose it.
- 17 If you ... (like) chocolate, you will love this cake.
- 18 If Bill ... (come) home early, he will eat dinner with us.
- 19 Sandra will join us later unless she ... (have) a lot of work to do.

IF - WHEN

We use if to say that something might happen.

We use when to say that something will definitely happen.

e.g. If you see Mark, will you give him the message? (You might see Mark.)

When you see Mark, will you give him the message? (It is certain that you will see Mark.)

10. Fill in the gaps using when or if.

- 1 A: Have you phoned Paul yet?
B: No, I'll phone him ...*when*... I get home.
- 2 A: ... I get a new job soon, I may have a party.
B: That's a good idea.
- 3 A: I really liked that dress we saw.
B: Well, you can buy it ... you get paid.
- 4 A: Shall we go somewhere this weekend?
B: Yes ... it's sunny, we could go to the beach.
- 5 A: Did you make this cake yourself?
B: Yes ... you like it, I'll give you the recipe.
- 6 A: Is Jane still asleep?
B: Yes ... she wakes up, I'll tell her you're here.
- 7 A: Have you done your homework?
B: No. I'll do it ... we've finished dinner.
- 8 A: We've run out of milk.
B: Well, ... I go to the shops, I'll buy some more.

11. Choose the correct answer.

- 1 If you are bored ...C... something else.
A you would do

- B you will do
C do
- 2 ... I you, I would look for a new job.
A Would be
B Were
C Had been
- 3 I ... you if I had known you were in hospital.
A would visit
B would have visited
C will visit
- 4 If you ... well, lie down for a while.
A hadn't felt
B don't feel
C didn't feel
- 5 Ice ... if the temperature rises above 0°C.
A will melt
B would melt
C melts
- 6 Had I known about the meeting, I ... it.
A would have attended
B attended
C will attend
- 7 If he ... in the garden, he would have heard the doorbell.
A isn't
B was
C hadn't been
- 8 I ... to the bank manager if I were you.
A would talk
B will talk
C talked

MIXED CONDITIONALS

All types of conditionals can be mixed. Any tense combination is possible if the context permits it.

| If - clause | Main clause |
|--------------------------------------|--|
| Type 2 If nobody paid the bill, | Type 1 the electricity will be cut off. |
| Type 2 If he had money, | Type 3 he would have bought her a gift. |
| Type 2 If he had won the lottery, | Type 3 he wouldn't be asking for money now. |

12. Rewrite the sentences, as in the example.

- 1 He doesn't know her. That's why he didn't speak to her.
...If he knew her, he would have spoken to her...
- 2 He lost his job. He's unemployed now.
...If he hadn't lost his job, he wouldn't be unemployed...
- 3 His pet died. That's why he's unhappy now.
- 4 She doesn't have a mobile phone. That's why she couldn't be contacted yesterday.
- 5 Tom didn't see the boss earlier. He's waiting for her now.
- 6 He is allergic to seafood. That's why he didn't eat paella last night.
- 7 I lost my map. That's why I'm asking for directions now
- 8 She doesn't speak French. She didn't have a good time in Paris.

- 9 He lost the race. He is not a champion now.
 10 She didn't go to the bank yesterday. That's why she hasn't got any money now.
 11 They went to a party last night. That's why they are tired now.
 12 I crashed my car. That's why I'm taking the bus today.

WISHES

We use the verb wish and the expression if only to express a wish. If only is more emphatic than I wish.

wish/if only + past simple/past continuous: when we want to say that we would like something to be different in the present.

e.g. I wish/If only I had a room of my own. (But I don't have a room of my own.)

wish/if only + past perfect: to express regret that something happened or did not happen in the past.

e.g. I wish I had got your message earlier. (But I didn't get it earlier.) If only I had talked to him. (But I didn't talk to him.)

wish/if only + would: a) for a polite imperative

e.g. I wish you would stop shouting. (Please, stop shouting.)

b) to express our wish for a change in a situation or someone's behavior because we are annoyed by it.

e.g. I wish the wind would stop blowing, (wish for a change in a situation)

If only John would stop insulting people. (wish for a change in someone's behavior)

After the subject pronouns I and we, we use could instead of would.

e.g. I wish we could go to the party. (NOT: I wish we would go...)

Note: We can use were instead of was after wish or if only.

e.g. I wish she were/was more sensitive.

13. Wendy has just started university. It isn't what she expected, and she is disappointed. Read what she says and make sentences, as in the example.

e.g. I wish my room wasn't/weren't so small.

1. My room is so small.
2. I have to share the bathroom.
3. The kitchen is such a mess.
4. My tutors are strict.
5. The classes are so hard to understand.
6. The people are not friendly.
7. I can't visit my family and friends because they are so far away.
8. I don't have any friends.

14. Elise is a famous singer. These are some of the things she finds annoying. Read what she says and make sentences, as in the example.

e.g. I wish people wouldn't stare at me everywhere I go.

1. People stare at me everywhere I go.
2. People always ask me to sing at parties.
3. Magazines print false stories about my private life.
4. Photographers take photos of me all the time.
5. People make me sign autographs wherever I go.
6. People never give me any privacy.

15. Put the verbs in brackets into the correct tense.

- 1 A: I wish I ...*could play*... (play) a musical instrument.
B: You should take lessons.
- 2 A: If only the wind ... (stop) blowing so hard.
B: Yes, it's very windy today, isn't it?

- 3 A: I wish John ... (come) with us.
B: So do I. He would have really enjoyed it.
- 4 A: Paul, I wish you ... (stop) making so much noise.
B: Sorry, I'll try.
- 5 A: I wish I ... (study) more when I was at school.
B: It doesn't matter now. You've got a good job.
- 6 A: I wish I ... (be) young again.
B: So do I. We had some good times back then.
- 7 A: I wish I ... (not/speak) to Jane like that.
B: Don't worry. I'm sure she'll forgive you.
- 8 A: If only Bob ... (call) me.
B: Well, he promised to call today.
- 9 A: I'm exhausted. I wish I ... (do) some of the housework yesterday.
B: Sorry I wasn't here to help you.
- 10 A: I wish you ... (make) less noise when you come in.
B: It's not my fault. The door squeaks when you open it.
- 11 A: Are you going to your school reunion party next week?
B: No. I wish I ... (go) because I would like to see everyone again.

16. Rewrite the sentences using the correct conditional type, as in the examples.

- 1 I wish Jack were here. (he/help us)
...If Jack were here, he would help us...
- 2 I wish we hadn't got stuck in traffic. (we/be late for work)
...If we hadn't got stuck in traffic, we would have been late for work...
- 3 I wish you paid more attention in class. (you/understand everything)
- 4 I wish they had called before they came. (I/cook something)
- 5 I wish Tim weren't so selfish. (he/make friends much more easily)
- 6 I wish Sandra hadn't got up late today. (we/go shopping together)
- 7 I wish you hadn't left the door unlocked. (thieves/ break in)

17. Complete the wishes. Also make correct conditional sentences, as in the example.

1. I've got to get up.
I wish *I didn't have to get up*. (stay in bed for another hour)
If I didn't have to get up, I would stay in bed for another hour.
2. I should have been more careful.
I wish ... (not crash into the wall)
3. She's always shouting at me.
I wish ... (concentrate on my work)
4. He hasn't called me yet.
I wish ... (stop worrying)

HAD BETTER / WOULD RATHER

We use had better + bare infinitive to give advice or to say what the best thing to do in a particular situation is.

*e.g. You had I'd better take some warm clothes with you. (You should/ought to take ...)
I'd better not call him now; he'll be busy.*

Had better is stronger than should/ought to, but it is not as strong as must.

e.g. You must call a doctor, (strong advice)

You had better call a doctor, (less strong than must)

You should/ought to call a doctor. (less strong than had better)

We use would rather (= would prefer to) to express preference.

e.g. I'm busy. I'd rather not take a break now.

When the subject of would rather is also the subject of the following verb, we use the following constructions:

a) would rather + bare present infinitive (present/ future)

e.g. I'd rather stay at home tonight.

b) would rather + bare perfect infinitive (past)

e.g. I'd rather have gone on holiday to Italy last summer.

When the subject of would rather is different from the subject of the following verb, we use the following constructions:

a) would rather + past tense (present/future)

e.g. I'd rather Tim did the shopping today.

b) would rather + past perfect (past)

e.g. I'd rather Kate hadn't spent so much money yesterday.

Study the ways in which we can express preference:

a) prefer + gerund + to + gerund (general preference)

e.g. I prefer jogging to cycling.

b) prefer + full infinitive + rather than + bare infinitive (general preference)

e.g. I prefer to go out rather than stay at home.

c) prefer + noun + to + noun (general preference)

e.g. She prefers orange juice to apple juice.

d) would prefer + full infinitive + rather than + (bare infinitive) (specific preference)

e.g. I'd prefer to pay in cash rather than (pay) by credit card.

e) would rather + bare infinitive + than (+ bare infinitive)

e.g. She'd rather have a salad than (have) a steak.

18. In pairs, ask and answer questions using the prompts below, as in the example. The choice of answer is yours.

SA: Would you rather go on holiday to Spain or Italy?

SB: I'd rather go to Spain than Italy.

1. go on holiday to Spain or Italy?
2. eat pizza or spaghetti for dinner?
3. play cards or chess this evening?
4. work in a bank or a school?
5. have a dog or a cat as a pet?
6. learn French or German at school?

19. Complete the sentences, as in the example.

- 1 I'll cook dinner if you really want me to, but ...*I'd rather you cooked it*
- 2 I'll go to the supermarket if you really want me to, but ...
- 3 I'll wash the dishes if you really want me to, but...
- 4 I'll empty the rubbish bin if you really want me to, but...
- 5 I'll iron all the clothes if you really want me to, but...
- 6 I'll clean the bathroom if you really want me to, but...

20. Fill in the gaps with would rather, prefers or (would) prefer.

- 1 Do you ...*prefer*... reading magazines or books?
- 2 She ... go to a disco than to go to the theatre.
- 3 Jack ... listening to music to watching television.
- 4 He ... study History than Maths.
- 5 I ... the piano to the violin.
- 6 ... you ... to have spaghetti or steak for dinner tonight?
- 7 I ... see a comedy film than an adventure film.
- 8 ... you ... going to the cinema or going to the theatre?

21. Put the verbs in brackets into the correct form.

- 1 A: Did you enjoy the party last night?
B: No, I'd rather ...*have stayed*... (stay) at home.
- 2 A: Shall I dust the computer, Tom?
B: I'd rather you ... (not/touch) it, actually. I'll do it myself.
- 3 A: I've got a terrible cold.
B: You'd better ... (not/go) to work today, then.
- 4 A: I'm going to work now.
B: I think it's going to rain today. You'd better ... (take) your umbrella with you.
- 5 A: I didn't enjoy Ben's party. I would rather he ... (invite) more people.
B: Oh! I enjoyed it.
- 6 A: You had better ... (study) hard this weekend for the exam on Monday.
B: I will, but I would prefer ... (go out) with my friends.
- 7 A: My parents prefer ... (spend) their holidays in the mountains.
B: Do they? I like to be by the sea.
- 8 A: We'd better ... (not/book) a taxi to bring us home tonight.
B: You're right. We might want to stay late.
- 9 A: They're organising a party for Susan's birthday.
B: I know, but it's a secret, so we'd better ... (not/talk) about it in case she hears.
- 10 A: I'd rather you ... (not/leave) your shoes in the kitchen every time you come home from school.
B: Sorry, I keep forgetting.
- 11 A: I didn't enjoy my lunch today. I'd rather ... (eat) something else.
B: I'll make you some sandwiches tomorrow then.
- 12 A: Did you enjoy the film last night?
B: Not really. I would rather we ... (see) a comedy instead.
- 13 A: Shall we stay in tonight?
B: Well, if you don't mind I would prefer ... (visit) my parents.

THE UNREAL PRESENT AND PAST

The past simple can be used to talk about imaginary, unreal or improbable situations which are contrary to facts in the present (unreal present). The past perfect can be used to refer to imaginary, unreal or improbable situations which are contrary to facts in the past (unreal past).

The past simple is used with:

- Type 2 Conditionals
e.g. If he knew the truth, he would be very angry.
- suppose/supposing
e.g. Suppose/Supposing they didn't invite you, what would you do?
- wish/if only
e.g. I wish/If only I had a lot of money.
- would rather (present)
e.g. I'd rather Lisa went to the market.
- as if/as though
e.g. Jim behaves as if last though he were the boss.
- it's (about/high) time
e.g. It's (about/high) time they did something about it.

The past perfect is used with:

- Type 3 Conditionals
e.g. If she had asked me, I would have helped her.
- suppose/supposing
e.g. Suppose/Supposing you had lost your money, what would you have done?
- wish/if only
e.g. I wish/If only I hadn't invited them to my party.

- would rather (past)

e.g. *I'd rather you hadn't said anything about it.*

- as if/as though

e.g. *He hadn't seen her before, but he acted as if last though he had known her for years.*

22. Underline the correct tense.

- 1 It's about time she **learnt/had learnt** how to cook.
- 2 I'd rather you **didn't touch/had not touched** my favorite vase. You may break it.
- 3 If she **heard/had heard** the news, she would have called us by now.
- 4 They would have opened the door if they **knew/had known** who was there.
- 5 It's high time they **made/had made** some changes.
- 6 I wish I **saved/had saved** some money last month.
- 7 Ben would have taken up sport earlier if he **realized/had realized** how much fun it was.
- 8 Tom speaks to everyone as if he **knew/had known** everything.
- 9 He would rather you **didn't open/hadn't opened** the letter. He wanted to do it himself.
- 10 Suppose you **met/had met** him, what would you say to him?
- 11 If only he **called/had called** me last night, we could have gone out.
- 12 I'd rather Mary **spent/had spent** the night with us. It's snowing too heavily for her to drive home.
- 13 If you **knew/had known** what she did yesterday, you would be very surprised.
- 14 Supposing she **were seen/had been seen** leaving early, what would have happened?

23. Complete the following sentences.

1. Your friend wants to go skating, but you want to go bowling. What do you say?
I would prefer ...*to go bowling*...
2. Your friend likes staying in hotels, but you think camping is more fun. What do you say?
I prefer
3. Your parents want you to take the dog for a walk. You want your brother to do it. What do you say?
I'd rather
4. Your brother has bought a guitar. You want him to stop playing. What do you say?
I'd rather you
5. Your friend is very tired. You think she should go to bed. What do you say?
You'd better

Тема 5: Аннотирование научных статей

5.1 Запомните слова и выражения, необходимые для освоения темы курса:

Основные штампы (key-patterns) аннотаций на английском и русском языках

1. The article (paper, book, etc.) deals with... - Эта статья (работа, книга и т.д.) касается...
2. As the title implies the article describes.... - Согласно названию, в статье описывается...
3. It is specially noted... - Особенно отмечается...
4. A mention should be made... - Упомянется...
5. It is spoken in detail... - Подробно описывается...
6. ...are noted - Упомянутся...
7. It is reported... - Сообщается...
8. The text gives a valuable information on.... - Текст дает ценную информацию...
9. Much attention is given to... - Большое внимание уделяется...
10. The article is of great help to ... - Эта статья окажет большую помощь...
11. The article is of interest to... - Эта статья представляет интерес для...
12. It (the article) gives a detailed analysis of - 12. Она (статья) дает детальный анализ...
13. It draws our attention to... - Она (статья, работа) привлекает наше внимание к...
14. The difference between the terms...and...should be stressed - Следует подчеркнуть различие между терминами ...и...
 15. It should be stressed (emphasized) that... - Следует подчеркнуть, что...
 16. ...is proposed - Предлагается...
 17. ...are examined - Проверяются (рассматриваются)
 18. ...are discussed - Обсуждаются...
 19. An option permits... - Выбор позволяет...
 20. The method proposed ... etc. - Предлагаемый метод... и т.д.
 21. It is described in short ... - Кратко описывается ...
 22. It is introduced - Вводится ...
 23. It is shown that - Показано, что ...
 24. It is given ... - Дается (предлагается) ...
 25. It is dealt with - Рассматривается ...
 26. It is provided for ... - Обеспечивается ...
 27. It is designed for - Предназначен для ...
 28. It is examined, investigated ... - Исследуется ...
 29. It is analyzed ... - Анализируется ...
 30. It is formulated - Формулируется ...
 31. The need is stressed to employ... - Подчеркивается необходимость использования...
 32. Attention is drawn to... - Обращается внимание на ...
 33. Data are given about... - Приведены данные о ...
 34. Attempts are made to analyze, formulate ... - Делаются попытки проанализировать, сформулировать ...
 35. Conclusions are drawn.... - Делаются выводы ...
 36. Recommendations are given ... - Даны рекомендации ...

Образцы клише для аннотаций на английском языке

- The article deals with ...
- As the title implies the article describes ...
- The paper is concerned with...
- It is known that...
- It should be noted about...
- The fact that ... is stressed.
- A mention should be made about ...

- It is spoken in detail about...
- It is reported that ...
- The text gives valuable information on...
- Much attention is given to...
- It is shown that...
- The following conclusions are drawn...
- The paper looks at recent research dealing with...
- The main idea of the article is...
- It gives a detailed analysis of...
- It draws our attention to...
- It is stressed that...
- The article is of great help to ...
- The article is of interest to ...
- is/are noted, examined, discussed in detail, stressed, reported, considered.

5.2 Подготовьте устный рассказ по теме на основе предложенного: №5

When Should You Summarize an Article?

There are a few instances when you might want to summarize an article. These are:

To show how an author's ideas support your argument

To argue against the author's ideas

To condense a lot of information into a small space

To increase your understanding of an article

What Needs to Be Included in a Summary of an Article?

A great summary should include certain important elements that make the reading experience easier on the reader. A good summary will consist of the following elements.

The main idea of the article is conveyed clearly and concisely

The summary is written in the unique style of the writer

The summary is much shorter than the original document

The summary explains all of the important notions and arguments

The summary condenses a lot of information into a small space

How Do You Summarize an Article?

Summarizing an article can be boiled down to three simple steps. By following these steps, you should have a thorough, clear, and concise summary in no time.

Identify the main idea or topic.

Identify the important arguments.

Write your summary.

Continue reading for detailed explanations of each of these steps.

Identify the Main Idea or Topic

The aim of an article is to convey a certain idea or topic through the use of exposition and logic.

In a summary, you want to identify the main idea of the article and put this information into your own words. To do this, you must be willing to read the article several times. On the first reading, try to gain a general notion of what the article is trying to say. Once you've done this write down your initial impression. This is most likely the thesis, or main idea, of the article. Also, be sure to include the author's first and last name and the title of the article in your notation for later reference.

Example: In the article "Why Two Best Friends Doesn't Work," author Cassandra Grimes argues that most teenage girls can't get along in groups of more than two.

When trying to identify the central idea, you should ask yourself, "Why was this essay written and published?" Clues to help determine this include the following.

How to Identify the Main Idea of an Article

Gather information from the title.

Identify the place it was published, as this can help you determine the intended audience.

Determine the date of publication.

Determine the type of essay. (Is it expository, argumentative, literary, scholarly?)

Take note of the tone of the piece.

Identify certain notions or arguments that seem to be repeated throughout.

Applying these methods of identification, let's take a look at the article "Bypass Cure" by James Johnson. We can assume the subject of the article from the title. Upon further examination, it becomes clear that the author is arguing that new research suggests the best cure for diabetes is the surgical solution of a gastric bypass.

Example: "Bypass Cure" by James Johnson records a recent discovery by researchers that people who have bypass surgery for weight control are also instantly cured of diabetes. Since rising diabetic rates and obesity has become a worldwide concern, the article provides a startling but controversial potential solution.

Now that we have identified the main idea of the article, we can move onto the next step.

Identify Important Arguments

At this point in the preparation process, you should read the article again. This time, read more carefully. Look specifically for the supporting arguments. Some tips on how to identify the important arguments of an article are listed below.

How to Identify Important Arguments in an Article

Read on a paper copy or use a computer program that lets you make annotations.

Underline the topic sentence of each paragraph. (If no one sentence tells the main concept, then write a summary of the main point in the margin.)

Write that sentence in your own words on the side of the page or on another piece of paper.

When you finish the article, read all the topic sentences you marked or wrote down.

In your own words, rewrite those main ideas.

Use complete sentences with good transition words.

Be sure you don't use the same words, phrases, or sentence structure as the original.

You may find you need to leave out some of the unimportant details.

Your summary should be as short and concise as possible.

In short, you want to boil the article down to its main, supporting arguments. Let everything else fall away, and what you are left with is an argument or an opinion, and the arguments that support it.

Write Your Summary

Your summary should start with the author's name and the title of the work. Here are several ways to do this correctly:

Introduction Sentence Examples for an Article Summary

In "Cats Don't Dance," John Wood explains ...

John Wood, in "Cats Don't Dance," explains ...

According to John Wood in "Cats Don't Dance" ...

As John Wood vividly elucidates in his ironic story "Cats Don't Dance" ...

John Wood claims in his ironic story "Cats Don't Dance" that ...

Combine the thesis of the article with the title and author into your first sentence of the summary. Reference the following sentence as an example.

In "Cats Don't Dance," John Wood explains that in spite of the fact that cats are popular pets who seem to like us, felines are not really good at any activities that require cooperation with someone else, whether that is dancing or sharing.

If possible, your first sentence should summarize the article. The rest of your summary should cover some of the central concepts used to support the thesis. Be sure to restate these ideas in your own words, and to make your summary as short and concise as possible. Condense sentences and leave out unimportant details and examples. Stick to the important points.

How to Quote the Author of an Article

When you refer to the author for the first time, you always use their full name. When you refer to the author after that, you always use their last name. The following examples show how to use the author's name in an article summary after you have already introduced them.

Johnson comments ...

According to Wood's perspective ...

As Jones implies in the story about ...

Toller criticizes...

In conclusion, Kessler elaborates about ...

You don't need to use an author's title (Dr., Professor, or Mr. and Mrs.), but it does help to add their credentials to show they are an authoritative source. The sentences below show ways to do this.

In "Global Warming isn't Real," Steven Collins, a professor at the University of Michigan, claims that ...

New York Times critic Johann Bachman argues in "Global Warming is the Next Best Thing for the Earth" that ...

If you are discussing the ideas of the author, you always need to make it clear that you are reciting their ideas, not your own.

How to Introduce the Ideas of the Author in an Article Summary

Use author tags

Use mentions of "the article" or "the text"

Add the page number that the information is found on in parenthesis at the end of the sentence

Using Author Tags

In writing your summary, you need to clearly state the name of the author and the name of the article, essay, book, or other source. The sentence below is a great example of how to do this.

According to Mary Johnson in her essay, "Cats Make Good Pets," the feline domestic companion is far superior to the canine one.

You also need to continue to make it clear to the reader when you are talking about the author's ideas. To do this, use "author tags," which are either the last name of the author or a pronoun (he or she) to show you are still discussing that person's ideas.

Also, try to make use of different verbs and adverbs. Your choice of author tag verbs and adverbs can contribute to the way you analyze the article. Certain words will create a specific tone. See the tables for a selection of different word choices.

How Long Is a Summary of an Article?

The length of an article summary will depend on the length of the article you are writing about.

If the article is long (say, 10-12 pages) then your summary should be about four pages. If the article is shorter, your summary should be about one to two pages. Sometimes, an article summary can be less than one page.

The length of a summary will also depend on the instructions you have been given. If you are writing a summary for yourself, it's up to you how long or short it will be (but remember, a summary is supposed to be a short regurgitation of the information outline in an article). If you are writing a summary for a class assignment, the length should be specified.

How to Edit and Revise Your Summary

Before you are officially done, it is important to edit your work. The steps below explain the process of editing and revision.

Re-read the summary and edit out any obvious mistakes.

Read your summary aloud. If anything sounds off, fix it.

Let one of your peers read your summary. Make changes according to their feedback.

With that, your summary should be complete.

5.3 Систематизация грамматического материала:

Синтаксис: Побудительные предложения, восклицательные предложения, вопросительные предложения.

В побудительном предложении выражаются различные побуждения к действию – приказ, просьба, запрещение, рекомендация, совет и т.д. Повелительные предложения, выражающие приказание, произносятся с понижающейся интонацией, а предложения, выражающие просьбу, - с повышающейся интонацией.

Повелительное предложение может быть как утвердительным, так и отрицательным. Глагол в повелительном предложении употребляется в форме повелительного наклонения. Подлежащее как правило отсутствует, и предложение начинается прямо со сказуемого. Подразумевается, что действие должен выполнять тот, кому адресовано обращение.

- Open the book. *Откройте книгу.*
Translate this article, please. *Переведите, пожалуйста, эту статью.*
Take off your hat! *Снимите шляпу!*
Don't go there. *Не ходите туда.*
Tell me all about it. *Расскажи мне все об этом.*
Put the dictionary on the shelf. *Положите словарь на полку.*
Don't be late, please. *Не опоздайте, пожалуйста.*

Предложение может состоять и из одного сказуемого, выраженного глаголом в повелительном наклонении:

- Write! *Пиши(те)!*
Don't talk! *Не разговаривай(те)!*

Для выражения просьбы в конце повелительного предложения часто употребляется *will you?* или *won't you?*, отделяющиеся запятой:

- Come here, **will you?** *Идите сюда, пожалуйста.*
Close the window, **will you?** *Закройте, пожалуйста, окно.*
Fetch me a chair, **won't you?** *Принесите мне стул, пожалуйста.*
Come and see me, **won't you?** *Заходите ко мне, пожалуйста.*

Просьба может быть выражена также в форме вопросительного предложения, начинающегося с *will* или *would*. В отличие от общего вопроса, предложение, выражающее просьбу, произносится с падающей интонацией:

- Will** you come here? *Идите сюда, пожалуйста.*
Will you give me that book? *Дайте мне эту книгу, пожалуйста.*
Would you mind lending me your dictionary? *Не будете ли вы добры одолжить мне ваш словарь?*
Would you give me some water? *Дайте мне воды, пожалуйста.*
Will you fetch me a chair, please? *Принесите мне стул, пожалуйста.*
Would you be good enough to close the window? *Не будете ли вы добры закрыть окно?*

Для усиления просьбы перед глаголом в повелительном наклонении употребляется вспомогательный глагол **do**:

- Do write to me! *Пожалуйста, пишите мне!*
Do listen to me. *Послушайте же меня!*
Do come with me. *Идемте со мной, ну!*

Восклицательные предложения передают различные эмоциональные чувства – радость, удивление, огорчение и т.д. Любое предложение: повествовательное,

вопросительное или повелительное может стать восклицательным, если высказываемая мысль сопровождается сильным чувством и интонацией. На письме оно обычно обозначается восклицательным знаком. Восклицательные предложения произносятся с понижающейся интонацией.

At last you have returned! *Наконец вы вернулись!*
Have you ever seen such weather?! *Вы когда-нибудь видели такую погоду?!*
How can you be so lazy! *Ну как можно быть таким ленивым!*
Oh, please, forgive me! *О, пожалуйста, прости меня!*
Hurry up! *Спешите!*
You are so stupid! *Ты так глуп!*

Среди них выделяют восклицательные предложения, начинающиеся с местоимения **what** – *какой, какая, что за* или наречия **how** – *как*. В этих предложениях сохраняется прямой порядок слов, т.е. сказуемое следует за подлежащим. В отличие от русского языка, слова **what** и **how** всегда стоят непосредственно перед определяемым словом. То есть, если по-русски возможна конструкция: "**Какую** я сделал ошибку!", то в английском возможно лишь: "**Какую** ошибку я сделал!"

Местоимение **what** относится обычно к существительному, перед которым могут находиться еще и определяющие его прилагательное или наречие:

What a beautiful house that is! *Какой это красивый дом!*
What beautiful hair she has got! *Какие у нее прекрасные волосы!*
What interesting news I've heard! *Какую интересную новость я узнал!*
What a cold day it is! *Какой холодный день!*
What clever people they are! *Какие они умные люди!*
What a large house that is! *Какой это большой дом!*

А наречие **how** относится к прилагательному или наречию; предложение строится по схеме: **How** + прилагательное (наречие) + подлежащее + сказуемое:

How beautifully she sings! *Как красиво она поет!*
How slowly they run! *Как медленно они бегут!*
How far it is! *Как это далеко!*
How hot it was! *Как жарко было!*
How well she sings! *Как хорошо она поет!*
How quickly you walk! *Как быстро вы ходите! = Как вы быстро ходите!*

Если местоимение **what** определяет исчисляемое существительное в единственном числе, то это существительное употребляется с неопределенным артиклем:

What a foolish mistake I have made! *Какую глупую ошибку я сделал!*
What a beautiful girl she is! *Какая она красивая девушка!*
What a fine building that is! *Какое это красивое здание!*

С исчисляемым существительным во множественном числе и с неисчисляемым существительным артикль не употребляется:

What foolish mistakes I have made! *Какие глупые ошибки я сделал!*
What interesting books you have brought! *Какие интересные книги вы принесли!*
What fine weather it is! *Какая хорошая погода!*
What strange ideas he has! *Какие у него странные идеи!*

Чаще всего восклицательные предложения неполные. В них опускаются подлежащее, часть сказуемого, или все сказуемое целиком:

What a fine building (that is)! *Какое прекрасное здание!*
What a silly story (it is)! *Что за глупая история!*

What a funny girl (she is)! *До чего смешная девчонка!*

How late (it is)! *Как поздно!*

How wonderful! *Как замечательно!*

How beautiful! *Как красиво!*

What a girl! *Ну и девушка!*

How cold (it is)! *Как холодно!*

Порядок слов в английском предложении

В русском языке, благодаря наличию падежных окончаний, мы можем переставлять члены предложения, не меняя основного смысла высказывания. Например, предложения Студенты изучают эти планы и Эти планы изучают студенты совпадают по своему основному смыслу. Подлежащее в обоих случаях - студенты, хотя в первом предложении это слово стоит на первом месте, а во втором предложении - на последнем.

По-английски такие перестановки невозможны. Возьмём предложение The students study these plans Студенты изучают эти планы. Если подлежащее и дополнение поменяются местами, то получится бессмыслица: These plans study the students Эти планы изучают студентов. Произошло это потому, что слово plans, попав на первое место, стало подлежащим.

Английское предложение имеет твёрдый порядок слов.

Порядок слов в английском предложении показан в этой таблице:

| I | II | III Дополнение | | | IV Обстоятельство |
|------------|------------------|------------------------------|---------------------------|--------------------------|---------------------------------|
| Подлежащее | Сказуемое | Косвенное без предлога | Прямое | Косвенное с предлогом | |
| We Мы | study изучаем | | math математику | | |
| He Он | gives дает | us нам | lessons уроки | | in this room. в этой комнате |
| She Она | reads читает | | her notes свои заметки | to Peter Петру | every day. каждый день |

Вопросительное предложение

Общее правило построения вопросов в английском языке таково: Все вопросы (кроме специальных вопросов к подлежащему предложения) строятся путем инверсии. Инверсией называется нарушение обычного порядка слов в английском предложении, когда сказуемое следует за подлежащим.

В тех случаях, когда сказуемое предложения образовано без вспомогательных глаголов (в Present и Past Indefinite) используется вспомогательный глагол to do в требуемой форме - do/does/did.

Общие вопросы

Общий вопрос задается с целью получить подтверждение или отрицание высказанной в вопросе мысли. На общий вопрос обычно дается краткий ответ: "да" или "нет".

Для построения общего вопроса вспомогательный или модальный глагол, входящий в состав сказуемого, ставится в начале предложения перед подлежащим.

а) Примеры сказуемого с одним вспомогательным глаголом: Is he speaking to the teacher?
- Он говорит с учителем?

б) Примеры сказуемого с несколькими вспомогательными глаголами:
You will be writing letters to us. – Ты будешь писать нам письма.

Will you be writing letters to us? – Будешь ли ты писать нам письма?

Примеры с модальными глаголами:

She can drive a car. – Она умеет водить машину.

Can she drive a car? - Она умеет водить машину? (Yes, she can.; No, she cannot)

Когда в составе сказуемого нет вспомогательного глагола (т.е. когда сказуемое выражено глаголом в Present или Past Indefinite), то перед подлежащим ставятся соответственно формы do / does или did; смысловой же глагол ставится в форме инфинитива без to (словарная форма) после подлежащего.

С появлением вспомогательного глагола do на него переходит вся грамматическая нагрузка - время, лицо, число: в Present Indefinite в 3-м лице ед. числа окончание -s, -es смыслового глагола переходит на глагол do, превращая его в does; а в Past Indefinite окончание прошедшего времени -ed переходит на do, превращая его в did.

Do you go to school? – Ходишь ли ты в школу?

Do you speak English well? - Ты хорошо говоришь по-английски?

Ответы на общие вопросы

Общий вопрос требует краткого ответа "да" или "нет", которые в английском языке образуются следующим образом:

а) Положительный состоит из слова Yes за которым (после запятой) идет подлежащее, выраженное личным местоимением в им. падеже (никогда не используется существительное) и тот вспомогательный или модальный глагол, который использовался в вопросе (вспомогательный глагол согласуется с местоимением ответа);

б) Отрицательный ответ состоит из слова No, личного местоимения и вспомогательного (или модального) глагола с последующей частицей not

Например: Are you a student? - Ты студент?

Yes, I am. - Да.; No, I am not. - Нет.

Do you know him? – Ты знаешь его?

Yes, I do. – Да (знаю).; No, I don't. – Нет (не знаю).

Специальные вопросы

Специальный вопрос начинается с вопросительного слова и задается с целью получения более подробной уточняющей информации. Вопросительное слово в специальном вопросе заменяет член предложения, к которому ставится вопрос.

Специальные вопросы могут начинаться словами:

who? – кто? whom? – кого? whose? - чей? what? – что? какой? which? –
который?

when? – когда? where? – где? куда? why? – почему? how? – как?

how much? – сколько? how many? – сколько? how long? – как долго?
сколько времени?

how often? – как часто?

Построение специальных вопросов:

1) Специальные вопросы ко всем членам предложения, кроме подлежащего (и его определения) строятся так же, как и общие вопросы – посредством инверсии, когда вспомогательный или модальный глагол ставится перед подлежащим.

Специальный вопрос (кроме вопроса к подлежащему) начинается с вопросительного слова или группы слов за которым следуют вспомогательный или модальный глагол, подлежащее и смысловой глагол (сохраняется структура общего вопроса).

Вопрос к прямому дополнению:

What are you reading? Что ты читаешь?

What do you want to show us? Что вы хотите показать нам?

Вопрос к обстоятельству

Обстоятельства бывают разного типа: времени, места, причины, условия, образа действия и др.

He will come back tomorrow. – Он вернется завтра.

When will he come back? – Когда он вернется?

What did he do it for? Зачем он это сделал?

Where are you from?

Вопрос к определению

Вопрос к определению начинается с вопросительных слов *what* какой, *which* (of) который (из), *whose* чей, *how much* сколько (с неисчисляемыми существительными), *how many* сколько (с исчисляемыми существительными). Они ставятся непосредственно перед определяемым существительным (или перед другим определением к этому существительному), а затем уже идет вспомогательный или модальный глагол.

What books do you like to read? Какие книги вы любите читать?

Which books will you take? Какие книги (из имеющихся) вы возьмете?

Вопрос к сказуемому

Вопрос к сказуемому является типовым ко всем предложениям: "Что он (она, оно, они, это) делает (делал, будет делать)?" , например:

What does he do? Что он делает?

Специальные вопросы к подлежащему

Вопрос к подлежащему (как и к определению подлежащего) не требует изменения прямого порядка слов, характерного для повествовательного предложения. Просто подлежащее (со всеми его определениями) заменяется вопросительным местоимением, которое исполняет в вопросе роль подлежащего. Вопросы к подлежащему начинаются с вопросительных местоимений:

who – кто (для одушевленных существительных)

what - что (для неодушевленных существительных)

The teacher read an interesting story to the students yesterday.

Who read an interesting story to the students yesterday?

Сказуемое в таких вопросах (после *who*, *what* в роли подлежащего) всегда выражается глаголом в 3-м лице единственного числа (не забудьте про окончание *-s* в 3-м лице ед. числа в Present Indefinite. Правила образования *-s* форм см. здесь.):

Who is reading this book? Кто читает эту книгу?

Who goes to school?

Альтернативные вопросы

Альтернативный вопрос задается тогда, когда предлагается сделать выбор, отдать чему-либо предпочтение.

Альтернативный вопрос может начинаться со вспомогательного или модального глагола (как общий вопрос) или с вопросительного слова (как специальный вопрос) и должен обязательно содержать союз *or* - или. Часть вопроса до союза *or* произносится с повышающейся интонацией, после союза *or* - с понижением голоса в конце предложения.

Например вопрос, представляющий собой два общих вопроса, соединенных союзом *or*: Is he reading or is he writing?

Did he pass the exam or did he fail?

Вторая часть вопроса, как правило, имеет усеченную форму, в которой остается (называется) только та часть, которая обозначает выбор (альтернативу):

Is he reading or writing?

Разделительные вопросы

Основными функциями разделительных вопросов являются: проверка предположения, запрос о согласии собеседника с говорящим, поиски подтверждения своей мысли, выражение сомнения.

Разделительный (или расчлененный) вопрос состоит из двух частей: повествовательной и вопросительной.

Первая часть - повествовательное утвердительное или отрицательное предложение с прямым порядком слов.

Вторая часть, присоединяемая через запятую, представляет собой краткий общий вопрос, состоящий из местоимения, заменяющего подлежащее, и вспомогательного или модального глагола. Повторяется тот вспомогательный или модальный глагол, который входит в состав сказуемого первой части. А в Present и Past Indefinite, где нет вспомогательного глагола, употребляются соответствующие формы *do/ does/ did*.

В второй части употребляется обратный порядок слов, и она может переводиться на русский язык: не правда ли?, не так ли?, верно ведь?

1. Если первая часть вопроса утвердительная, то глагол во второй части стоит в отрицательной форме, например:

You speak French, don't you? You are looking for something, aren't you? Pete works at a plant, doesn't he?

2. Если первая часть отрицательная, то во второй части употребляется утвердительная форма, например:

It is not very warm today, is it? John doesn't live in London, does he?

Безличные предложения

Поскольку в английском языке подлежащее является обязательным элементом предложения, в безличных предложениях употребляется формальное подлежащее, выраженное местоимением *it*. Оно не имеет лексического значения и на русский язык не переводится.

Безличные предложения используются для выражения:

1. Явлений природы, состояния погоды: It is/(was) winter. (Была) Зима. It often rains in autumn. Осенью часто идет дождь. It was getting dark. Темнело. It is cold. Холодно. It snows. Идет снег.

2. Времени, расстояния, температуры: It is early morning. Ранее утро. It is five o'clock. Пять часов. It is two miles to the lake. До озера две мили. It is late. Поздно.

3. Оценки ситуации в предложениях с составным именным (иногда глагольным) сказуемым, за которым следует подлежащее предложения, выраженное инфинитивом, герундием или придаточным предложением: It was easy to do this. Было легко сделать это.

It was clear that he would not come. Было ясно, что он не придет.

4. С некоторыми глаголами в страдательном залоге в оборотах, соответствующих русским неопределенно-личным оборотам: It is said he will come. Говорят, он придет.

Выполните упражнения для закрепления материала:

1. Write questions and answers for the following statements, as in the example.

- 1 Sam was hungry when he reached the restaurant.
... Was Sam hungry when he reached the restaurant? Yes. he was...
- 2 They should concentrate in class.
- 3 She can't speak any foreign languages.
- 4 They have to work overtime.
- 5 The boss was angry when Stuart arrived late.
- 6 The children didn't enjoy the film.
- 7 She wanted to go to the supermarket.
- 8 The train leaves at half past six.

2. Fill in who, whose, what, which, where, when, how long, how often, what time, why, how much, how many or how long ago.

1.How often ... do you play football?' Twice a week.'
2. '... does the train leave?' 'Nine o'clock.'
3. '... is Martin?' 'In the garden.'
4. '... is it?' 'Half past ten.'
5. '... does he earn?' '£1,000 a month.'
6. '... sisters have you got?' 'Two.'
7. '... is this book?' '£5.'
8. '... did he call?' 'To invite me out to dinner.'
9. '... is the new driver like?' 'He's very friendly.'
10. '... shall we do this evening?' 'Let's go out.'

11. '... is the office party?' 'On Saturday.'
12. '... have you been waiting?' 'About half an hour.'
13. '... is that briefcase?' 'I think it's Tom's.'
14. '... of these rings do you prefer?' 'The gold one.'
15. '... spilt coffee on the desk?' 'I did. Sorry.'
16. '... did you get your exam results?' 'Last Friday.'
17. '... did you meet Jessie?' 'Two years ago.'
18. '... is the easiest way to get to the cinema?' 'Go through the city centre.'

3. Write questions to which the words in bold are the answers.

- 1 They live **near the beach**.
...Where do they live?...
- 2 It takes **ten minutes** to drive to the supermarket.
- 3 George is **selfish**.
- 4 Mary is **tall, with dark hair and green eyes**.
- 5 I go swimming **twice a week**.
- 6 **The joke** made them laugh.
- 7 They are **Miss Drake's** books.
- 8 The shoes cost **twenty pounds**.
- 9 The film starts **at 7 pm**.
- 10 **Mr Samson** wants to open a shop.
- 11 Todd has been **to Spain**.
- 12 **She is happy because** she has won the competition.
- 13 Alan is a **very serious** person.
- 14 They moved here **six months ago**.

4. Write questions to which the words in bold are the answers.

Louise is **eight years old**. She lives in **Brighton, England**, and she has lived there **since she was two years old**. Louise goes to school every day and her favourite subjects are **English and History**. She has **two** brothers. Their names are **Steven and James**. Louise has several hobbies, such as **collecting wild flowers and playing the violin**. She practises the violin **every evening**. Her mother enjoys this, **because she likes listening to music**.

5. Write questions to which the words in bold are the answers.

- 1 Mark is decorating **the living room**.
...What is Mark decorating?...
- 2 She found **Steven's** wallet.
- 3 **Mum** made these cakes.
- 4 **Fiona's** dress was ruined at the party.
- 5 Melissa is wearing **a blue dress**.
- 6 **Bob** is the older of the two brothers.
- 7 Stacey has bought **a new bag**.
- 8 I like **the blue** jumper best.
- 9 **The roof** was blown off in the storm.
- 10 I ran into **Jason** the other day.
- 11 I spoke to the **manager's** secretary about my complaint
- 12 **The Ethiopian runner** won the 1500m race.

6. Complete the questions.

- 1 Ryan won two races.
a 'Who ...won two races...?' 'Ryan.'
- b 'How many ...races did Ryan win...?' 'Two.'
- 2 Stanley goes swimming three times a week.

- a 'Who ... ?' 'Stanley.
 b 'How often ... ?' 'Three times a week.'
 3 There are two shirts. The yellow one is mine.
 a 'Which ... ?' 'The yellow one.
 b 'Whose ... ?' 'Mine.
 4 Steven has broken Jim's mug.
 a 'Whose ... ?' 'Jim's.
 b 'Who ... ?' 'Steven.
 5 Linda is going to the theatre this evening.
 a 'Who ... ?' 'Linda.
 b 'Where ... ?' 'To the theatre.
 6 Anne bought Ralph a present yesterday.
 a 'Who ... ?' 'Anne.
 b 'Who ... ?' 'Ralph.
 7 There are two bags. The one on the chair is Fay's.
 a 'Whose ... ?' 'Fay's.
 b 'Which ... ?' 'The one on the chair.'

7. Use the prepositions in brackets to write questions to match the statements.

- 1 She bought some flowers. Who ...*did she buy them for?* ... (for)
 2 I got an invitation this morning. Who ...? (from)
 3 Pedro comes from Spain. Where exactly ...? (from)
 4 I read an interesting article yesterday. What ...? (about)
 5 Lisa is excited. What ...? (about)
 6 Linda played tennis. Who ...? (with)
 7 Sam wrote a letter. Who ...? (to)
 8 I went to a restaurant last night. Who ...? (with)

8. Write the short form of the following negative questions.

- 1 Has she not replied to your letter yet?
 ...*Hasn't she replied to your letter yet?*...
 2 Do they not live here any more?
 3 Can she not drive a car?
 4 Does he not understand what he has to do?
 5 Do you not know the answer to this question?
 6 Did he not offer you anything to drink?
 7 Have we not got any milk left?
 8 Could you not do anything to help him?

9. Make negative questions using the words given, as in the example.

- 1 A: I'm really tired today.
 B: Why? ...*Didn't you go...* (go) to bed early last night?
 2 A: ... (know) what time the film starts?
 B: No, but I'll phone the cinema and ask now.
 3 A: Let's go to see the new Brad Pitt film tonight.
 B: ... (already/see) it?
 4 A: ... (help) me make dinner?
 B: No, sorry. I'm very busy at the moment.
 5 A: ... (type) the reports yet?
 B: No, sir. I'll finish them before I go home, though.
 6 A: ... (cold)?
 B: No. Actually I think it's quite warm in here.

10. Turn the following into indirect questions.

- 1 Who left this bag here? Do you know ...*who left this bag here?*...
- 2 Who is that woman? We need to find out ...
- 3 What time does the next train leave? Can you tell me ...
- 4 How much does this dress cost? Could you tell me ...
- 5 Where does Mary live? I don't know ...
- 6 Are the police investigating the robbery? Have you any idea ...
- 7 Did the caller leave a message? I'd like to find out ...
- 8 Is he the manager? I'd like to know ...
- 9 Who reported the crime? Do you know ...
- 10 How did they find the missing jewellery? Have you any idea ...

11. Decide if the statement after each exchange is true (T) or false (F).

- 1 Mark: I love playing football.
Paul: So do I.
...T... *Paul loves playing football.*
- 2 Lucy: I don't enjoy watching horror films.
Jessica: Neither do I.
Jessica enjoys watching horror films.
- 3 Simon: I have never been to America before.
Steven: Neither have I.
Steven has never been to America before.
- 4 Richard: I have got a lot of pen-friends.
Julia: So have I.
Julia hasn't got a lot of pen-friends.
- 5 Belinda: I am going to take the bus to school.
Lucy: So am I.
Lucy is going to take the bus to school.

12. Fill in the gaps with appropriate responses.

- 1 A: I didn't go to the party last night.
B: ...*Neither/Nor did I*... I wish I had, though.
- 2 A: I enjoyed that film.
B: It was brilliant.
- 3 A: I don't like omelettes.
B: I think they're horrible.
- 4 A: I'm not looking forward to this exam.
B: I'm sure it will be very difficult.
- 5 A: I'm going to York next weekend.
B: ... ! Perhaps I'll see you there.
- 6 A: I've just bought a new car.
B: Mine is a Rover.
- 7 A: I haven't got any pets.
B: I used to have a dog, though.
- 8 A: I was quite ill last week.
B: I had the flu.

13. Fill in the blanks with phrases using the verbs given and so or not.

- 1 A: Are they going on holiday this year?
B: ...*I don't imagine so*... (imagine). They haven't saved any money.
- 2 A: Is Debbie ill?
B: ... (think). I saw her in town this morning.
- 3 A: Did John fail his exams?

- B: ... (afraid). He'll have to take them again.
 4 A: Will you be finished soon?
 B: (expect). I haven't got much left to do.
 5 A: Can you come to the meeting after work?
 B: ... (think). I haven't got any other plans.
 6 A: Have they sold their house?
 B: ... (appear). There's a 'sold' sign up outside.
 7 A: Has he got a new car?
 B: ... (believe). I saw him driving a different one last week.
 8 A: Could you lend me some money, please?
 B: ... (afraid). I haven't got any.
 9 A: Are you going anywhere nice this weekend?
 B: ... (suppose). My boss wants me to work.

14. Fill in the correct question tags and short answers.

- 1 A: You've seen that film, ...*haven't you*...?
 B: Yes, ...*I have*....
 2 A: They want to go skiing this year, ... ?
 B: No,They want to go on an adventure holiday.
 3 A: He'll probably be hungry when he comes in, ... ?
 B: Yes,I'll make him some sandwiches.
 4 A: She likes going to the cinema, ... ?
 B: NoShe prefers going to the theatre.
 5 A: You've been to university, ... ?
 B: Yes,
 6 A: I'm a bit younger than Sally, ... ?
 B: Yes,
 7 A: They aren't moving, ... ?
 B: Yes,
 8 A: You won't forget to call me, ... ?
 B: No,Don't worry.
 9 A: You took some photographs at the ceremony, ... ?
 B: Yes,... .They're in this album.
 10 A: He knows I'm planning a party for him, ... ?
 B: No,He doesn't suspect a thing.
 11 A: They have bought a new car, ... ?
 B: Yes,It's a Volvo.
 12 A: He works for his father, ... ?
 B: Yes,His father owns a large company.
 13 A: I'm not late, ... ?
 B: No,You're just on time.
 14 A: They'll be here in a minute, ... ?
 B: Yes, We'd better tidy up.
 15 A: You did the washing-up, ... ?
 B: Yes, ... , and I cleaned the kitchen.

15. Underline the correct answer.

- 1 A: You're new here, **are you/aren't you**?
 B: Yes. I started work here yesterday.
 A: Ah. Well, you've met everyone in the office, **hadn't you/haven't you**?
 B: Yes. There are a lot of people working here, **aren't they/aren't there**?
 2 A: You will remember to lock all the doors when you leave, **will you/won't you**?
 B: Of course. I'm not stupid, **am I/aren't I**?

A: No. But you forgot to lock the doors last week, **didn't you/did you?**

B: You're not going to let me forget that, **aren't you/are you?**

3 A: You haven't seen Linda lately, **have you/haven't you?**

B: I saw her today. I told you, **did I/didn't I?**

A: Oh, yes! She didn't mention the party, **did she/didn't she?**

B: No, she didn't. It's tomorrow night, **is it/isn't it?**

16. Fill in the question tags.

1 You haven't got any money, ...*have you*...?

2 There's some water in the jug, ...?

3 She will be here on time, ...?

4 Mum can give me a lift, ...?

5 You know my brother, ...?

6 They live together, ...?

7 We have plenty of time, ...?

8 That boy is very clever, ...?

9 You have a car, ...?

10 The train will arrive soon, ...?

11 He has finished his homework, ...?

12 That's my wallet, ...?

Тема 6: Основные правила презентации научно-технической информации

6.1 Запомните слова и выражения, необходимые для освоения темы курса:

Начало презентации

| | |
|---|--|
| Good morning / afternoon / evening ladies and gentlemen | Доброе утро / день / вечер дамы и господа |
| My name is... I am ... | Меня зовут ... Я являюсь ... |
| Today I would like to talk with you about ... | Сегодня я хотел бы поговорить с вами о... |
| My aim for today's presentation is to give you information about ... | Цель моей сегодняшней презентации – проинформировать вас о... |
| I have been asked to comment on what I think of the way ... | Меня попросили сказать / прокомментировать, что я думаю о способе ... |
| Please feel free to interrupt me if there are any questions. | Пожалуйста, не стесняйтесь прерывать меня, если возникнут любые вопросы. |
| If you have any questions, please feel free to ask me at the end of the presentation. | Если у вас есть какие-либо вопросы, пожалуйста, задайте их по окончании презентации. |

Сообщение о плане презентации

| | |
|--|--|
| At the outset ... | Вначале ... |
| First of all, ... / Above all, ... | Прежде всего ... |
| First I would like to talk about ... | Сначала я хотел бы сказать о ... |
| I'd like to start by saying ... | Я бы хотел начать с ... |
| Before discussing ... | Перед тем как обсуждать ... |
| Describing this process, it is necessary to start with ... | Описывая этот процесс, необходимо начать с ... |
| Firstly, we must become accustomed to the terminology, which uses ... | Сначала мы должны ознакомиться с терминологией, которую использует ... |
| I'd like to come to the right point ... | Я бы хотел сразу приступить к делу ... |
| I am going to divide my review / report / article into 3 areas / parts ... | Я собираюсь разделить свой обзор / доклад / статью на 3 части ... |
| I will begin with a definition of ..., then go on to a brief review ... | Я начну с определения ..., затем перейду к краткому обзору ... |
| Let us start by mentioning a few facts ... | Давайте начнем с упоминания некоторых фактов ... |
| Then I would like to take a look at... | Затем я хотел бы взглянуть на ... |
| Following that we should talk about ... | Вслед за этим мы должны поговорить о ... |
| Lastly we are going to discuss ... | В заключение мы обсудим ... |
| I would like to talk to you today about _____ for ___ minutes. | Сегодня я хотел бы поговорить с вами о _____ в течение _____ минут. |
| We should be finished here today by _____ o'clock. | Мы должны закончить сегодня к _____ часам. |

Управление презентацией

| | |
|---|---|
| Now we will look at ... | Сейчас мы посмотрим на ... |
| I'd like now to discuss... | Я бы хотел обсудить сейчас ... |
| Before moving to the next point I need to ... | Прежде чем перейти к следующему вопросу, мне необходимо ... |
| Let's now talk about... | Давайте сейчас поговорим о ... |
| Let's now turn to... | Давайте перейдем сейчас к ... |
| Let's move on to... | Давайте перейдем к ... |
| That will bring us to our next point ... | Это приведет нас к нашему следующему пункту ... |
| Moving on to our next point ... | Переходим к нашему следующему пункту ... |

| | |
|--|---|
| Let us now turn to ..., namely to ... | Теперь перейдем к ..., а именно к ... |
| We come now to the description of ... | Теперь мы подошли к описанию ... |
| Let's switch to another topic ... | Перейдем на другую тему ... |
| Let us now proceed to consider how ... | Давайте перейдем к рассмотрению того, как ... |
| Firstly ... | Во-первых ... |
| Secondly ... | Во-вторых ... |
| Thirdly ... | В-третьих ... |
| I'd like to describe in detail ... | Я бы хотел подробно описать ... |
| Let's face the fact ... | Давайте обратимся к факту ... |
| Consider another situation. | Рассмотрим другую ситуацию ... |
| Let's go back a bit to ... | Давайте немного вернемся к ... |
| It will take up too much time / space ... | Это займет слишком много времени / места ... |
| This point will be discussed later / after ... | Этот вопрос будет обсуждаться позднее / после ... |
| Lastly ... | Наконец / в заключение ... |
| Eventually we must confess ... | В конечном итоге, мы должны признаться ... |
| Now we come to the final phase of ... | Теперь перейдем к заключительному этапу ... |
| One more question remains to discuss ... | Остается еще один вопрос для обсуждения ... |
| And the last point, ... | И последний вопрос / замечание, ... |
| A final remark. | Последнее замечание. |
| Подведение итогов | |
| I would just like to sum up the main points again ... | Я бы еще раз хотел подвести итоги основных пунктов ... |
| If I could just summarize our main points before your questions. So, in conclusion ... | Я хочу только подвести итоги наших главных пунктов перед тем, как вы начнете задавать вопросы. Итак, в заключение ... |
| Finally let me just sum up today's main topics ... | В заключение, позвольте мне подвести итоги сегодняшних основных тем ... |
| Concluding what has been said above, I want to stress that ... | Подводя итог тому, что было сказано выше, я хочу подчеркнуть, что ... |
| I will sum up what has been said ... | Я подытожу все сказанное ... |
| To conclude this work ... | В завершение этой работы ... |
| To summarize, the approach to ... described here is ... | Резюмируем: подход к ..., описанный здесь, состоит в ... |
| We arrived at the conclusion that ... | Мы пришли к заключению, что ... |
| We shouldn't rush to a conclusion ... | Мы не должны делать поспешный вывод ... |
| We find the following points significant ... | Мы находим важными следующие моменты ... |
| We can draw just one conclusion since ... | Мы можем сделать лишь один вывод, поскольку ... |
| As a summary I would like to say that ... | В качестве обобщения, я бы хотел сказать, что ... |
| Finally, the results are given in ... | И, наконец, результаты представлены в ... |
| Уточнения | |
| I'm sorry, could you expand on that a little? | Простите, можно немножко поподробнее? |
| Could you clarify your question for me? | Могли бы вы прояснить этот вопрос для меня? |
| I'm sorry I don't think I've understood your question, could you rephrase it for me? | Извините, по-моему, я не понял вашего вопроса. Могли бы вы изложить его иначе (перефразировать) для меня? |
| I think what you are asking is ... | Я думаю то, о чем вы спрашиваете, это ... |
| If I've understood you correctly you are asking about ... | Если я правильно вас понял, вы спрашиваете о ... |
| So you are asking about ... | Итак, вы спрашиваете о ... |
| Thus ... | Таким образом ... |
| Thus we see ... | Таким образом, мы видим ... |

| | |
|---|--|
| In consequence ... | В результате ... |
| In consequence of ... | Вследствие ... |
| Turning now to possible variants ... | Переходя теперь к возможным вариантам ... |
| We can further divide this category into two types ... | В дальнейшем мы можем разделить эту категорию на два типа ... |
| >We can now go one step further ... | Теперь мы можем продвинуться на шаг вперед ... |
| That is why we have repeatedly suggested that ... | Вот почему мы неоднократно предлагали ... |
| However this conclusion may turn out to be hasty, if ... | Однако этот вывод может оказаться поспешным, если ... |
| Maybe we could get definite results at an earlier date ... | Возможно, мы могли бы получить определенные результаты на более раннюю дату (раньше) ... |
| No definite conclusions have so far been reached in these discussions ... | В ходе этих дискуссий так и не были сделаны какие-либо определенные выводы ... |
| Results are encouraging for ... | Результаты обнадеживающие, поскольку ... |
| Results from such research should provide ... | Результаты такого исследования должны обеспечить ... |
| That yields no results ... | Это не дает никаких результатов ... |
| The logical conclusion is that ... | Логическим заключением является то, что ... |
| The result was astounding ... | Результат был ошеломляющим ... |
| The results are not surprising ... | Результаты неудивительны ... |
| Then eventually I came to the conclusion that ... | Затем, со временем, я пришел к выводу, о том что ... |
| There are two important consequences of ... | Есть два важных следствия ... |
| The first step is to develop ... | Первый шаг состоит в том, чтобы разработать ... |
| The second phase of is that ... | Второй этап ... в том, чтобы ... |
| There are two main stages in the procedure ... | В данной процедуре есть два главных этапа ... |
| Although I think that ... | Хотя я полагаю, что ... |
| I strongly believe that ... | Я решительно полагаю, что ... |
| In order to understand ... | Для того чтобы понять ... |
| It has to be said that ... | Необходимо сказать, что ... |
| Many experts are coming to believe that only ... | Многие эксперты все больше приходят к убеждению, что только ... |
| Some experts, however, think that ... | Некоторые эксперты, однако, думают, что ... |
| Someone may say that ... | Кто-то может сказать, что ... |
| Though we used to think ... | Хотя мы привыкли полагать ... |
| It is generally considered that ... | Обычно полагают, что ... |
| We should realize that ... | Мы должны осознавать, что ... |
| Now we understand why it is so hard to ... | Теперь мы понимаем, почему так трудно ... |
| Consider how it can be done ... | Рассмотрим, как это может быть сделано ... |
| At first glance it would seem that ... | На первый взгляд могло бы показаться, что ... |
| It can be viewed in a different light ... | Можно иначе смотреть на это ... |
| It has been assumed that ... | Предполагалось, что ... |
| Let us assume for a moment that ... | Предположим на минуту, что ... |
| Suppose, for example, that ... | Предположим, например, что ... |
| Though it might seem paradoxical, ... | Хотя это могло бы показаться парадоксальным ... |
| You might know that ... | Вы, возможно, знаете, что ... |
| But it can be claimed that ... | Но можно утверждать, что ... |
| Let us not forget that ... | Давайте не будем забывать, что ... |
| This simplified approach ignores the importance of ... | Этот упрощенный подход игнорирует важность ... |

6.2 Подготовьте устный рассказ по теме на основе предложенного:

A presentation is the practice of showing and explaining the content of a topic to an audience or learner. In the business world, there are sales presentations, informational and motivational presentations, interviews, status reports, image-building, and training sessions.

Students are often asked to make oral presentations. You might have been asked to research a subject and use a presentation as a means of introducing it to other students for discussion.

Before you prepare for a presentation, it is important that you think about your objectives. There are three basic purposes of giving oral presentations: to inform, to persuade, and to build goodwill.

Decide what you want to achieve:

- inform – to provide information for use in decision making;
- persuade – to reinforce or change a receiver's belief about a topic;
- build relationships – to send some messages which have the simple goal of building good-will

between you and the receiver.

Preparation

A successful presentation needs careful background research. Explore as many sources as possible, from press cuttings to the Internet. Once you have completed your research, start writing for speech bearing in mind the difference between spoken and written language. Use simple, direct sentences, active verbs, adjectives and the pronouns "you" and "I".

Structuring a Presentation

A good presentation starts with a brief introduction and ends with a brief conclusion. The introduction is used to welcome your audience, introduce your topic/ subject, outlines the structure of your talk. The introduction may include an icebreaker such as a story, an interesting statement or a fact. Plan an effective opening; use a joke or an anecdote to break the ice. The introduction also needs an objective, that is, the purpose or goal of the presentation. It informs the audience of the purpose of the presentation too.

Next, **the body** of the presentation comes. Do not write it out word for word. All you want is an outline. There are several options for structuring the presentation:

- 1) Timeline: arrangement in a sequential order.
- 2) Climax: the main points are delivered in order of increasing importance.
- 3) Problem/ Solution: a problem is presented, a solution is suggested.
- 4) Classification: the important items are the major points.

5) Simple to complex: ideas are listed from the simplest to the most complex; it can also be done in a reverse order.

After the body, comes **the closing**. A strong ending to the presentation is as important as an effective beginning. You should summarise the main points. This is where you ask for questions, provide a wrap-up (summary), and thank the participants for attending.

Each successful presentation has three essential objectives: the three Es – to educate, to entertain, to explain.

The main objective of making a presentation is to relay information to your audience and to capture and hold their attention. Adult audience has a limited attention span of about 45 minutes. In that time, they will absorb about a third of what you said, and a maximum of seven concepts. Limit yourself to three or four main points, and emphasise them at the beginning of your speech, in the middle, and again at the end to reiterate your message. You should know your presentation so well that during the actual presentation you should only have to briefly glance at your notes.

People process information in many ways. Some learn visually, others learn by listening, and the kinesthetic types prefer to learn through movement. It's best to provide something for everyone. Visual learners learn from pictures, graphs, and images. Auditory learners learn from listening to a speaker. And, kinesthetic learners like to be involved and participate.

Scientific report writing requires the use of certain techniques and conventions that are detailed, strict and not always easy to master. The main purpose of a scientific report is to communicate. A typical structure and style have evolved to convey essential information and ideas as concisely and effectively as possible. The main aim of the report is to state your opinion on the issue or to provide precise information about a practical investigation.

Audience. Assume that your intended reader has a background similar to yours before you started the project. That is, a general understanding of the topic but no specific knowledge of the details. The reader should be able to reproduce whatever you did by following your report.

Clarity of Writing. Good scientific reports share many of the qualities found in other kinds of writing. To write is to think, so a paper that lays out ideas in a logical order will facilitate the same kind of thinking. Make each sentence follow from the previous one, building an argument piece by piece. Group related sentences into paragraphs, and group paragraphs into sections. Create a flow from beginning to end.

Style. It is customary for reports to be written in the third person or the 'scientific passive', for example, instead of writing 'I saw', one writes 'it was observed'; rather than, 'I think that ...' one writes 'it could be stated that ...' and so on. Avoid jargon, slang, or colloquial terms. Define acronyms and any abbreviations not used as standard measurement units. Most of the report describes what you did, and thus it should be in the past tense (e.g., "values were averaged"), but use present or future tense as appropriate (e.g., "x is bigger than y" or "that effect will happen"). Employ the active rather than passive voice to avoid boring writing and contorted phrases (e.g., "the software calculated average values" is better than "average values were calculated by the software").

Typical Sections. There are four major sections to a scientific report, sometimes known as IMRAD – Introduction, Methods, Results, And Discussion. Respectively, these sections structure your report to say "here's the problem, here's how I studied it, here's what I found, and here's what it means." There are additional minor sections that precede or follow the major sections including the title, abstract, acknowledgements, references, and appendices. All sections are important, but at different stages to different readers. When flipping through a journal, a reader might read the title first, and if interested further then the abstract, then conclusions, and then if he or she is truly fascinated perhaps the entire paper. You have to convince the reader that what you have done is interesting and important by communicating appeal and content in all sections.

Title of the report. Convey the essential point of the paper. Be precise, concise, and use key words. Avoid padding with phrases like "A study of ..." or headlines like "Global warming will fry Earth!" It is usual to write the title as one phrase or sentence. A good title is brief and informative. Titles should not exceed 10 or 12 words, and they should reveal the content of the study. Many titles take one of these two forms: a simple nominal sentence (Asymmetric Information, Stock Returns and Monetary Policy) or beginning with The effect of (for example, The Effects of Financial Restrictions and Technological Diversity on Innovation). Sometimes it is impossible to make word-by-word translation from Russian into English, for example, Об оценке работы фирмы should be translated as Assessing the Firm Performance or К проблеме хеджевых фондов is translated as Hedge Funds. Sometimes the title contains two parts, the first one is the topic, while the second is its specific details (International Financial Contagion: Evidence from the Argentine Crisis of 2001- 2002). If the report is of a very problematic issue its title may be in the form of a question (Was There a Credit Crunch in Turkey?)

Introduction. This section should contain a brief history of the research problem with appropriate references to the relevant literature and the purpose of the study. Introduce the problem, moving from the broader issues to your specific problem, finishing the section with the precise aims of the paper (key questions). Craft this section carefully, setting up your argument in logical order. Refer to relevant ideas/theories and related research by other authors. Answer the question "what is the problem and why is it important?" The introduction should also explain whether the study is an extension of a previous one, or whether a completely new hypothesis is to be tested. The final section of the introduction generally includes a list of all the hypotheses being tested in the study. The results of the current study are not to be referred to in the introduction.

You may use the following expressions:

| | | |
|------------|---------|---------------------------------------|
| This paper | aims at | Настоящий доклад имеет своей целью... |
|------------|---------|---------------------------------------|

| | | |
|--|---|---|
| | deals with, considers describes examines presents reports on | В настоящем докладе рассматриваются... В настоящем докладе делается описание... В настоящем докладе исследуется ... В настоящем докладе представлен... В настоящем докладе сообщается о ... |
|--|---|---|

Examples of an Introduction

A. There has been a European Union foreign policy, confirmed in constitutional form in the Union Treaty, since 1993. The first decade, most commentators agree, has proved to be difficult: 'painful and problematic' according to one. As the twenty-first century progresses, replete with an array of new challenges, the need for a reassessment, and perhaps reinvigoration of Union 'foreign and security policy' is widely argued. The purpose of this article is to provide both a retrospective, of the evolution of the Union's foreign policy so far, and a prospective, of the challenges which it presently faces.

B. This paper examines companies incorporated under the Companies Act 1985. Its purpose is to consider the suitability of such companies for not-for-profit-organisations ('NFPOs').

Methods. Explain how you studied the problem, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed, study area, etc. Provide enough detail for the reader to reproduce what you did. Include flowcharts, maps or tables if they aid clarity or brevity. Answer the question "what steps did I follow?" but do not include results yet. Here you may use such expressions as:

| | |
|--|---|
| A method of ...is proposed | Предлагается метод... |
| Data on... are discussed | Обсуждаются данные по ... |
| Present data encompass a period of ... | Настоящие данные охватывают период в |
| The design of the experiments was to reveal... | Эксперименты были направлены на выявление |
| | ... |
| The effect of... on... is discussed | Обсуждается влияние ... на ... |
| The methods used for ... are discussed | Описываются методы, используемые для ... |

Results. Explain your actual findings, using subheadings to divide the section into logical parts, with the text addressing the study aims. Tables are an easy and neat way of summarizing the results. An alternative or additional way of presenting data is in the form of line graphs, bar-charts, pie-charts, etc. Graphs, charts and illustrations are referred to as 'figures' (for example, Fig. 1) in the text of the report. All figures should be numbered in order of appearance in the text. For each table or graph, describe and interpret what you see (you do the thinking -- do not leave this to the reader). Expressions to describe results obtained may be:

| | |
|---|--|
| The most important results are as follows | Самые важные результаты имеют следующий вид... |
| The results indicate the dominant role of | Результаты указывают на доминирующую роль... |
| The results of ... are discussed | Обсуждаются результаты ... |
| The results of observations are supported by... | Результаты наблюдений дополняются |

Discussion. This is the most difficult section of a report to write and requires considerable thought and care. Essentially it is a consideration of the results obtained in the study, guided by any statistical tests used, indicating whether the hypotheses tested are considered true or are to be rejected.

This is best thought of in three steps: the main results must be very briefly summarized; the procedure must be critically assessed and weaknesses noted; and a final evaluation of the results made in terms of the design, leading to a final judgment concerning the hypotheses being tested. The discussion

can only refer to results, which are presented in the results section. Any detailed results which only appear in the appendixes cannot be discussed.

Evaluation of the results should include reference to other research with indications as to whether or not the current findings are in agreement with other findings (that is, reference is made to the introduction). The main conclusions reached should be summarized at the end of the discussion. Suggestions for follow-up research can also be given.

Discuss the importance of what you found, in light of the overall study aims. Stand back from the details and synthesize what has (and has not) been learned about the problem, and what it all means. Say what you actually found, not what you hoped to find. Begin with specific comments and expand to more general issues. Recommend any improvements for further study. Answer the question "what is the significance of the research?"

Important Note: this section is often combined with either the Results section or the Conclusions section. Decide whether understanding and clarity are improved if you include some discussion as you cover the results, or if discussion material is better as part of the broader summing up.

Conclusions. Restate the study aims or key questions and summarize your findings using clear, concise statements. Keep this section brief and to the point.

Acknowledgments. This is an optional section. Thank people who directly contributed to the paper, by providing data, assisting with some part of the analysis, proofreading, typing, etc. It is not a dedication; so don't thank Mom and Dad for bringing you into the world, or your roommate for making your coffee.

References. Within the text, cite references by author and year unless instructed otherwise, for example "Comrie (1999) stated that ..." or "several studies have found that x is greater than y (Comrie 1999; Smith 1999)." For two authors, list both names, and for three or more use the abbreviation "et al." (note the period) following the first name, for example "Comrie and Smith (1999)" or "Comrie et al. (1999)." Attribute every idea that is not your own to avoid plagiarism.

6.3 Систематизация грамматического материала:

Согласование времен в английском предложении (Sequence of Tenses)

Если в главном предложении сказуемое выражено глаголом в одной из форм прошедшего времени, то в придаточном предложении употребление времен ограничено. Правило, которому в этом случае подчиняется употребление времен в придаточном предложении, называется согласованием времен.

Правило 1: Если глагол главного предложения имеет форму настоящего или будущего времени, то глагол придаточного предложения будет иметь любую форму, которая требуется смыслом предложения. То есть никаких изменений не произойдет, согласование времен здесь в силу не вступает.

Правило 2: Если глагол главного предложения имеет форму прошедшего времени (обычно Past Simple), то глагол придаточного предложения должен быть в форме одного из прошедших времен. То есть в данном случае время придаточного предложения изменится. Все эти изменения отражены в нижеследующей таблице:

| Переход из одного времени в другое | Примеры | |
|--------------------------------------|---|--|
| Present Simple » Past Simple | He can speak French – Он говорит по-французски. | Boris said that he could speak French – Борис сказал, что он говорит по-французски. |
| Present Continuous » Past Continuous | They are listening to him – Они слушают его | I thought they were listening to him – Я думал, они слушают его. |
| Present Perfect » Past Perfect | Our teacher has asked my parents to help him – Наш учитель попросил моих родителей помочь ему. | Mary told me that our teacher had asked my parents to help him – Мария сказала мне, что наш учитель попросил моих родителей помочь ему. |

| | | |
|--|--|---|
| Past Simple » Past Perfect | I invited her – Я пригласил ее. | Peter didn't know that I had invited her – Петр не знал, что я пригласил ее. |
| Past Continuous » Past Perfect Continuous | She was crying – Она плакала | John said that she had been crying – Джон сказал, что она плакала. |
| Present Perfect Continuous » Past Perfect Continuous | It has been raining for an hour – Дождь идет уже час. | He said that it had been raining for an hour – Он сказал, что уже час шел дождь. |
| Future Simple » Future in the Past | She will show us the map – Она покажет нам карту. | I didn't expect she would show us the map – Я не ожидал, что она покажет нам карту. |

Изменение обстоятельств времени и места при согласовании времен.

Следует запомнить, что при согласовании времен изменяются также некоторые слова (обстоятельства времени и места).

this » that
 these » those
 here » there
 now » then
 yesterday » the day before
 today » that day
 tomorrow » the next (following) day
 last week (year) » the previous week (year)
 ago » before
 next week (year) » the following week (year)

Прямая и косвенная речь

Перевод прямой речи в косвенную в английском языке

Для того чтобы перевести прямую речь в косвенную, нужно сделать определенные действия. Итак, чтобы передать чьи-то слова в английском языке (то есть перевести прямую речь в косвенную), мы:

1. Убираем кавычки и ставим слово *that*

Например, у нас есть предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы передать кому-то эти слова, так же как и в русском, мы убираем кавычки и ставим слово *that* – «что».

She said that Она сказала, что.....

2. Меняем действующее лицо

В прямой речи обычно человек говорит от своего лица. Но в косвенной речи мы не можем говорить от лица этого человека. Поэтому мы меняем «я» на другое действующее лицо. Возьмем к нашему предложению:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Так как мы передаем слова девушки, вместо «я» ставим «она»:

She said that she Она сказала, что она....

3. Согласовываем время

В английском языке мы не можем использовать в одном предложении прошедшее время с настоящим или будущим. Поэтому, если мы говорим «сказал» (то есть используем прошедшее время), то следующую часть предложения нужно согласовать с этим прошедшим временем. Возьмем наше предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы согласовать первую и вторую части предложения, меняем *will* на *would*. см. таблицу выше.

She said that she would buy a dress. Она сказала, что она купит платье.

4. Меняем некоторые слова

В некоторых случаях мы должны согласовать не только времена, но и отдельные слова. Что это за слова? Давайте рассмотрим небольшой пример.

She said, "I am driving now". Она сказала: «Я за рулем сейчас».

То есть она в данный момент за рулем. Однако, когда мы будем передавать ее слова, мы будем говорить не про данный момент (тот, когда мы говорим сейчас), а про момент времени в прошлом (тот, когда она была за рулем). Поэтому мы меняем *now* (сейчас) на *then* (тогда) *см. таблицу выше.*

She said that she was driving then. Она сказала, что она была за рулем тогда.

Вопросы в косвенной речи в английском языке

Вопросы в косвенной речи, по сути, не являются вопросами, так как порядок слов в них такой же, как в утвердительном предложении. Мы не используем вспомогательные глаголы (*do, does, did*) в таких предложениях.

He asked, "Do you like this cafe?" Он спросил: «Тебе нравится это кафе?»

Чтобы задать вопрос в косвенной речи, мы убираем кавычки и ставим *if*, которые переводятся как «ли». Согласование времен происходит так же, как и в обычных предложениях. Наше предложение будет выглядеть так:

He asked if I liked that cafe. Он спросил, нравится ли мне то кафе.

Давайте рассмотрим еще один пример:

She said, "Will he call back?" Она сказала: «Он перезвонит?»

She said if he would call back. Она сказала, перезвонит ли он.

Специальные вопросы в косвенной речи

Специальные вопросы задаются со следующими вопросительными словами: *what* – что *when* – когда *how* – как *why* – почему *where* – где *which* – который

При переводе таких вопросов в косвенную речь мы оставляем прямой порядок слов (как в утвердительных предложениях), а на место *if* ставим вопросительное слово.

Например, у нас есть вопрос в прямой речи:

She said, "When will you come?" Она сказала: «Когда ты придешь?»

В косвенной речи такой вопрос будет выглядеть так:

She said when I would come. Она сказала, когда я приду.

He asked, "Where does she work?" Он спросил: «Где она работает?»

He asked where she worked. Он спросил, где она работает.

Выполните упражнения для закрепления материала:

1. Ruth met lots of students when she went to visit a university last month. Read their words, then report what they said.

e.g. I Sarah told her (that) she had made lots of friends.

1. I've made lots of friends. (Sarah)
2. The library is huge. (Tina)
3. I'm learning lots of interesting things. (Paul)
- 4 The teachers are very friendly. (Simon)
5. I will always remember my time here. (Elaine)
6. I'm taking my final exams next month. (Roger)

2. Turn the following sentences into reported speech.

1 Robert said, 'This film is very funny'.

...Robert said (that) the film was very funny....

2 'I'm starting a new job next week,' she said.

3 'I got my exam results last week,' he told them.

4 'I can't afford to buy this dress,' said Sally.

- 5 'I would buy a car if I had enough money,' he said to her.
 6 Frank said, 'That's the house where I was born.'
 7 'That was a wonderful party,' said Jill.
 8 'Oranges grow in hot countries,' the teacher said.
 9 'A lot of people visit museums,' he said.
 10 'This is a very famous statue,' the tour guide told us.
 11 'I don't like that jacket,' said Bob.
 12 'I'm lost,' the boy said. (up-to-date reporting)
 13 'I may be a little late this evening,' she said.
 14 'You'd better clean up this mess,' Mum said to Claire.
 15 'I've already done the shopping,' she said. (up-to-date reporting)
 16 'I found this note under the sofa,' said Sue.
 17 'I won't be late again,' he said to us.
 18 'If I finish work early, I'll call you,' she said.
 19 'I've been training hard recently,' he told the reporters.
 20 'Shall I make some tea?' said Zoe.
 21 'We must go home now,' said the man to his children.
 22 'Those are the boys who chased me,' Sarah said.
 23 'I'm going to a party tonight,' Lynne told her friends (up-to-date reporting)
 24 'I used to have long hair,' Laura said.
 25 'There is too much violence on TV,' said Grandad.
 26 'You ought to make a decision soon,' Andrew told her.

3. Complete the sentences with your own ideas using reported speech, as in the example.

- 1 'I bought a new dress yesterday.'
 'Did you? But you told me ... *you had bought trousers.*' ...
 2 'Bill is moving house on Saturday.'
 'Is he?'
 3 'I like Chinese food a lot.'
 'Do you? '
 4 'Tom can speak German fluently.'
 'Can he? '
 5 'I haven't seen Anna for months.'
 'Haven't you? '
 6 'Sam is working for his father at the moment.'
 'Is he? '
 7 'I'm afraid I have to work this weekend.'
 'Do you? '
 8 'Janet knows about the surprise party.'
 'Does she?'

4. Turn the sentences into reported speech. In which of the following sentences do the tenses not change? In which do they not have to be changed? Why?

- 1 'The instructions say, 'The camera needs two batteries.'
The instructions say (that) the camera needs two batteries.
The tenses do not change because the introductory verb is in the present simple.
 2 'I've finished the letters you asked me to write,' Jill said.
 3 'Pandas live in China,' the teacher said.
 4 'Dad says, 'It's time for bed.'
 5 'I have to tidy my bedroom now,' Toby said.
 6 'The article says, 'There has been an increase in the number of university students.'
 7 'Mr Brown says, 'My son is going to work abroad.'
 8 'I should have bought her a present,' he said.

- 9 'I'm never going to have a pet,' my sister always says.
 10 Alison says, 'The taxi is here.'
 11 Mr Collins says, 'You needn't work late this evening.'
 12 'I'll pick you up at eight o' clock,' she told me.
 13 'Coal is found underground,' he said.
 14 'You ought to go to the doctor's,' she said to her son.
 15 'It is raining hard today,' she said.
 16 They said, 'We've never travelled by plane before.'
 17 'We might go to the cinema tonight,' they said.
 18 Mum always says, 'You should wear warmer clothes.'

5. Lucy's grandmother was a famous actress. Now that she has retired, she is showing Lucy reviews from some of the films she made. Using the prompts below, make sentences, as in the example.
 e.g. 'When I starred in 'The Love Affair' in 1952, 'Movie World' said that I was an extremely talented actress. The Stars' said that...

- 1 'The Love Affair' - 1952
 'Frances Garner is an extremely talented actress. Movie World
 'Garner gives an amazing performance in this film. The Stars
 2 'Over the Moon' - 1958
 'Garner brings any character to life." Film Stars
 'Frances Garner is always a pleasure to watch.' Movie News
 3 'The Secret House" - 1961
 'Ms Garner is the best actress ever seen on screen. Film Weekly
 'Garner has a gift which is very rare.' Movie Times
 4 'Only for You' - 1963
 'Frances Garner has made this film a success.' Film World
 'Garner truly is a star of the screen.' Screen Play

REPORTED QUESTIONS

Yesterday, they carried out an experiment.

One student asked the teacher why he was mixing the liquids.

The other student asked the teacher if/whether they should take notes.

◆ Reported questions are usually introduced with the verbs ask, inquire, wonder or the expression want to know. The verb is in the affirmative. The question mark and words/expressions such as please, well ..., oh, etc. are omitted. The verb tenses, pronouns and time expressions change as in statements.
 e.g. 'What did you make for dinner yesterday?' Bob asked me.

Bob asked me what I had made for dinner the day before.

◆ When the direct speech begins with a question word (who, where, how old, how long, when, why, what, etc.), the reported question is introduced with the same question word. When the direct question begins with an auxiliary (is, do, have) or a modal verb (can, may, etc.), then the reported question begins with if or whether.

e.g. 'Why do you want to leave your job?'

Pam asked me. Pam asked me why I wanted to leave my job.

'Do you like rock music?' he asked us.

He asked us if/whether we liked rock music.

'Can you ride a motorcycle?' Ben asked David.

Ben asked David if/whether he could ride a motorcycle.

6. Turn the questions into reported speech. Begin each one with I asked the ... and give the name of the person who does the job, as in the example.

- 1 'Do I need another filling?'

...I asked the dentist if I needed another filling....

- 2 'How much does this blouse cost?'

- 3 'How many tablets should I take each day?'
- 4 'Can I borrow the book for another week?'
- 5 'Will it cost very much to repair the television?'
- 6 'May I look at the menu, please?'
- 7 'What do I have to do for homework?'
- 8 'When will the report be typed?'
- 9 'Will you be able to deliver the flowers today?'
- 10 'Can I make an appointment to have my hair cut?'

7. Turn the following into reported questions.

- 1 'What is your name?' he asked me.
...*He asked me what my name was....*
- 2 'Where are your parents?' Uncle Bill asked us.
- 3 'Will you help me carry the box, please?' Dad asked.
- 4 'What time will you be home?' Mum asked me.
- 5 'Can you play the guitar?' he asked her.
- 6 'Who was at the door?' David asked Janet.
- 7 'Where is the post office?' they asked us.
- 8 'When will you do your homework?' Meg asked me.
- 9 The boss asked me, 'Have you finished those reports?'
- 10 John asked Sam, 'Do you like computer games?'
- 11 'Will you give me a lift to work, please?' he asked her
- 12 'Where is your jacket?' she asked him.

8. Yesterday, Simon interviewed a famous actor. He asked him the following questions. Turn them into reported questions.

- 1 'Do you enjoy being famous?'
...*Simon asked him if/whether he enjoyed being famous....*
- 2 'What is the best part of your job?'
- 3 'What do you find difficult about acting?'
- 4 'How many films have you starred in?'
- 5 'What is your favourite film?'
- 6 'Have you met many other famous people?'
- 7 'Where would you most like to make a film?'
- 8 'Have you visited many interesting places?'
- 9 'What are your plans for the future?'
- 10 'Are you happy with your life?'

REPORTED COMMANDS / REQUESTS / SUGGESTIONS

“Inform the manager immediately.”

“Let's call the computer expert.”

“Please don't tell anyone about this.”

Lorna asked them not to tell anyone about it.

Peter told them to inform the manager right away.

Jim suggested calling the computer expert.

◆ To report commands, instructions, requests or suggestions in reported speech, we use an appropriate introductory verb (ask, order, beg, suggest, tell, etc.) and the to-infinitive, -ing form or that-clause depending on the introductory verb.

a) 'Stop the car!' the policeman said to him.

The policeman ordered him to stop the car.

b) 'Put all the ingredients in a bowl,' she said to me.

She told me to put all the ingredients in a bowl.

c) 'Will you please hold this bag for me?' Laura said to Helen.

Laura asked Helen to hold the bag for her.

d) 'How about going to the cinema?' I said to them.

I suggested going to the cinema.

9. Turn the following sentences into reported speech.

1 The teacher said to the student, 'Come and see me after the lesson.'

...*The teacher asked the student to go and see him/ her after the lesson....*

2 He said, 'Shall we go out for dinner?'

3 Colin said to Dave, 'Please hold this book for me.'

4 He said to her, 'Close the door, please.'

5 Father said, 'How about going to the beach?'

6 She said, 'Let's watch the game on TV.'

7 He said to them, 'Please, please don't hurt me.'

8 The policeman said to the thieves, 'Put your hands up!'

9 The man said to the waiter, 'Can you bring me some water, please?'

10 Jason said to his father, 'Please, please let me go to the party.'

11 The librarian said to the boys, 'Don't make so much noise.'

12 The chef said to me, 'Put the cake in the oven.'

10. First read, then report what the teacher told the students before the exam.

1 Please leave your bags at the front room.

...*He asked the students to leave their bags at the front of the room....*

2 Don't talk during the exam.

3 Raise your hand if you need anything.

4 Write all you answers in pen.

5 Answer all the questions.

6 Don't forget to write your name at the top of the page.

7 Check your answers again before you hand the paper in.

8 Please, leave quietly when you finish.

11. Study the speech bubbles, then complete the sentences below using reported speech, as in the example.

Hurry up!

Be quiet!

Let's go to the theatre.

We'll discuss it later.

Can I have a biscuit, please, Mum?

I won't be home tonight, Dad.

Will you help me with these bags, please, Jim?

I'm going to bed.

1 It was very late, so I ...*said I was going to bed.*

2 Clare was planning to stay with friends, so she

3 I was hungry, so I

4 The shopping was very heavy, so Sarah

5 Mark wasn't ready for school, so his brother

6 The children were shouting, so the teacher

7 Susie wanted to watch a play, so she

8 Pam was busy when I asked for some advice, so she

12. Turn the following sentences into reported

1 'Where are you going?' she said to them.

...*She asked them where they were going....*

2 'I'm going shopping,' said Anna, (up-to-date reporting)

- 3 'Go away!' said his friend.
 4 She asked me, 'Are you ready to leave?'
 5 'I'll pick you up at five o'clock,' he said to her.
 6 'It's time for lunch,' Ruth says.
 7 'When did you arrive?' asked Marilyn.
 8 The meeting started ten minutes ago,' she said, (up-to-date reporting)
 9 My father said to me, 'Don't be late.'
 10 Tom has already left,' said Pam to us.
 11 'Who's there?' said Joe.
 12 'What colour skirt did you buy?' she asked me.
 13 They said to him, 'We're leaving early in the morning. (up-to-date reporting)
 14 'Don't go near the fire,' Dad said to the boys.
 15 'Let's have a barbecue this weekend,' said Liz.

13. Choose the correct answer.

- 1 She said that it was going to be a wonderful party.
 a 'It was going to be a wonderful party.'
 b 'It's going to be a wonderful party.'
 2 He said the bus might be a little late that day.
 a 'The bus was a little late today.'
 b 'The bus might be a little late today.'
 3 She told him that he should study harder.
 a 'You should study harder.'
 b 'You should have studied harder.'
 4 He said that the fire had done a lot of damage to the building.
 a 'The fire had done a lot of damage to the building'
 b 'The fire has done a lot of damage to the building,
 5 He said that Michael was the best student he had ever taught.
 a 'Michael is the best student I have ever taught.'
 b 'Michael was the best student I have ever taught.'
 6 She told us that the new furniture had been delivered the day before.
 a 'The new furniture had been delivered yesterday.'
 b 'The new furniture was delivered yesterday.'
 7 They said that the manager would inspect the office the following day.
 a 'The manager will inspect the office the following day.'
 b 'The manager will inspect the office tomorrow.'
 8 He said that if we hadn't acted so quickly, the accident would have been even worse.
 a 'If you hadn't acted so quickly, the accident would have been even worse.'
 b 'If you haven't acted so quickly, the accident would be even worse.'

14. Complete the sentences.

- 1 'You should spend more time studying.'
 The teacher advised ...*me to spend more time studying*...
 2 'Don't forget to lock the door before you leave.'
 Sam reminded
 3 'I'm sorry I forgot to call you.'
 Jim apologised
 4 'You never listen to me, Stuart.'
 Mary complained
 5 'Shall we go bowling this evening?'
 Mark suggested
 6 'You mustn't play near the road.'
 Father forbade

- 7 'This man stole my wallet!'
Mr Brown accused
- 8 'I'm the best basketball player in the school.'
Steve boasted
- 9 'Yes, I took the letter.'
Claire admitted
- 10 'You must stay for lunch, Sarah.'
Mrs Stamp insisted
- 11 'Please, please, let me borrow your bicycle.'
Martin begged
- 12 'Don't touch the oven. It's hot.'
Mother warned

15. Fill in the gaps with one of the introductory verbs from the list below in the past simple.

- | | | | |
|--------|----------|---------|----------|
| deny | suggest | boast | agree |
| insist | accuse | promise | complain |
| advise | threaten | warn | remind |
- 1 'I'm the fastest runner on the team,' he said.
He ...*boasted*... about being the fastest runner on the team.
- 2 'I didn't take your jacket,' he said to her.
He ... taking her jacket.
- 3 'You should go to the doctor's,' Mum said to me.
Mum ... me to go to the doctor's.
- 4 'I'll call you next week,' she said to him.
She ... to call him next week.
- 5 'Yes, I'll set the table for dinner,' he said to her.
He ... to set the table for dinner.
- 6 'He always forgets my birthday,' she said.
She ... that he always forgot her birthday.
- 7 'Let's go for a walk,' she said.
She ... going for a walk.
- 8 'Leave, or I'll shoot,' the man said to them.
The man ... to shoot them if they didn't leave.
- 9 'Don't forget to feed the cat,' she said to him.
She ... him to feed the cat.
- 10 'You broke my CD player,' she said to him.
She ... him of breaking her CD player.
- 11 'Don't go near the edge of the cliff,' Dad said to their
Dad ... them not to go near the edge of the cliff.
- 12 'You must do your homework before you go out,' she said to us.
She ... on us doing our homework before we went out.

16. Turn the sentences into reported speech using an appropriate introductory verb.

- 1 'No, I won't do your homework for you,' she said to me.
...*She refused to do my homework for me*....
- 2 'You lied to me,' Dennis told Ann.
- 3 'I promise I won't tell anyone your secret,' Tara said to Diana.
- 4 'Don't forget to post the letters,' Mum said to me.
- 5 'I'm sorry I ruined your shirt,' Sarah told Frances.
- 6 'No, I didn't use Tim's computer,' George said.
- 7 'Don't get too close to the fire,' Mike said to the children.
- 8 'Let's have a party,' Simon said.
- 9 'I'll punish you if you behave badly,' Mum told the twins.

- 10 'It was me who broke the vase,' she said.
 11 'Could I use your phone, please?' David asked me.
 12 'Yes, I'll help you with the washing-up,' Sandra told me.
 13 'Everyone stop talking!' Mr Jones told the class.
 14 'Please, please, don't tell anyone about this,' he said to us.
 15 'You should go to the dentist's,' she told her brother.
 16 'Children, sit down!' the school bus driver said.
 17 'Throw down your weapons!' the policeman said to the robbers.
 18 'No, you may not stay out late tonight,' Dad said to Louise.
 19 'You must wash your hands before eating dinner,' she told the children.
 20 'That's the most beautiful necklace I've ever seen' Amanda said.

EXCLAMATIONS – YES/NO SHORT ANSWERS – QUESTION TAGS

- We use the verbs exclaim/say that to report exclamations which begin with 'What a/an ...' or 'How...'' in direct speech.

e.g. 'What an unusual design!' he said.

He exclaimed/said that it was an unusual design.

He exclaimed/said that the design was unusual. But with exclamations such as 'Splendid!', 'Great!', 'Good!', 'Excellent!', 'Oh!', 'Oh dear!' etc. we use the expression give an exclamation of delight/ disgust/ relief/surprise, etc.

e.g. 'Wow!' he said as he unwrapped his gift.

He gave an exclamation of surprise as he unwrapped his gift.

- Study the following examples:

5 g. a) They said, 'Thank you.' - They thanked us.

b) "You fool!" she said. - She called him a fool.

c) 'Happy Birthday!' we said to Tamzin. We wished Tamzin a happy birthday.

d) 'Congratulations!' they said to us. They congratulated us.

- Yes /No short answers are expressed in reported speech with subject + appropriate auxiliary verb/introductory verb.

e. g. 'Will you help me decorate the cake?' she asked him. "Yes," he said.

She asked him to help her decorate the cake and he said he would/he agreed.

- Question tags are omitted in reported speech. We use an appropriate introductory verb to convey the same meaning.

e. g. 'You won't tell anyone, will you?' she said to him. She asked him not to tell anyone.

17. Turn the following sentences into reported speech.

1 "Will you call me?" he asked. 'Yes, of course,' she said.

He asked her to call him and she said she would.

2 "Wow!" they said as the fireworks exploded in the sky.

3 'You'll try to visit John, won't you?' he said to us.

4 'How delicious!' she said as she tasted the dessert.

5 'What a surprise!' he said when he saw the present.

6 'Amazing!' she said when she saw the magician's act.

7 'Well, good luck, then,' she said to him.

8 'Can you do this puzzle?' she asked. 'No', he said.

REPORTING A DIALOG

In dialogues we use a mixture of statements, questions, commands, requests, etc. In reported speech, we use: and, as, adding that, and (he/she) added that, because, but, since, and then (he/she) went on to say (that), while, then, etc. to link the sentences in a dialogue. We can also use introductory verbs in the present participle form (offering, begging, explaining, etc.).

- a) 'I'm exhausted,' she said to him. 'Can you make me a cup of tea?'
She exclaimed that she was exhausted and asked him to make her a cup of tea.
- b) 'I'll take a taxi home. It's getting late,' he said.
He said that he would take a taxi home as/ because/since it was getting late.
- c) Mr Adams: Can I talk to Mr Stephens?
Secretary: I'm sorry, but he's not here. Would you like me to take a message?
Mr Adams: No, thank you. I need to see him in person.
Mr Adams asked to talk to Mr Stephens. His secretary said that he wasn't there and offered to take a message. Mr Adams declined, explaining that he needed to see him in person.

18. Turn the following sentences into reported speech.

- 1 'I'm hungry,' she said. 'I haven't eaten all day.'
...She said that she was hungry, explaining that she hadn't eaten all day...
- 2 'Let's go to the cinema,' he said. 'We haven't seen a film for months.'
- 3 Tim: Dave is ill. He can't come to the party.
Mike: What's wrong with him?
Tim: He's got flu. He has to stay in bed.
- 4 'You're early,' he said to her. 'I'm not ready yet.'
- 5 'Hurry up!' she told him. 'We're going to miss the bus.'
- 6 'Have you got your key?' she said. 'I've forgotten mine.'
- 7 'I'm going out,' Colin said. 'I might be back late.'
- 8 Sally: I've bought a car. It's being delivered tomorrow.
John: What kind of car is it?
Sally: It's a sports car. It was very expensive.
- 9 'I'm sorry I'm late. I overslept,' he said to them.
- 10 Martin: Can you help me? I need some advice.
James: What's the problem?
Martin: I don't know what to buy my mother for her birthday. I want to get something special.

19. Turn the following sentences into direct speech, as in the example.

- 1 He threatened to tell the headmaster if we didn't behave properly.
...I'll tell the headmaster if you don't behave properly,' he said....
- 2 She invited me to go to the cinema with her.
- 3 He offered to help me clean the house.
- 4 We explained that we were late because we had missed the bus.
- 5 She advised me to see a professional.
- 6 She admitted to reading my diary.
- 7 She agreed to help me interview the candidates.
- 8 He accused me of breaking his glasses.
- 9 We apologised for missing their dinner party.
- 10 Edward complained that the children were always disturbing him.

20. Turn the following sentences from direct into reported speech or vice versa.

- 1 'What are your plans for the weekend?' he asked her.
...He asked her what her plans for the weekend were....
- 2 Malcolm suggested that they go fishing that afternoon.
- 3 Simon denied having damaged the car.
- 4 'Could you open the door for me, please?' Kate asked Harry.
- 5 Julia claimed to have met Kevin Costner.
- 6 'You never listen when I'm talking to you,' she said.
- 7 The instructor said, 'This is how you open the parachute.'
- 8 'I promise I won't lose your necklace,' she told her friend.
- 9 Stuart begged his parents to let him go to the disco.

- 10 His father said to him, 'No, you can't go to the concert.'
 11 'Yes, you may stay out late on Saturday,' said Mum.
 12 The man demanded to speak to his lawyer.
 13 'I'm afraid there are no tickets left,' he said to us.
 14 The path is very slippery,' the guide said to the climbers.
 15 He asked her to write to him while she was away.

21. Turn the following into reported speech. Use appropriate introductory verbs.

- 1 Sam: 'We're having trouble finding a good sales assistant.'
 ...*Sam complained that they were having trouble finding a good sales assistant...*
 2 Dave: 'We've been interviewing people for two weeks.'
 3 Lucy: 'Why don't you contact the Job Centre?'
 4 Ann: 'I think that Julie Smith is looking for a job.'
 5 Tom: 'Yes, right. We forgot that she has been looking for a job.'
 6 Dave: 'Actually, Julie might be perfect for the job. Ann, do you have her phone number?'
 7 Ann: 'Yes, I do. I'll give her a call if you like.'
 8 Sam: 'Don't forget to ask her if she can work flexible hours.'

Сравнительно-сопоставительные конструкции и обороты в предложении

Все три формы прилагательных – основная (или положительная), сравнительная и превосходная используются в сравнительных конструкциях.

Положительная степень

(или основная форма прилагательного)

1 Одинаковое качество двух предметов (лиц, явлений) выражается прилагательными в положительной степени (основная форма) в конструкции с союзами **as...as** в значении *такой же ...как, так же...как*:

| | |
|---|--|
| He is as tall as his brother. | <i>Он такой же высокий, как и его брат.</i> |
| This text is as difficult as that one. | <i>Этот текст такой же трудный, как и тот.</i> |

Иногда употребляется конструкция с прилагательным **same** *тот же самый, одинаковый*: **the same...as** – *такой же, тот же самый*:

| | |
|--------------------------------------|--|
| Mary is the same age as Jane. | <i>Мэри того же возраста, что и Джейн.</i> |
|--------------------------------------|--|

2 Разное качество предметов выражается конструкцией **not so/as...as** в значении *не так...как, не такой...как*:

| | |
|--|--|
| He is not so (as) tall as his brother. | <i>Он не такой высокий, как его брат.</i> |
| The problem is not so simple as it seems. | <i>Эта проблема не такая простая, как кажется.</i> |

Если после второго **as** следует личное местоимение в третьем лице, то обычно глагол повторяется:

| | |
|---|---|
| I am not as strong as he <u>is</u> . | <i>Я не такой сильный, как он.</i> |
| Her sister is not so pretty as she <u>is</u> . | <i>Ее сестра не такая хорошенькая, как она.</i> |

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

| | |
|--|---------------------------------------|
| She is not so beautiful as you (are). | <i>Она не такая красивая, как ты.</i> |
|--|---------------------------------------|

3 Если один из сравниваемых объектов превосходит другой вдвое (**twice** [twɑɪs]) или в несколько раз (... **times**) по степени проявления какого-либо качества, то употребляется следующая конструкция:

Your room is **twice as large as** mine.

Ваша комната в два раза больше моей.

This box is **three times as heavy as** that.

Этот ящик в три раза тяжелее того.

Когда второй объект сравнения не упомянут, то **as** после прилагательного не употребляется:

This grade is **twice as expensive**.

Этот сорт в два раза дороже.

He is **twice as old**.

Он в два раза старше.

А если один из объектов уступает по качеству в два раза, то употребляется **half** половина, наполовину, в два раза меньше. Обратите внимание на то, что стоящее за ним прилагательное в конструкции **as... as** имеет противоположное значение тому, что принято в русском языке:

Your flat is **half as large as** mine.

Ваша квартира вдвое меньше моей.

Moscow is **half as big as** New York.

Москва наполовину меньше Нью-Йорка.

В подобных сравнительных конструкциях союз **as... as** и последующее прилагательное могут вообще опускаться, что должно компенсироваться наличием соответствующего существительного:

Your flat is **three times the size of** mine.

Ваша квартира в три раза больше моей.

He is **half my age**.

Он в два раза моложе меня.

Сравнительная степень

1 При сравнении степени качества одного предмета с другим после прилагательного в СРАВНИТЕЛЬНОЙ степени употребляется союз **than** [Dxn] - чем, который при переводе на русский язык часто опускается:

He is **older than** I am.

Он старше, чем я. (меня)

This book is **more interesting than** that one.

Эта книга интереснее, чем та (книга).

Эта конструкция может содержать и количественный компонент сравнения:

My mother is **ten years younger than** my father.

Моя мама на 10 лет

моложе отца.

Уменьшение качества выражается с помощью **less... than**:

I am **less musical than** my sister.

Я менее музыкален, чем моя сестра.

Если после **than** следует личное местоимение в третьем лице, то глагол обычно повторяется:

She has **more good marks than** he has.

У нее больше хороших отметок, чем у него.

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

He is **stronger than** you. *Он сильнее, чем ты.*

В этом случае, если нет второго сказуемого, после **than** обычно употребляется личное местоимение в объектном падеже **me/ him/ her/ them/ us**, а не в именительном:

You are taller **than I am**. или You are taller **than me**. *Ты выше, чем я (меня).*

I got up earlier **than she did**. или I got up earlier **than her**. *Я встал раньше ее (чем она).*

She runs quicker **than him**. *Она бежит быстрее (чем он).*

2 Для усиления сравнительной степени часто употребляются слова **much** [mʌs] или **far** [fɑr] со значением - значительно, гораздо, намного, а также **still еще**, **even** ['Jvɪn] даже, **by far** намного, безусловно. Причем **much more** [mʌL] и **far more** употребляется перед неисчисляемыми существительными, а **many more** перед исчисляемыми существительными :

My boyfriend is **much older than** me.

Мой друг гораздо старше меня.

This book is **far better than** that one.

Эта книга значительно лучше той.

It is **still colder** today.

Сегодня еще холоднее.

He has **much more free time than** I have.

У него гораздо больше свободного времени, чем у меня.

I have **many more books than** he (has).

У меня гораздо больше книг, чем у него.

3 При передаче зависимости одного качества от другого (обычно их параллельное возрастание или убывание) используется конструкция **the... the**, например:

The more you have, **the more** you want. *Чем больше ты имеешь, тем больше ты хочешь.*

The longer I stay here **the better** I like it. *Чем дольше я нахожусь здесь, тем больше мне нравится.*

Превосходная степень

Если один предмет или лицо превосходят остальные в каком-либо качестве, то употребляется прилагательное в превосходной степени с артиклем **the**. Речь обычно идет не о сравнении двух предметов (лиц, явлений), а трех или более.

"Why did you stay at that hotel?" – "It was **the cheapest** (that) we could find." *"Почему вы остановились в той гостинице?" – "Она была самая дешевая, которую мы могли найти".*

Обычно при сравнении употребляется конструкция **the прилагательное... in**, если речь идет о местоположении, например:

Tom is **the cleverest** (boy) **in** the class. *Том – самый умный (парень) в классе.*

What's **the longest** river **in** the world? *Какая самая длинная река в мире?*

Или конструкция **the прилагательное... of**, например:

the happiest day **of** my life *счастливейший день моей жизни*

He is **the best of** my friends. *Он лучший из моих друзей.*

Pete is **the best** student **of** us all. *Пит лучший студент из всех нас.*

She is **the prettiest of** them all. *Она самая хорошенькая из них.*

После превосходной степени часто употребляется определительное придаточное предложение со сказуемым в **Present Perfect** (как вы помните, здесь речь идет о свершившемся факте в прошлом, значение которого продолжается до настоящего момента). Это предложение может вводиться относительным местоимением **that** *который*, но оно обычно опускается.

This is **the most interesting** book (that) *Это самая интересная книга, которую я когда-либо читал.*
I have ever read.

Типы придаточных предложений и способы их связи

TIME CLAUSES

They had booked tickets before they went to the cinema. They will go home when the film is over.

◆ We use the following time conjunctions to introduce time clauses.

when - as - while - before - after - since - until/till - whenever - as long as - by the time- as soon as - the moment that - no sooner ...than - hardly... when - once - immediately - the first/last/next time etc.

◆ When the time clause precedes the main clause, a comma is used.

e.g. *Whenever he is in town, he visits us.*

He visits us whenever he is in town.

Sequence of Tenses

◆ Time clauses follow the rule of the sequence of tenses. That is, when the verb of the main clause is in a present or future form, the verb of the time clause is in a present form. When the verb of the main clause is in a past form, the verb of the time clause is in a past form too.

Main clause

Time clause

present / future / imperative → present simple or present perfect

She takes off her shoes the moment that she gets home.

I'll call you as soon as I get to my hotel.

Turn off the lights before you leave.

past simple/ past perfect → past simple or past perfect

He took a shower after he had finished painting the room.

They had reserved a table before they went to the restaurant.

TIME CONJUNCTIONS

◆ **ago - before**

ago = before now

e.g. *My parents got married twenty years ago. (= twenty years before now)*

before = before a past time

e.g. *Helen and Mike got married last month.*

They had met six months before. (= six months before last month)

◆ **until/till - by the time**

until/till = up to the time when

e.g. *You must stay in the office until/till you finish/have finished the report.*

(= up to the time when you finish the report) They'll be at their summer house until/till Sunday.

(= up to Sunday)

by the time + clause = not later than the moment something happens

e.g. *I will have set the table by the time you come home. (= before, not later than the moment you come home)*

by = not later than

e.g. *I'll let you know my decision by Friday. (= not later than Friday)*

Note: a) **not... until/till**

e.g. *I won't have finished my work until/till/ before Thursday.*

b) Both until/till and before can be used to say how far away a future event is.

e.g. *There's only one week until/till/before my summer holidays.*

◆ **during - while/as**

during + noun = in the time period

e.g. *We learnt several interesting facts during the lecture.*

while/as + clause = in the time period

e.g. *We learnt several interesting facts while/as we were listening to the lecture.*

◆ **when = (time conjunction) + present tense**

e.g. *We'll order some pizzas when our friends get here.*

when = (question word) + will/would

e.g. *I'm not sure when his next book will be published.*

CLAUSES OF RESULT

Dolphins are so appealing (that) it is hard not to like them.

They are such intelligent creatures (that) they can communicate with each other.

Clauses of result are used to express the result of something. They are introduced with the following words/expressions:

as a result - therefore - consequently/as a consequence - so - so/such ... that etc.

◆ **as a result/therefore/consequently**

e.g. *The president was taken ill and, as a result/ therefore/consequently the summit meeting was cancelled.*

The president was taken ill. As a result/therefore/ consequently, the summit meeting was cancelled.

◆ **so** e.g. *It was hot, so I turned on the air-conditioning.*

◆ **such a/an + adjective + singular countable noun**

e.g. *It was such an interesting book (that) I couldn't put it down.*

◆ **such + adjective + plural/uncountable noun**

e.g. *They are such good friends (that) they've never had an argument.*

It was such expensive jewellery (that) it was kept in a safe.

◆ **such a lot of + plural/uncountable noun**

e.g. *She invited such a lot of guests to her party that there wasn't enough room for all of them.*

He has such a lot of money (that) he doesn't know what to do with it.

◆ **so + adjective/adverb**

e.g. *He is so devoted that he deserves praise.*

He speaks so quickly that I can't understand him.

◆ **so much/little + uncountable noun**

so many/few + plural noun

e.g. *There is so much traffic that we won't be on time. He pays so little attention to what I say that it makes me angry.*

He made so many mistakes that he failed. There are so few wolves left that we have to protect them.

CLAUSES OF REASON

Traffic is getting worse because/as more people are buying cars. Traffic is getting worse on account of the fact that more people are buying cars.

Causes of reason are used to express the reason for something. They are introduced with the following words/expressions:

because - as/since - the reason for/why - because of /on account of/due to - now that - for etc.

◆ **because** e.g. *I took a taxi because it was raining.*

Because it was raining, I took a taxi.

◆ **as/since (=because)** e.g. *They bought him a gift as/since it was his birthday. As/Since it was his birthday, they bought him a gift.*

◆ **the reason for + noun/-ing form**

the reason why + clause

e.g. *The reason for his resignation was (the fact) that he had been offered a better job. The fact that he had been offered a better job was the reason for his resigning. The reason why he resigned was (the fact) that he had been offered a better job.*

◆ **because of/on account of/due to + noun**

because of/on account of/due to the fact that + clause

e.g. *All flights were cancelled because of /on account of the thick fog.*

All flights were cancelled due to the thick fog. He asked for a few days off because of /on account of the fact that he was exhausted. He asked for a few days off due to the fact that he was exhausted.

◆ **now (that) + clause** e.g. *Now (that) they have children, they have less free time.*

◆ **for = because (in formal written style)**

A clause of reason introduced with for always comes after the main clause.

e.g. *The citizens of Harbridge were upset, for a new factory was to be built near their town.*

CLAUSES OF PURPOSE

They met in a café to discuss their holiday.

They met in a café so that they could discuss their holiday.

Clauses of purpose are used to express the purpose of an action. That is, they explain why someone does something. They are introduced with the following words/expressions:

to - in order to/so as to-so that/in order that - in case-for etc.

◆ **to - infinitive**

e.g. *She went shopping to look for some new clothes.*

◆ **in order to/so as to + infinitive (formal)**

e.g. *He did a postgraduate course in order to/so as to widen his knowledge of international politics.*

In negative sentences we use in order not to or so as not to. We never use not to alone.

e.g. *He wrote the number down in order not to/so as not to forget it.*

◆ **so that + can/will (present or future reference)**

e.g. *Emma has booked a first-class ticket so that she can travel in comfort.*

so that + could/would (past reference)

e.g. *He recorded the match so that he could watch it later.*

Note: In order that has the same structure as so that. However, it is not used very often as it is formal.

e.g. *We will send you the forms in order that you can make your application.*

◆ **in case + present tense (present or future reference)**

in case + past tense (past reference)

In case is never used with will or would.

e.g. *Take your credit card in case you run out of cash. He took a jumper in case it got cold.*

◆ **for + noun** (when we want to express the purpose of an action)

e.g. *He went to the doctor's for a check-up.*

for + -ing form (when we want to express the purpose or function of something)

e.g. *We use a spade for digging.*

Clauses of purpose follow the rule of the sequence of tenses, like time clauses.

e.g. *He borrowed some money so that he could pay his phone bill.*

Note: We can express negative purpose by using:

a) **prevent + noun/pronoun + (from) + -ing form**

e.g. *She covered the sofa with a sheet to prevent it (from) getting dirty.*

b) **avoid + -ing form**

e.g. *They set off early in the morning to avoid getting stuck in traffic.*

EXCLAMATIONS

Exclamations are words or sentences used to express admiration, surprise, etc.

To form exclamatory sentences we can use what (a/an), how, such, so or a negative question.

◆ **so + adjective/adverb**

e.g. *This cake is so tasty! He works so hard!*

◆ **such + a/an (+ adjective) + singular countable noun**

e.g. *This is such an original design!*

◆ **such (+ adjective) + uncountable/plural noun**

e.g. *You gave me such valuable information!*

She's wearing such elegant clothes!

◆ **what + a/an (+ adjective) + singular countable noun**

e.g. *What a lovely view!*

What an unusual pattern! What a day!

◆ **what (+ adjective) + uncountable/plural noun**

e.g. *What expensive furniture!*

What comfortable shoes!

◆ **how + adjective/adverb**

e.g. *How clever he is! How well she behaved!*

◆ **negative question (+ exclamation mark)**

e.g. *Isn't she a graceful dancer!*

CLAUSES OF CONTRAST

He prefers to make things by hand although/even though he could use a machine.

Clauses of contrast are used to express a contrast. They are introduced with the following words/phrases:

but - although/even though/though - in spite of/despite - however - while/whereas - yet - nevertheless - on the other hand

◆ **but** e.g. *It was cold, but she wasn't wearing a coat.*

◆ **although/even though/though + clause**

Even though is more emphatic than although. Though is informal and is often used in everyday speech. It can also be put at the end of a sentence.

e.g. *Although/Even though/Though it was summer, it was chilly.*

It was chilly although/even though/though it was summer.

It was summer. It was chilly, though.

◆ **in spite of/despite + noun/-ing form**

e.g. *In spite of/Despite his qualifications, he couldn't get a job.*

He couldn't get a job in spite of/despite (his) being qualified.

in spite of/despite the fact that + clause

e.g. *In spite of/Despite the fact that he was qualified, he couldn't get a job.*

◆ **however/nevertheless** A comma is always used after however/nevertheless.

e.g. *The man fell off the ladder. However/Nevertheless, he wasn't hurt.*

◆ **while/whereas**

e.g. *She is tall, while/whereas her brother is rather short.*

◆ **yet (formal)/still**

e.g. *The fire was widespread, yet no property was damaged. My car is old. Still, it is in very good condition.*

◆ **on the other hand**

e.g. *Cars aren't environmentally friendly.*

On the other hand, bicycles are. / Bicycles, on the other hand, are.

CLAUSES OF MANNER

They look as if/as though they are in a hurry.

Clauses of manner are introduced with *as if/as though* and are used to express the way in which something is done/said, etc.

◆ We use **as if /as though** after verbs such as *act, appear, be, behave, feel, look, seem, smell, sound, taste* to say how somebody or something looks, behaves, etc.

e.g. *He is acting as if/as though he's had bad news.*

We also use **as if /as though** with other verbs to say how somebody does something.

e.g. *She talks as if/as though she knows everything.*

◆ We use **as if /as though + past tense** when we are talking about an unreal present situation. *Were* can be used instead of *was* in all persons.

e.g. *He spends his money as if/as though he was I were a millionaire. (But he isn't.) He behaves as if/as though he owned the place. (But he doesn't.)*

Note: We can use *like* instead of *as if/as though* in spoken English.

e.g. *She looks like she's going to faint, (informal spoken English).*

RELATIVE CLAUSES

A camel is an animal which/that lives in hot countries.

A computer is something which/ that we use for storing information.

A firefighter is someone who/that puts out fires and whose job is very risky.

Relative clauses are introduced with a) relative pronouns (*who(m), which, whose, that*) and b) relative adverbs (*when, where, why*).

We use:

◆ **who/that to refer to people.**

◆ **which/that to refer to objects or animals.**

Who/which/that can be omitted when it is the object of the relative clause; that is, when there is a noun or subject pronoun between the relative pronoun and the verb. It cannot be omitted when it is the subject of the relative clause. We can use *whom* instead of *who* when it is the object of the relative clause. *Whom* is not often used in everyday English.

e.g. a) *I saw a friend. I hadn't seen him for years.*

I saw a friend (who/whom/that) I hadn't seen for years. (Who/whom/that is the object, therefore it can be omitted.)

b) *I met a woman. She was from Japan.*

I met a woman who/that was from Japan. (Who/that is the subject, therefore it cannot be omitted.)

◆ **whose instead of possessive adjectives** (*my, your, his, etc.*) with people, objects and animals in order to show possession.

e.g. a) *That's the boy — his bicycle was stolen yesterday.*

That's the boy whose bicycle was stolen yesterday.

b) *That's the building —its windows were smashed.*

That's the building whose windows were smashed.

◆ We usually avoid using prepositions before relative pronouns.

e.g. a) *The person to whom the money will be entrusted must be reliable, (formal English — unusual structure)*

b) *The chair that you are sitting on is an antique. (usual structure)*

c) *The chair you are sitting on is an antique. (everyday English)*

◆ Which can refer back to a whole clause.

e.g. *He helped me do the washing-up. That was kind of him. He helped me do the washing-up, which was kind of him. (Which refers back to the whole clause. That is, it refers to the fact that he helped the speaker do the washing-up.)*

◆ We can use the structure all/most/some/a few/half/none/two, etc. + of + whom/which.

e.g. a) *He invited a lot of people. All of them were his friends.*

He invited a lot of people, all of whom were his friends.

b) *He has a number of watches. Three of them are solid gold.*

He has a number of watches, three of which are solid gold.

◆ That is never used after a comma or preposition.

e.g. a) *The Chinese vase, which is on the coffee table, is very expensive. (NOT: ...that is on the coffee table ...)*

b) *The bank in which the money was deposited is across the street. (NOT: The bank in that the money...)*

◆ We use that with words such as all, everything, something, anything, no(thing), none, few, little, much, only and with the superlative form.

e.g. *Is this all that you can do for me? (more natural than ...all which you can do ...)* *The only thing that is important to me is my family. It's the best song that I've ever heard.*

who/that (people)

subject — cannot be omitted

who/whom/that(people)

object — can be omitted

which/that (objects, animals)

subject — cannot be omitted

object — can be omitted

whose (people, objects, animals)

possession — cannot be omitted

RELATIVE ADVERBS

We use:

◆ **where** to refer to place, usually after nouns such as place, house, street, town, country, etc. It can be replaced by **which/that + preposition** and, in this case, which/that can be omitted.

e.g. *The house where he was born has been demolished.*

The house (which/that) he was born in has been demolished.

◆ **when** to refer to time, usually after nouns such as **time, period, moment, day, year, summer**, etc. It can either be replaced by **that** or can be omitted.

e.g. *That was the year when she graduated.*

That was the year (that) she graduated.

◆ **why** to give reason, usually after the word **reason**. It can either be replaced by **that** or can be omitted.

e.g. *The reason why she left her job was that she didn't get on with her boss.*

The reason (that) she left her job was that she didn't get on with her boss.

IDENTIFYING/NON-IDENTIFYING CLAUSES

There are two types of relative clause: identifying relative clauses and non-identifying relative clauses. An identifying relative clause gives necessary information and is essential to the meaning of the main sentence. It is not put in commas. A non-identifying relative clause gives extra information and is not essential to the meaning of the main sentence. It is put in commas.

Identifying relative clauses are introduced with:

◆ **who, which, that.** They can be omitted if they are the object of the relative clause.

e.g. a) *People are prosecuted. (Which people? We don't know. The meaning of the sentence is not clear.)*

People who/that lie in court are prosecuted. (Which people? Those who lie in court. The meaning of the sentence is clear.)

b) *The papers are missing. (Which papers? We don't know. The meaning of the sentence is not clear.)*

The papers (which/that) you gave me to check are missing. (Which papers? The ones you gave me to check. The meaning of the sentence is clear.)

◆ **whose, where, when, (the reason) why.** Whose cannot be omitted. Where can be omitted when there is a preposition. When and why can either be replaced by that or can be omitted.

e.g. a) *The man was angry. (Which man? We don't know. The meaning of the sentence is not clear.)*

The man whose car was damaged was angry. (Which man? The one whose car was damaged. The meaning of the sentence is clear.)

b) *The shop is near my house. (Which shop? We don't know.)*

The shop where I bought this shirt is near my house. OR The shop I bought this shirt from is near my house. (Which shop? The one I bought this shirt from.)

c) *The day was the happiest day of my life. (Which day? We don't know.)*

The day (when/that) I got married was the happiest day of my life. (Which day? The day I got married.)

d) *I was upset. This is the reason. (The reason for what? We don't know.)*

I was upset. This is the reason (why/that) I didn't call you. (The reason I didn't call you.)

Non-identifying relative clauses are introduced with:

◆ **who, whom, which.** They cannot be omitted or replaced by that.

e.g. a) *Jenny Ladd is my favourite author. (The meaning of the sentence is clear.) Jenny Ladd, who has written a lot of successful books, is my favourite author. (The relative clause gives extra information.)*

b) *My cousin Peter is a doctor. (The meaning of the sentence is clear.)*

My cousin Peter, who(m) you have just met, is a doctor. (The relative clause gives extra information.)

c) *His flat is modern and spacious.*

His flat, which he bought two years ago, is modern and spacious.

◆ **whose, where, when.** They cannot be omitted.

e.g. a) *The bride looked stunning. (The meaning of the sentence is clear.)*

The bride, whose wedding dress was designed by Valentino, looked stunning. (The relative clause gives extra information.)

b) *Stratford-upon-Avon is visited by thousands of tourists every year.*

Stratford-upon-Avon, where Shakespeare was born, is visited by thousands of tourists every year.

c) *The best time to visit the island is in May. The best time to visit the island is in May, when it isn't too crowded.*

LINKING WORDS

Linking words show the logical relationship between sentences or parts of a sentence.

Positive Addition

and, both ... and, too, besides (this/that), moreover, what is more, in addition (to), also, as well as (this/that) furthermore etc.

She is both intelligent and beautiful.

Negative Addition

neither... nor, nor, neither, either

Neither John nor David goes to university.

Contrast

but, although, in spite of, despite, while, whereas, ever though, on the other hand, however, yet, still etc.

Sarah is kind but not very reliable.

Giving Examples

such as, like, for example, for instance, especially, in particular etc.

All the food was delicious, but the steak in particular was excellent.

Cause/Reason

as, because, because of, since, for this reason, due to, so, as a result (of) etc.

I stayed in bed because I felt ill.

Condition

if, whether, only if, in case of, in case, provided (that providing (that), unless, as/so long as, otherwise, or (else on condition (that) etc.

We took an umbrella with us in case it rained.

Purpose

to, so that, so as (not) to, in order (not) to, in order that, in case etc.

I took some paper and a pen so that I could make notes.

Effect/Result

such/so ... that, so, consequently, as a result, therefore, for this reason etc.

It was so cold that we decided to light a fire.

Time

when, whenever, as, as soon as, while, before, until/till after, since etc.

We did not leave until/till the babysitter arrived.

Place

where, wherever

We can't decide where to go on holiday this year.

Exception

except (for), apart from

The party was good fun, apart from the problem with the stereo.

Relatives

who, whom, whose, which, what, that

That's the horse which/that won the Grand National.

Listing Points/Events

To begin: initially, first, at first, firstly, to start/begin with, first of all etc.

First of all, we greeted the guests.

To continue: secondly, after this/that, second, afterwards, then, next etc.

Then, we offered them drinks.

To conclude: finally, lastly, in the end, at last, eventually etc.

Finally, we served them the meal.

Summarising

in conclusion, in summary, to sum up, on the whole, all in all, altogether, in short etc.

To sum up, I firmly believe that animals have the right to a happy life.

МИНОБРНАУКИ РОССИИ

ФГБОУ ВО «Уральский государственный горный университет»



УТВЕРЖДАЮ

Проректор по учебно-методическому
комплексу
С. А. Упоров
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ВВЕДЕНИЕ

Самостоятельная работа в высшем учебном заведении - это часть учебного процесса, метод обучения, прием учебно-познавательной деятельности, комплексная целевая стандартизованная учебная деятельность с запланированными видом, типом, формами контроля.

Самостоятельная работа представляет собой плановую деятельность обучающихся по поручению и под методическим руководством преподавателя.

Целью самостоятельной работы студентов является закрепление тех знаний, которые они получили на аудиторных занятиях, а также способствование развитию у студентов творческих навыков, инициативы, умению организовать свое время.

Самостоятельная работа реализует следующие задачи:

- предполагает освоение курса дисциплины;
- помогает освоению навыков учебной и научной работы;
- способствует осознанию ответственности процесса познания;
- способствует углублению и пополнению знаний студентов, освоению ими навыков и умений;
- формирует интерес к познавательным действиям, освоению методов и приемов познавательного процесса,
- создает условия для творческой и научной деятельности обучающихся;
- способствует развитию у студентов таких личных качеств, как целеустремленность, заинтересованность, исследование нового.

Самостоятельная работа обучающегося выполняет следующие функции:

- развивающую (повышение культуры умственного труда, приобщение к творческим видам деятельности, обогащение интеллектуальных способностей студентов);
- информационно-обучающую (учебная деятельность студентов на аудиторных занятиях, неподкрепленная самостоятельной работой, становится мало результативной);
- ориентирующую и стимулирующую (процессу обучения придается ускорение и мотивация);
- воспитательную (формируются и развиваются профессиональные качества бакалавра и гражданина);
- исследовательскую (новый уровень профессионально-творческого мышления).

Организация самостоятельной работы студентов должна опираться на определенные требования, а, именно:

- сложность осваиваемых знаний должна соответствовать уровню развития студентов;
- стандартизация заданий в соответствии с логической системой курса дисциплины;
- объем задания должен соответствовать уровню студента;
- задания должны быть адаптированными к уровню студентов.

Содержание самостоятельной работы студентов представляет собой, с одной стороны, совокупность практических учебных заданий, которые должен выполнить студент в процессе обучения, объект его деятельности; с другой стороны – это способ деятельности студента по выполнению соответствующего практического учебного задания.

Свое внешнее выражение содержание самостоятельной работы студентов находит во всех организационных формах аудиторной и внеаудиторной деятельности, в ходе самостоятельного выполнения различных заданий.

Функциональное предназначение самостоятельной работы студентов в процессе практических занятий по овладению специальными знаниями заключается в самостоятельном прочтении, просмотре, прослушивании, наблюдении, конспектировании, осмыслении, запоминании и воспроизведении определенной информации. Цель и планирование самостоятельной работы студента определяет преподаватель. Вся информация осуществляется на основе ее воспроизведения.

Основные формы организации самостоятельной работы студентов определяются следующими параметрами:

- содержание учебной дисциплины;

- уровень образования и степень подготовленности студентов;
- необходимость упорядочения нагрузки студентов при самостоятельной работе.

Таким образом, самостоятельная работа студентов является важнейшей составной частью процесса обучения.

Методические указания по организации самостоятельной работы и задания для обучающихся по дисциплине «*Профессиональный иностранный язык*» обращают внимание студента на главное, существенное в изучаемой дисциплине, помогают выработать умение анализировать явления и факты, связывать теоретические положения с практикой, а также облегчают подготовку к сдаче экзамена.

Видами самостоятельной работы обучающихся по дисциплине «*Профессиональный иностранный язык*» являются:

- повторение материала аудиторных занятий;
- самостоятельное изучение тем курса (в т.ч. работа с литературой);
- подготовка к практическим занятиям (в т.ч. чтение и перевод учебных текстов, запоминание иноязычной лексики);
- подготовка к экзамену.

В методических указаниях представлены материалы для самостоятельной работы и рекомендации по организации отдельных её видов.

I. Самостоятельная работа, обеспечивающая подготовку к аудиторным занятиям

1.1 Повторение материала практических занятий

Практические занятия направлены на развитие умений иноязычного говорения в рамках заданных РПД тем: Представление и знакомство, Деловая переписка, Наука и образование, Чтение и перевод научной литературы по направлению исследования, Аннотирование научных статей, Основные правила презентации научно-технической информации.

Подготовьте устный рассказ по теме на основе предложенного:

№1

Let me introduce myself. My name is ... Now I work as an economist in a joint-stock company. I graduated from the Ural State Mining University in 2017 and got a qualification of an economist-specialist of Finance and Credit.

I am interested in dealing in securities. I often read such journal as “Money and Credit”, “Money”, “Banks and Banking”.

In order to develop my scientific outlook I have decided to take a master's degree course at the Ural State Mining University. This year is quite difficult; I've had to combine my work and studies, to attend classes in different disciplines, to read a lot of material to get ready for final examinations. I prefer dealing with applied sphere of science. I don't have any articles published yet, but I'm working at.

I have already started collecting and working up the material for my master's thesis. My research deals with the Russian security market and general principles of functioning of similar markets abroad. The subject of my investigation is different kinds of securities and stock exchanges where the given financial instruments circulate. My thesis consists of two chapters. The first chapter is devoted to the analysis of stock price fluctuations, indicators, indices and factors. In the second chapter I am going to develop some new rules and principles to receive legible formulations. The most interesting aspect, I think, is an attempt to formulate some laws of a revolution in the field of securities in the contemporary Russian economic environment. I hope my research will be of great importance and serve as guidance to forecast different situations at the Russian security market. I don't use any special equipment except my notebook. Of course, I'm not satisfied with the result obtained. I have a long way to go. I plan to submit my thesis in two years.

My scientific supervisor is Mr... He is professor, Doctor of Economics.

The English language plays an important role in my life and study. I think of improving my speaking skills, so I'll be able to talk to foreign specialists on my own, to take part in scientific conferences abroad. But now I am reading a lot of specialized and scientific books and journals in English searching the material for my thesis.

№2

We can't imagine business without communication. Business is made through communication. It can be face-to-face conversation organized in the office or at the restaurant or business correspondence. It can be held with the help of regular mail or E-mail.

A business letter is the principal means used by a business firm to keep in touch with its customers. According to the purpose of the letter there may be different kinds, e.g. a letter of request, a memo (memorandum), a letter of advice, an invitation letter, a congratulation letter, a letter of thanks (gratitude), a letter of apology, an enquiry letter, a letter of guarantee, a letter of complaint, a letter of claim, an order letter, etc.

There are special rules to organize a business letter in a right way. The business letter consists of several parts.

First you should write your own name and address (in the right up corner), telephone numbers, and then write down the title, name and address of the recipient.

Always type the date, in the logical order of day, month, year (10th November 20...).

It is important to use the correct title of the person you are addressing to:

Dr. – means doctor (a person, who has Doctor's degree or PhD);

Professor – if you are addressing the professor;

Mr. / Sir – if you are addressing a male, but is not sure in his title;
Mrs. – if you are addressing a female (married);
Miss – if you are addressing a female (single);
Ms – if you are addressing a female (married or unmarried businesswoman);
Madam – addressing a female if you are not sure in her family status.

The salutation is the greeting with which every letter begins. Opening salutation is typed in the left-hand corner. There are several types of opening salutation:

Dear Sirs – to a company;
Dear Sir – to a man if you do not know his name;
Dear Madam – to a woman if you do not know her name;
Dear Sir or Madam – to a person if you know neither the name, nor sex;
Gentlemen – the most common salutation in the United States.

If your correspondent is known to you personally the warmer and more friendly greeting, *Dear Mr ...* is preferred.

The message forms the body of the letter and is the part that really matters. Some letters are very short and may consist of only one paragraph. Many others have three paragraphs: Introduction (why are you writing?), Details (facts, information, instructions), Action (what action will you take?).

Finishing the letter is a polite way of bringing a letter to a close and you should write one of the following phrases:

Yours sincerely; Truly yours, Yours faithfully sign the letter and put your (title), name and surname.

Business letters have to be written (typed) accurately in plain language.

№3

Science is important to world peace in many ways. On one hand, scientists have helped to develop many of the modern tools of war. On the other hand, they have also helped to keep the peace through research which has improved life for people. Scientists have helped us understand the problem of supplying the world with enough energy; they have begun to develop a number of solutions to the energy problem - for example, using energy from the sun and from the atom. Scientists have also analyzed the world's resources. We can begin to learn to share the resources with the knowledge provided to us by science. Science studies the Universe and how to use its possibilities for the benefit of men.

Science is also important to everyone who is affected by modern technology. Many of the things that make our lives easier and better are the results of advances in technology and, if the present patterns continue, technology will affect us even more in the future than it does now. In some cases, such as technology for taking salt out of ocean water, technology may be essential for our lives on Earth.

The study of science also provides people with an understanding of natural world. Scientists are learning to predict earthquakes, are continuing to study many other natural events such as storms. Scientists are also studying various aspects of human biology and the origin and developments of the human race. The study of the natural world may help to improve life for many people all over the world.

A basic knowledge of science is essential for everyone. It helps people find their way in the changing world.

№4

Electromagnetism is everywhere. It is a field that exists throughout space. When particles are electrically charged, the electromagnetic field exerts a force on them. These particles then move and exert a force on the electromagnetic field. By generating these fields when and where we want them and by controlling these forces we have electricity. This gives us the power we use in the modern world. All our TVs, phones, street lights and cars depend on electromagnetism.

So what is electromagnetism? Actually, it is two things, but they are so closely connected that it is convenient for us to think of them as one, as two sides of the same coin. There are two types of field: electric and magnetic. Electrically-charged particles result in an electric field, static electricity. When there is a conductor, a material which will allow electric field to pass through it, then we can create an electric current. In our homes, the conductors are the wires that run through our house to the light bulbs

or the TV. A magnetic field results from the motion of an electric current and is used to generate the electricity we use.

In the 19th century, James Clerk Maxwell, the Scottish physicist, produced the equations that proved the two forces acted as one. One effect of this was for physicists all over the world to hurry back to their libraries and laboratories to rewrite the theories on the motion of objects. Maxwell's equations showed that what physicists had believed for centuries was in fact not correct. It was not until Einstein, in the 20th century, that the theory of motion was put right - at least for now.

How do we know the two things are one? Well, sailors had known for centuries that lightning affected the magnetic compasses on their ships. No one, however, made the connection between lightning and electricity until Benjamin Franklin, the American politician and scientist, flew a kite in a thunderstorm to attract the lightning. In other parts of the world, physicists were experimenting with magnets and electricity. Most passed a current across a magnetic needle and watched it move. The Frenchman, Andre Marie Ampere eventually applied mathematics to electromagnetism. It is from his work that we have our modern understanding of electromagnetism.

One piece of the jigsaw remained. No one had discovered a way of generating electricity. True, there were batteries, Alessandro Volta invented the Voltaic pile in 1800, but it was of limited use. Certainly no battery could provide enough electrical power to operate a machine. For that the world would have to wait for Michael Faraday to find a way of creating an electrical current, when and where it was needed.

№5

When Should You Summarize an Article?

There are a few instances when you might want to summarize an article. These are:

To show how an author's ideas support your argument

To argue against the author's ideas

To condense a lot of information into a small space

To increase your understanding of an article

What Needs to Be Included in a Summary of an Article?

A great summary should include certain important elements that make the reading experience easier on the reader. A good summary will consist of the following elements.

The main idea of the article is conveyed clearly and concisely

The summary is written in the unique style of the writer

The summary is much shorter than the original document

The summary explains all of the important notions and arguments

The summary condenses a lot of information into a small space

How Do You Summarize an Article?

Summarizing an article can be boiled down to three simple steps. By following these steps, you should have a thorough, clear, and concise summary in no time.

Identify the main idea or topic.

Identify the important arguments.

Write your summary.

Continue reading for detailed explanations of each of these steps.

Identify the Main Idea or Topic

The aim of an article is to convey a certain idea or topic through the use of exposition and logic.

In a summary, you want to identify the main idea of the article and put this information into your own words. To do this, you must be willing to read the article several times. On the first reading, try to gain a general notion of what the article is trying to say. Once you've done this write down your initial impression. This is most likely the thesis, or main idea, of the article. Also, be sure to include the author's first and last name and the title of the article in your notation for later reference.

Example: In the article "Why Two Best Friends Doesn't Work," author Cassandra Grimes argues that most teenage girls can't get along in groups of more than two.

When trying to identify the central idea, you should ask yourself, "Why was this essay written

and published?" Clues to help determine this include the following.

How to Identify the Main Idea of an Article

Gather information from the title.

Identify the place it was published, as this can help you determine the intended audience.

Determine the date of publication.

Determine the type of essay. (Is it expository, argumentative, literary, scholarly?)

Take note of the tone of the piece.

Identify certain notions or arguments that seem to be repeated throughout.

Applying these methods of identification, let's take a look at the article "Bypass Cure" by James Johnson. We can assume the subject of the article from the title. Upon further examination, it becomes clear that the author is arguing that new research suggests the best cure for diabetes is the surgical solution of a gastric bypass.

Example: "Bypass Cure" by James Johnson records a recent discovery by researchers that people who have bypass surgery for weight control are also instantly cured of diabetes. Since rising diabetic rates and obesity has become a worldwide concern, the article provides a startling but controversial potential solution.

Now that we have identified the main idea of the article, we can move onto the next step.

Identify Important Arguments

At this point in the preparation process, you should read the article again. This time, read more carefully. Look specifically for the supporting arguments. Some tips on how to identify the important arguments of an article are listed below.

How to Identify Important Arguments in an Article

Read on a paper copy or use a computer program that lets you make annotations.

Underline the topic sentence of each paragraph. (If no one sentence tells the main concept, then write a summary of the main point in the margin.)

Write that sentence in your own words on the side of the page or on another piece of paper.

When you finish the article, read all the topic sentences you marked or wrote down.

In your own words, rewrite those main ideas.

Use complete sentences with good transition words.

Be sure you don't use the same words, phrases, or sentence structure as the original.

You may find you need to leave out some of the unimportant details.

Your summary should be as short and concise as possible.

In short, you want to boil the article down to its main, supporting arguments. Let everything else fall away, and what you are left with is an argument or an opinion, and the arguments that support it.

Write Your Summary

Your summary should start with the author's name and the title of the work. Here are several ways to do this correctly:

Introduction Sentence Examples for an Article Summary

In "Cats Don't Dance," John Wood explains ...

John Wood, in "Cats Don't Dance," explains ...

According to John Wood in "Cats Don't Dance" ...

As John Wood vividly elucidates in his ironic story "Cats Don't Dance" ...

John Wood claims in his ironic story "Cats Don't Dance" that ...

Combine the thesis of the article with the title and author into your first sentence of the summary. Reference the following sentence as an example.

In "Cats Don't Dance," John Wood explains that in spite of the fact that cats are popular pets who seem to like us, felines are not really good at any activities that require cooperation with someone else, whether that is dancing or sharing.

If possible, your first sentence should summarize the article. The rest of your summary should cover some of the central concepts used to support the thesis. Be sure to restate these ideas in your own words, and to make your summary as short and concise as possible. Condense sentences and leave out unimportant details and examples. Stick to the important points.

How to Quote the Author of an Article

When you refer to the author for the first time, you always use their full name. When you refer to the author after that, you always use their last name. The following examples show how to use the author's name in an article summary after you have already introduced them.

Johnson comments ...

According to Wood's perspective ...

As Jones implies in the story about ...

Toller criticizes...

In conclusion, Kessler elaborates about ...

You don't need to use an author's title (Dr., Professor, or Mr. and Mrs.), but it does help to add their credentials to show they are an authoritative source. The sentences below show ways to do this.

In "Global Warming isn't Real," Steven Collins, a professor at the University of Michigan, claims that ...

New York Times critic Johann Bachman argues in "Global Warming is the Next Best Thing for the Earth" that ...

If you are discussing the ideas of the author, you always need to make it clear that you are reciting their ideas, not your own.

How to Introduce the Ideas of the Author in an Article Summary

Use author tags

Use mentions of "the article" or "the text"

Add the page number that the information is found on in parenthesis at the end of the sentence

Using Author Tags

In writing your summary, you need to clearly state the name of the author and the name of the article, essay, book, or other source. The sentence below is a great example of how to do this.

According to Mary Johnson in her essay, "Cats Make Good Pets," the feline domestic companion is far superior to the canine one.

You also need to continue to make it clear to the reader when you are talking about the author's ideas. To do this, use "author tags," which are either the last name of the author or a pronoun (he or she) to show you are still discussing that person's ideas.

Also, try to make use of different verbs and adverbs. Your choice of author tag verbs and adverbs can contribute to the way you analyze the article. Certain words will create a specific tone. See the tables for a selection of different word choices.

How Long Is a Summary of an Article?

The length of an article summary will depend on the length of the article you are writing about.

If the article is long (say, 10-12 pages) then your summary should be about four pages. If the article is shorter, your summary should be about one to two pages. Sometimes, an article summary can be less than one page.

The length of a summary will also depend on the instructions you have been given. If you are writing a summary for yourself, it's up to you how long or short it will be (but remember, a summary is supposed to be a short regurgitation of the information outline in an article). If you are writing a summary for a class assignment, the length should be specified.

How to Edit and Revise Your Summary

Before you are officially done, it is important to edit your work. The steps below explain the process of editing and revision.

Re-read the summary and edit out any obvious mistakes.

Read your summary aloud. If anything sounds off, fix it.

Let one of your peers read your summary. Make changes according to their feedback.

With that, your summary should be complete.

№6

A presentation is the practice of showing and explaining the content of a topic to an audience or learner. In the business world, there are sales presentations, informational and motivational presentations, interviews, status reports, image-building, and training sessions.

Students are often asked to make oral presentations. You might have been asked to research a subject and use a presentation as a means of introducing it to other students for discussion.

Before you prepare for a presentation, it is important that you think about your objectives. There are three basic purposes of giving oral presentations: to inform, to persuade, and to build goodwill.

Decide what you want to achieve:

- inform – to provide information for use in decision making;

- persuade – to reinforce or change a receiver's belief about a topic;

- build relationships – to send some messages which have the simple goal of building good-will between you and the receiver.

Preparation

A successful presentation needs careful background research. Explore as many sources as possible, from press cuttings to the Internet. Once you have completed your research, start writing for speech bearing in mind the difference between spoken and written language. Use simple, direct sentences, active verbs, adjectives and the pronouns "you" and "I".

Structuring a Presentation

A good presentation starts with a brief introduction and ends with a brief conclusion. The introduction is used to welcome your audience, introduce your topic/ subject, outlines the structure of your talk. The introduction may include an icebreaker such as a story, an interesting statement or a fact. Plan an effective opening; use a joke or an anecdote to break the ice. The introduction also needs an objective, that is, the purpose or goal of the presentation. It informs the audience of the purpose of the presentation too.

Next, ***the body*** of the presentation comes. Do not write it out word for word. All you want is an outline. There are several options for structuring the presentation:

1) Timeline: arrangement in a sequential order.

2) Climax: the main points are delivered in order of increasing importance.

3) Problem/ Solution: a problem is presented, a solution is suggested.

4) Classification: the important items are the major points.

5) Simple to complex: ideas are listed from the simplest to the most complex; it can also be done in a reverse order.

After the body, comes ***the closing***. A strong ending to the presentation is as important as an effective beginning. You should summarise the main points. This is where you ask for questions, provide a wrap-up (summary), and thank the participants for attending.

Each successful presentation has three essential objectives: the three Es – to educate, to entertain, to explain.

The main objective of making a presentation is to relay information to your audience and to capture and hold their attention. Adult audience has a limited attention span of about 45 minutes. In that time, they will absorb about a third of what you said, and a maximum of seven concepts. Limit yourself to three or four main points, and emphasise them at the beginning of your speech, in the middle, and again at the end to reiterate your message. You should know your presentation so well that during the actual presentation you should only have to briefly glance at your notes.

People process information in many ways. Some learn visually, others learn by listening, and the kinesthetic types prefer to learn through movement. It's best to provide something for everyone. Visual learners learn from pictures, graphs, and images. Auditory learners learn from listening to a speaker. And, kinesthetic learners like to be involved and participate.

Практические занятия направлены также на формирование грамматического навыка по темам: Система времен английского глагола действительного залога. Формы выражения будущего времени в придаточных предложениях условия и времени. Категория страдательного залога английского глагола. Образование форм. Модальные глаголы can, could, to be able to, must, have to, will, shall, should, ought to, may, might. Сослагательное наклонение. Три типа условных предложений. Синтаксис: Побудительные предложения, восклицательные предложения, вопросительные предложения. Сложные предложения. Прямая и косвенная речь. Согласование времен в английском предложении. Сравнительно-сопоставительные конструкции и обороты в предложении. Типы придаточных предложений и способы их связи.

Повторите материал практических занятий.

Синтаксис: Побудительные предложения, восклицательные предложения, вопросительные предложения.

В побудительном предложении выражаются различные побуждения к действию – приказ, просьба, запрещение, рекомендация, совет и т.д. Повелительные предложения, выражающие приказания, произносятся с понижающейся интонацией, а предложения, выражающие просьбу, - с повышающейся интонацией.

Повелительное предложение может быть как утвердительным, так и отрицательным. Глагол в повелительном предложении употребляется в форме повелительного наклонения. Подлежащее как правило отсутствует, и предложение начинается прямо со сказуемого. Подразумевается, что действие должен выполнять тот, кому адресовано обращение.

- Open the book. *Откройте книгу.*
Translate this article, please. *Переведите, пожалуйста, эту статью.*
Take off your hat! *Снимите шляпу!*
Don't go there. *Не ходите туда.*
Tell me all about it. *Расскажи мне все об этом.*
Put the dictionary on the shelf. *Положите словарь на полку.*
Don't be late, please. *Не опоздайте, пожалуйста.*

Предложение может состоять и из одного сказуемого, выраженного глаголом в повелительном наклонении:

- Write! *Пиши(те)!*
Don't talk! *Не разговаривай(те)!*

Для выражения просьбы в конце повелительного предложения часто употребляется *will you?* или *won't you?*, отделяющиеся запятой:

- Come here, **will you?** *Идите сюда, пожалуйста.*
Close the window, **will you?** *Закройте, пожалуйста, окно.*
Fetch me a chair, **won't you?** *Принесите мне стул, пожалуйста.*
Come and see me, **won't you?** *Заходите ко мне, пожалуйста.*

Просьба может быть выражена также в форме вопросительного предложения, начинающегося с *will* или *would*. В отличие от общего вопроса, предложение, выражающее просьбу, произносится с падающей интонацией:

- Will you come here?** *Идите сюда, пожалуйста.*
Will you give me that book? *Дайте мне эту книгу, пожалуйста.*
Would you mind lending me your dictionary? *Не будете ли вы добры одолжить мне ваш словарь?*
Would you give me some water? *Дайте мне воды, пожалуйста.*
Will you fetch me a chair, please? *Принесите мне стул, пожалуйста.*

Would you be good enough to close the window? *Не будете ли вы добры закрыть окно?*

Для усиления просьбы перед глаголом в повелительном наклонении употребляется вспомогательный глагол **do**:

Do write to me! *Пожалуйста, пишите мне!*
Do listen to me. *Послушайте же меня!*
Do come with me. *Идемте со мной, ну!*

Восклицательные предложения передают различные эмоциональные чувства – радость, удивление, огорчение и т.д. Любое предложение: повествовательное, вопросительное или повелительное может стать восклицательным, если высказываемая мысль сопровождается сильным чувством и интонацией. На письме оно обычно обозначается восклицательным знаком. Восклицательные предложения произносятся с понижающейся интонацией.

At last you have returned! *Наконец вы вернулись!*
Have you ever seen such weather?! *Вы когда-нибудь видели такую погоду?!*
How can you be so lazy! *Ну как можно быть таким ленивым!*
Oh, please, forgive me! *О, пожалуйста, прости меня!*
Hurry up! *Спешите!*
You are so stupid! *Ты так глуп!*

Среди них выделяют восклицательные предложения, начинающиеся с местоимения **what** – *какой, какая, что за* или наречия **how** – *как*. В этих предложениях сохраняется прямой порядок слов, т.е. сказуемое следует за подлежащим. В отличие от русского языка, слова **what** и **how** всегда стоят непосредственно перед определяемым словом. То есть, если по-русски возможна конструкция: "**Какую** я сделал ошибку!", то в английском возможно лишь: "**Какую** ошибку я сделал!"

Местоимение **what** относится обычно к существительному, перед которым могут находиться еще и определяющие его прилагательное или наречие:

What a beautiful house that is! *Какой это красивый дом!*
What beautiful hair she has got! *Какие у нее прекрасные волосы!*
What interesting news I've heard! *Какую интересную новость я узнал!*
What a cold day it is! *Какой холодный день!*
What clever people they are! *Какие они умные люди!*
What a large house that is! *Какой это большой дом!*

А наречие **how** относится к прилагательному или наречию; предложение строится по схеме: **How** + прилагательное (наречие) + подлежащее + сказуемое:

How beautifully she sings! *Как красиво она поет!*
How slowly they run! *Как медленно они бегут!*
How far it is! *Как это далеко!*
How hot it was! *Как жарко было!*
How well she sings! *Как хорошо она поет!*
How quickly you walk! *Как быстро вы ходите! = Как вы быстро ходите!*

Если местоимение **what** определяет исчисляемое существительное в единственном числе, то это существительное употребляется с неопределенным артиклем:

What a foolish mistake I have made! *Какую глупую ошибку я сделал!*
What a beautiful girl she is! *Какая она красивая девушка!*
What a fine building that is! *Какое это красивое здание!*

С исчисляемым существительным во множественном числе и с неисчисляемым существительным артикль не употребляется:

- What** foolish mistakes I have made! *Какие глупые ошибки я сделал!*
What interesting books you have brought! *Какие интересные книги вы принесли!*
What fine weather it is! *Какая хорошая погода!*
What strange ideas he has! *Какие у него странные идеи!*

Чаще всего восклицательные предложения неполные. В них опускаются подлежащее, часть сказуемого, или все сказуемое целиком:

- What** a fine building (that is)! *Какое прекрасное здание!*
What a silly story (it is)! *Что за глупая история!*
What a funny girl (she is)! *До чего смешная девчонка!*
How late (it is)! *Как поздно!*
How wonderful! *Как замечательно!*
How beautiful! *Как красиво!*
What a girl! *Ну и девушка!*
How cold (it is)! *Как холодно!*

Порядок слов в английском предложении

В русском языке, благодаря наличию падежных окончаний, мы можем переставлять члены предложения, не меняя основного смысла высказывания. Например, предложения Студенты изучают эти планы и Эти планы изучают студенты совпадают по своему основному смыслу. Подлежащее в обоих случаях - студенты, хотя в первом предложении это слово стоит на первом месте, а во втором предложении - на последнем.

По-английски такие перестановки невозможны. Возьмём предложение The students study these plans Студенты изучают эти планы. Если подлежащее и дополнение поменяются местами, то получится бессмыслица: These plans study the students Эти планы изучают студентов. Произошло это потому, что слово plans, попав на первое место, стало подлежащим.

Английское предложение имеет твёрдый порядок слов.

Порядок слов в английском предложении показан в этой таблице:

| I | II | III Дополнение | | | IV Обстоятельство |
|------------|------------------|------------------------|---------------------------|-----------------------|---------------------------------|
| | | Косвенное без предлога | Прямое | Косвенное с предлогом | |
| Подлежащее | Сказуемое | Косвенное без предлога | Прямое | Косвенное с предлогом | |
| We Мы | study изучаем | | math математику | | |
| He Он | gives дает | us нам | lessons уроки | | in this room. в этой комнате |
| She Она | reads читает | | her notes свои заметки | to Peter Петру | every day. каждый день |

Вопросительное предложение

Общее правило построения вопросов в английском языке таково: Все вопросы (кроме специальных вопросов к подлежащему предложения) строятся путем инверсии. Инверсией называется нарушение обычного порядка слов в английском предложении, когда сказуемое следует за подлежащим.

В тех случаях, когда сказуемое предложения образовано без вспомогательных глаголов (в Present и Past Indefinite) используется вспомогательный глагол to do в требуемой форме - do/does/did.

Общие вопросы

Общий вопрос задается с целью получить подтверждение или отрицание высказанной в вопросе мысли. На общий вопрос обычно дается краткий ответ: "да" или "нет".

Для построения общего вопроса вспомогательный или модальный глагол, входящий в состав сказуемого, ставится в начале предложения перед подлежащим.

а) Примеры сказуемого с одним вспомогательным глаголом: Is he speaking to the teacher?
- Он говорит с учителем?

б) Примеры сказуемого с несколькими вспомогательными глаголами:

You will be writing letters to us. – Ты будешь писать нам письма.

Will you be writing letters to us? – Будешь ли ты писать нам письма?

Примеры с модальными глаголами:

She can drive a car. – Она умеет водить машину.

Can she drive a car? - Она умеет водить машину? (Yes, she can.; No, she cannot)

Когда в составе сказуемого нет вспомогательного глагола (т.е. когда сказуемое выражено глаголом в Present или Past Indefinite), то перед подлежащим ставятся соответственно формы do / does или did; смысловой же глагол ставится в форме инфинитива без to (словарная форма) после подлежащего.

С появлением вспомогательного глагола do на него переходит вся грамматическая нагрузка - время, лицо, число: в Present Indefinite в 3-м лице ед. числа окончание -s, -es смыслового глагола переходит на глагол do, превращая его в does; а в Past Indefinite окончание прошедшего времени -ed переходит на do, превращая его в did.

Do you go to school? – Ходишь ли ты в школу?

Do you speak English well? - Ты хорошо говоришь по-английски?

Ответы на общие вопросы

Общий вопрос требует краткого ответа "да" или "нет", которые в английском языке образуются следующим образом:

а) Положительный состоит из слова Yes за которым (после запятой) идет подлежащее, выраженное личным местоимением в им. падеже (никогда не используется существительное) и тот вспомогательный или модальный глагол, который использовался в вопросе (вспомогательный глагол согласуется с местоимением ответа);

б) Отрицательный ответ состоит из слова No, личного местоимения и вспомогательного (или модального) глагола с последующей частицей not

Например: Are you a student? - Ты студент?

Yes, I am. - Да.; No, I am not. - Нет.

Do you know him? – Ты знаешь его?

Yes, I do. – Да (знаю).; No, I don't. – Нет (не знаю).

Специальные вопросы

Специальный вопрос начинается с вопросительного слова и задается с целью получения более подробной уточняющей информации. Вопросительное слово в специальном вопросе заменяет член предложения, к которому ставится вопрос.

Специальные вопросы могут начинаться словами:

who? – кто? whom? – кого? whose? - чей? what? – что? какой? which? –
который?

when? – когда? where? – где? куда? why? – почему? how? – как?

how much? – сколько? how many? – сколько? how long? – как долго?
сколько времени?

how often? – как часто?

Построение специальных вопросов:

1) Специальные вопросы ко всем членам предложения, кроме подлежащего (и его определения) строятся так же, как и общие вопросы – посредством инверсии, когда вспомогательный или модальный глагол ставится перед подлежащим.

Специальный вопрос (кроме вопроса к подлежащему) начинается с вопросительного слова или группы слов за которым следуют вспомогательный или модальный глагол, подлежащее и смысловой глагол (сохраняется структура общего вопроса).

Вопрос к прямому дополнению:

What are you reading? Что ты читаешь?

What do you want to show us? Что вы хотите показать нам?

Вопрос к обстоятельству

Обстоятельства бывают разного типа: времени, места, причины, условия, образа действия и др.

He will come back tomorrow. – Он вернется завтра.

When will he come back? – Когда он вернется?

What did he do it for? Зачем он это сделал?

Where are you from?

Вопрос к определению

Вопрос к определению начинается с вопросительных слов what какой, which (of) который (из), whose чей, how much сколько (с неисчисляемыми существительными), how many сколько (с исчисляемыми существительными). Они ставятся непосредственно перед определяемым существительным (или перед другим определением к этому существительному), а затем уже идет вспомогательный или модальный глагол.

What books do you like to read? Какие книги вы любите читать?

Which books will you take? Какие книги (из имеющихся) вы возьмете?

Вопрос к сказуемому

Вопрос к сказуемому является типовым ко всем предложениям: "Что он (она, оно, они, это) делает (делал, будет делать)?", например:

What does he do? Что он делает?

Специальные вопросы к подлежащему

Вопрос к подлежащему (как и к определению подлежащего) не требует изменения прямого порядка слов, характерного для повествовательного предложения. Просто подлежащее (со всеми его определениями) заменяется вопросительным местоимением, которое исполняет в вопросе роль подлежащего. Вопросы к подлежащему начинаются с вопросительных местоимений:

who – кто (для одушевленных существительных)

what - что (для неодушевленных существительных)

The teacher read an interesting story to the students yesterday.

Who read an interesting story to the students yesterday?

Сказуемое в таких вопросах (после who, what в роли подлежащего) всегда выражается глаголом в 3-м лице единственного числа (не забудьте про окончание -s в 3-м лице ед. числа в Present Indefinite. Правила образования -s форм см. здесь.):

Who is reading this book? Кто читает эту книгу?

Who goes to school?

Альтернативные вопросы

Альтернативный вопрос задается тогда, когда предлагается сделать выбор, отдать чему-либо предпочтение.

Альтернативный вопрос может начинаться со вспомогательного или модального глагола (как общий вопрос) или с вопросительного слова (как специальный вопрос) и должен обязательно содержать союз or - или. Часть вопроса до союза or произносится с повышающейся интонацией, после союза or - с понижением голоса в конце предложения.

Например вопрос, представляющий собой два общих вопроса, соединенных союзом or: Is he reading or is he writing?

Did he pass the exam or did he fail?

Вторая часть вопроса, как правило, имеет усеченную форму, в которой остается (называется) только та часть, которая обозначает выбор (альтернативу):

Is he reading or writing?

Разделительные вопросы

Основными функциями разделительных вопросов являются: проверка предположения, запрос о согласии собеседника с говорящим, поиски подтверждения своей мысли, выражение сомнения.

Разделительный (или расчлененный) вопрос состоит из двух частей: повествовательной и вопросительной.

Первая часть - повествовательное утвердительное или отрицательное предложение с прямым порядком слов.

Вторая часть, присоединяемая через запятую, представляет собой краткий общий вопрос, состоящий из местоимения, заменяющего подлежащее, и вспомогательного или модального глагола. Повторяется тот вспомогательный или модальный глагол, который входит в состав сказуемого первой части. А в Present и Past Indefinite, где нет вспомогательного глагола, употребляются соответствующие формы do/ does/ did.

В второй части употребляется обратный порядок слов, и она может переводиться на русский язык: не правда ли?, не так ли?, верно ведь?

1. Если первая часть вопроса утвердительная, то глагол во второй части стоит в отрицательной форме, например:

You speak French, don't you? You are looking for something, aren't you? Pete works at a plant, doesn't he?

2. Если первая часть отрицательная, то во второй части употребляется утвердительная форма, например:

It is not very warm today, is it? John doesn't live in London, does he?

Безличные предложения

Поскольку в английском языке подлежащее является обязательным элементом предложения, в безличных предложениях употребляется формальное подлежащее, выраженное местоимением it. Оно не имеет лексического значения и на русский язык не переводится.

Безличные предложения используются для выражения:

1. Явлений природы, состояния погоды: It is/(was) winter. (Была) Зима. It often rains in autumn. Осенью часто идет дождь. It was getting dark. Темнело. It is cold. Холодно. It snows. Идет снег.

2. Времени, расстояния, температуры: It is early morning. Ранее утро. It is five o'clock. Пять часов. It is two miles to the lake. До озера две мили. It is late. Поздно.

3. Оценки ситуации в предложениях с составным именным (иногда глагольным) сказуемым, за которым следует подлежащее предложения, выраженное инфинитивом, герундием или придаточным предложением: It was easy to do this. Было легко сделать это.

It was clear that he would not come. Было ясно, что он не придет.

4. С некоторыми глаголами в страдательном залоге в оборотах, соответствующих русским неопределенно-личным оборотам: It is said he will come. Говорят, он придет.

Система времен английского глагола действительного залога

Present Simple употребляется для выражения:

1. постоянных состояний,

2. повторяющихся и повседневных действий (часто со следующими наречиями: always, never, usually и т.д.). Mr Gibson is a businessman. He lives in New York, (постоянное состояние) He usually starts work at 9 am. (повседневное действие) He often stays at the office until late in the evening, (повседневное действие)

3. непреложных истин и законов природы, The moon moves round the earth.

4. действий, происходящих по программе или по расписанию (движение поездов, автобусов и т.д.). The bus leaves in ten minutes.

Маркерами present simple являются: usually, always и т.п., every day / week / month / year и т.д., on Mondays I Tuesdays и т.д., in the morning / afternoon / evening, at night / the weekend и т.д.

Present Continuous употребляется для выражения:

1. действий, происходящих в момент речи He is reading a book right now.
2. временных действий, происходящих в настоящий период времени, но не обязательно в момент речи She is practising for a concert these days. (В данный момент она не играет. Она отдыхает.)
3. действий, происходящих слишком часто и по поводу которых мы хотим высказать раздражение или критику (обычно со словом "always") "You're always interrupting me!"(раздражение)
4. действия, заранее запланированных на будущее. He is flying to Milan in an hour. (Это запланировано.)

Маркерами present continuous являются: now, at the moment, these days, at present, always, tonight, still и т.д.

Во временах группы **Continuous** обычно **не употребляются** глаголы:

1. выражающие восприятия, ощущения (see, hear, feel, taste, smell), Например: This cake tastes delicious. (Но не: This cake is tasting delicious)
2. выражающие мыслительную деятельность [know, think, remember, forget, recognize(ze), believe, understand, notice, realise(ze), seem, sound и др.],
Например: I don't know his name.
3. выражающие эмоции, желания (love, prefer, like, hate, dislike, want и др.), Например: Shirley loves jazz music.
4. include, matter, need, belong, cost, mean, own, appear, have (когда выражает принадлежность) и т.д. Например: That jacket costs a tot of money. (Но не: That jacket is costing a lot of money.)

Present perfect употребляется для выражения:

1. действий, которые произошли в прошлом в неопределенное время. Конкретное время действия не важно, важен результат, Kim has bought a new mobile phone. (Когда она его купила? Мы это не уточняем, поскольку это не важно. Важного, что у нее есть новый мобильный телефон.)
2. действий, которые начались в прошлом и все еще продолжаются в настоящем, We has been a car salesman since /990. (Он стал продавцом автомобилей в 1990 году и до сих пор им является.)
3. действий, которые завершились совсем недавно и их результаты все еще ощущаются в настоящем. They have done their shopping. (Мы видим, что они только что сделали покупки, поскольку они выходят из супермаркета с полной тележкой.)
4. Present perfect simple употребляется также со словами "today", "this morning / afternoon" и т.д., когда обозначенное ими время в момент речи еще не истекло. He has made ten photos this morning. (Сейчас утро. Указанное время не истекло.)

К маркерам present perfect относятся: for, since, already, just, always, recently, ever, how long, yet, lately, never, so far, today, this morning/ afternoon / week / month / year и т.д.

Present perfect continuous употребляется для выражения:

1. действий, которые начались в прошлом и продолжаются в настоящее время He has been painting the house for three days. (Он начал красить дом три дня назад и красит его до сих пор.)
2. действий, которые завершились недавно и их результаты заметны (очевидны) сейчас. They're tired. They have been painting the garage door all morning. (Они только что закончили красить. Результат их действий очевиден. Краска на дверях еще не высохла, люди выглядят усталыми.)

Примечание.

1. С глаголами, не имеющими форм группы Continuous, вместо present perfect continuous употребляется present perfect simple. Например: I've known Sharon since we were at school together. (А не: I've been knowing Sharon since we were at school together.)

2. С глаголами live, feel и work можно употреблять как present perfect continuous, так и present perfect simple, при этом смысл предложения почти не изменяется.

Например: He has been living/has lived here since 1994.

К маркерам present perfect continuous относятся: for. since. all morning/afternoon/week/day и т.д., how long (в вопросах).

Past simple употребляется для выражения:

1. действий, произошедших в прошлом в определенное указанное время, то есть нам известно, когда эти действия произошли, They graduated four years ago. (Когда они закончили университет? Четыре года назад. Мы знаем время.)

2. повторяющихся в прошлом действий, которые более не происходят. В этом случае могут использоваться наречия частоты (always, often, usually и т.д.), He often played football with his dad when he was five. (Но теперь он уже не играет в футбол со своим отцом.) Then they ate with their friends.

3. действий, следовавших непосредственно одно за другим в прошлом.

They cooked the meal first.

4. Past simple употребляется также, когда речь идет о людях, которых уже нет в живых. Princess Diana visited a lot of schools.

Маркерами past simple являются: yesterday, last night / week / month / year I Monday и т.д., two days I weeks I months I years ago, then, when, in 1992 и т.д.

People used to dress differently in the past. Women used to wear long dresses. Did they use to carry parasols with them? Yes, they did. They didn't use to go out alone at night.

• **Used to** (+ основная форма глагола) употребляется для выражения привычных, повторявшихся в прошлом действий, которые сейчас уже не происходят. Эта конструкция не изменяется по лицам и числам. Например: Peter used to eat a lot of sweets. (= Peter doesn't eat many sweets any more.) Вопросы и отрицания строятся с помощью did / did not (didn't), подлежащего и глагола "use" без -d.

Например: Did Peter use to eat many sweets? Mary didn't use to stay out late.

Вместо "used to" можно употреблять past simple, при этом смысл высказывания не изменяется. Например: She used to live in the countryside. = She lived in the countryside.

Отрицательные и вопросительные формы употребляются редко.

Past continuous употребляется для выражения:

1. временного действия, продолжавшегося в прошлом в момент, о котором мы говорим. Мы не знаем, когда началось и когда закончилось это действие, At three o'clock yesterday afternoon Mike and his son were washing the dog. (Мы не знаем, когда они начали и когда закончили мыть собаку.)

2. временного действия, продолжавшегося в прошлом (longer action) в момент, когда произошло другое действие (shorter action). Для выражения второго действия (shorter action) мы употребляем past simple, He was reading a newspaper when his wife came, (was reading = longer action: came = shorter action)

3. двух и более временных действий, одновременно продолжавшихся в прошлом. The people were watching while the cowboy was riding the bull.

4. Past continuous употребляется также для описания обстановки, на фоне которой происходили события рассказа (повествования). The sun was shining and the birds were singing. Tom was driving his old truck through the forest.

Маркерами past continuous являются: while, when, as, all day / night / morning и т.д. when/while/as + past continuous (longer action) when + past simple (shorter action)

Past perfect употребляется:

1. для того, чтобы показать, что одно действие произошло раньше другого в прошлом. При этом то действие, которое произошло раньше, выражается past perfect simple, а случившееся позже - past simple,

They had done their homework before they went out to play yesterday afternoon. (=They did their homework first and then they went out to play.)

2. для выражения действий, которые произошли до указанного момента в прошлом,
She had watered all the flowers by five o'clock in the afternoon.
(=She had finished watering the flowers before five o'clock.)

3. как эквивалент present perfect simple в прошлом. То есть, past perfect simple употребляется для выражения действия, которое началось и закончилось в прошлом, а present perfect simple - для действия, которое началось в прошлом и продолжается (или только что закончилось) в настоящем. Например: Jill wasn't at home. She had gone out. (Тогда ее не было дома.) ЛИ isn 't at home. She has gone out. (Сейчас ее нет дома.)

К маркерам past perfect simple относятся: before, after, already, just, till/until, when, by, by the time и т.д.

Future simple употребляется:

1. для обозначения будущих действий, которые, возможно, произойдут, а возможно, и нет,
We'll visit Disney World one day.

2. для предсказаний будущих событий (predictions), Life will be better fifty years from now.

3. для выражения угроз или предупреждений (threats / warnings), Stop or I'll shoot.

4. для выражения обещаний (promises) и решений, принятых в момент речи (on-the-spot decisions), I'll help you with your homework.

5. с глаголами hope, think, believe, expect и т.п., с выражениями I'm sure, I'm afraid и т.п., а также с наречиями probably, perhaps и т.п. / think he will support me. He will probably go to work.

К маркерам future simple относятся: tomorrow, the day after tomorrow, next week I month / year, tonight, soon, in a week / month year и т.д.

ПРИМЕЧАНИЕ

Future simple не употребляется после слов while, before, until, as soon as, after, if и when в придаточных предложениях условия и времени. В таких случаях используется present simple. Например: I'll make a phone call while I wait for you. (А не:... while I will wait for you.) Please phone me when you finish work.

В дополнительных придаточных предложениях после "when" и "if" возможно употребление future simple. Например: I don't know when I if Helen will be back.

He is going to throw the ball.

Be going to употребляется для:

1. выражения заранее принятых планов и намерений на будущее,
Например: Bob is going to drive to Manchester tomorrow morning.

2. предсказаний, когда уже есть доказательства того, что они сбываются в близком будущем.
Например: Look at that tree. It is going to fall down.

We use the **future continuous**:

a) for an action which will be in progress at a stated for an action which will be future time.
This time next week, we'll be cruising round the islands.

b) for an action which will definitely happen in the future as the result of a routine or arrangement. *Don't call Julie. I'll be seeing her later, so I'll pass the message on.*

c) when we ask politely about someone's plans for the near future (what we want to know is if our wishes fit in with their plans.) *Will you be using the photocopier for long?*

No. Why?

I need to make some photocopies.

We use the **future perfect**:

1. For an action which will be finished before a stated future time. *She will have delivered all the newspapers by 8 o'clock.*

2. The future perfect is used with the following time expressions: before, by, by then, by the time, until/till.

We use the **future perfect continuous**:

1. to emphasize the duration of an action up to a certain time in the future. *By the end of next month, she will have been teaching for twenty years.*

The future perfect continuous is used with: by... for.

Формы выражения будущего времени в придаточных предложениях условия и времени

В придаточных времени с союзами when (когда), after (после), before (перед тем как), as soon as (как только), until (до тех пор пока не), относящихся к будущему времени, а также в придаточных условия, вводимых союзами if (если) и unless (если не), будущее время заменяется формой настоящего времени, но на русский язык переводится будущим, например:

If you help me, I shall do this work on time. - Если ты поможешь мне, я сделаю эту работу вовремя.

As soon as I get free, I shall give you a call. - Как только я освобожусь, я вам позвоню.

We shall not sit to dinner until you come. - Мы не сядем обедать, пока ты не придешь.

Иногда в сложносочиненном предложении словами when и if вводится придаточное дополнительное, а не придаточное времени или условия. В этом случае использование настоящего времени в придаточном будет ошибкой. Чтобы определить, какую форму глагола необходимо использовать, достаточно поставить вопрос к придаточному предложению - «при каком условии?» и «когда?» к придаточным условия и времени и «что?» - к придаточному дополнительному.

We shall sit to dinner (Когда?) when he comes. - Мы сядем обедать, когда он придет.

We will go to the movies if he comes. - Мы пойдем в кино, если он придет.

I want to know (что?) when you will come. - Я хочу знать, когда ты придешь.

I want to know (что?) if you will come. - Я хочу знать, придешь ли ты.

Модальные глаголы

| <u>Глаголы</u> | <u>Значение</u> | <u>Примеры</u> |
|----------------|--|---|
| CAN | физическая или умственная возможность/умение | I can swim very well. – Я очень хорошо умею плавать. |
| | возможность | You can go now. — Ты можешь идти сейчас. You cannot play football in the street. – На улице нельзя играть в футбол. |
| | вероятность | They can arrive any time. – Они могут приехать в любой момент. |
| | удивление | Can he have said that? – Неужели он это сказал? |
| | сомнение, недоверчивость | She can't be waiting for us now. – Не может быть, чтобы она сейчас нас ждала. |
| | разрешение | Can we go home? — Нам можно пойти домой? |
| | вежливая просьба | Could you tell me what time it is now? – Не могли бы вы подсказать, который сейчас час? |
| MAY | разрешение | May I borrow your book? – Я могу одолжить у тебя книгу? |
| | предположение | She may not come. – Она, возможно, не придет. |
| | возможность | In the museum you may see many interesting things. – В музее вы можете увидеть много интересных вещей. |
| | упрек – только MIGHT (+ perfect infinitive) | You might have told me that. – Ты мог бы мне это сказать. |
| MUST | обязательство, необходимость | He must work. He must earn money. – Он должен работать. Он должен зарабатывать деньги. |
| | вероятность (сильная степень) | He must be sick. — Он, должно быть, заболел. |
| | запрет | Tourists must not feed animals in the zoo. — Туристы не должны кормить животных в зоопарке. |
| SHOULD | моральное долженствование | You ought to be polite. – Вы должны быть любезными. |

| | | |
|-----------------|----------------------------------|--|
| OUGHT TO | совет | You should see a doctor. – Вам следует сходить к врачу. |
| | упрек, запрет | You should have taken the umbrella. – Тебе следовало взять с собой <u>зонт</u> . |
| SHALL | указ, обязанность | These rules shall apply in all circumstances. – Эти правила будут действовать при любых обстоятельствах. |
| | угроза | You shall suffer. — Ты будешь страдать. |
| | просьба об указании | Shall I open the window? – Мне открыть окно? |
| WILL | готовность, нежелание/отказ | The door won't open. — Дверь не открывается. |
| | вежливая просьба | Will you go with me? – Ты сможешь пойти со мной? |
| WOULD | готовность, нежелание/отказ | He would not answer this question. – Он не будет отвечать на этот вопрос. |
| | вежливая просьба | Would you please come with me? — Не могли бы вы пройти со мной. |
| | повторяющееся/привычное действие | We would talk for hours. – Мы беседовали часами. |
| NEED | необходимость | Do you need to work so hard? – Тебе надо столько работать? |
| NEEDN'T | отсутствие необходимости | She needn't go there. — Ей не нужно туда идти. |
| DARE | Посметь | How dare you say that? – Как ты смеешь такое говорить? |

| Модальные единицы эквивалентного типа | | |
|---|--|---|
| to be able (to) = can | Возможность соверш-я конкрет-го дей-ия в опред. момент | She was able to change the situation then. (Она тогда была в состоянии (могла) изменить ситуацию). |
| to be allowed (to) = may | Возмож-ть совер-ия дей-ия в наст.-м, прош-ом или буд-ем + оттенок разрешения | My sister is allowed to play outdoors. (Моей сестре разрешается играть на улице). |
| to have (to) = ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом или буд-ем при опред-х об-вах | They will have to set up in business soon. (Им вскоре придется открыть свое дело). |
| to be (to) = ought, must, should | Необходимость совер-я дей-я в наст.-м, прош-ом при наличии опред. планов, распис-ий и т.д. | We are to send Nick about his business. (Мы должны (= планируем) выпроводить Ника) |

Категория страдательного залога английского глагола. Образование форм. Passive Voice

образуется при помощи вспомогательного глагола to be в соответствующем времени, лице и числе и причастия прошедшего времени смысл. глагола – Participle II (III –я форма или ed-форма).

В страдательном залоге не употребляются:

1) Непереходные глаголы, т.к. при них нет объекта, который испытывал бы воздействие, то есть нет прямых дополнений которые могли бы стать подлежащими при глаголе в форме Passive.

Переходными в англ. языке называются глаголы, после которых в действительном залоге следует прямое дополнение; в русском языке это дополнение, отвечающее на вопросы винительного падежа – кого? что?: to build строить, to see видеть, to take брать, to open открывать и т.п.

Непереходными глаголами называются такие глаголы, которые не требуют после себя прямого дополнения: to live жить, to come приходиться, to fly летать, to cry плакать и др.

2) Глаголы-связки: be – быть, become – становиться/стать.

3) Модальные глаголы.

4) Некоторые переходные глаголы не могут использоваться в страдательном залоге. В большинстве случаев это глаголы состояния, такие как:

to fit годиться, быть впору to have иметь to lack не хватать, недоставать to like нравиться
to resemble напоминать, быть похожим to suit годиться, подходить и др.

При изменении глагола из действительного в страдательный залог меняется вся конструкция предложения:

- дополнение предложения в Active становится подлежащим предложения в Passive;
- подлежащее предложения в Active становится предложным дополнением, которое вводится предлогом by или вовсе опускается;
- сказуемое в форме Active становится сказуемым в форме Passive.

Особенности употребления форм Passive:

1. Форма Future Continuous не употребляется в Passive, вместо нее употребляется Future Indefinite:

At ten o'clock this morning Nick will be writing the letter. – At ten o'clock this morning the letter will be written by Nick.

2. В Passive нет форм Perfect Continuous, поэтому в тех случаях, когда нужно передать в Passive действие, начавшееся до какого-то момента и продолжающееся вплоть до этого момента, употребляются формы Perfect:

He has been writing the story for three months. The story has been written by him for three months.

3. Для краткости, во избежание сложных форм, формы Indefinite (Present, Past, Future) часто употребляются вместо форм Perfect и Continuous, как в повседневной речи так и в художественной литературе. Формы Perfect и Continuous чаще употребляются в научной литературе и технических инструкциях.

This letter has been written by Bill. (Present Perfect)

This letter is written by Bill. (Present Indefinite – более употребительно)

Apples are being sold in this shop. (Present Continuous)

Apples are sold in this shop. (Present Indefinite – более употребительно)

4. Если несколько однотипных действий относятся к одному подлежащему, то вспомогательные глаголы обычно употребляются только перед первым действием, например: The new course will be sold in shops and ordered by post.

Прямой пассив (The Direct Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует прямому дополнению предложения в Active. Прямой пассив образуется от большинства переходных глаголов.

I gave him a book. Я дал ему книгу. A book was given to him. Ему дали книгу. (или Книга была дана ему)

The thief stole my watch yesterday. Вор украл мои часы вчера.

My watch was stolen yesterday. Мои часы были украдены вчера.

В английском языке имеется ряд переходных глаголов, которые соответствуют непереходным глаголам в русском языке. В английском они могут употребляться в прямом пассиве, а в русском – нет. Это: to answer отвечать кому-л.

to believe верить кому-л. to enter входить (в) to follow следовать (за) to help помогать кому-л.

to influence влиять (на) to join присоединяться to need нуждаться to watch наблюдать (за)

Так как соответствующие русские глаголы, являясь непереходными, не могут употребляться в страдательном залоге, то они переводятся на русский язык глаголами в действительном залоге:

Winter is followed by spring.

А при отсутствии дополнения с предлогом by переводятся неопределенно-личными предложениями: Your help is needed.

Косвенный пассив (The Indirect Passive)

Это конструкция, в которой подлежащее предложения в Passive соответствует косвенному дополнению предложения в Active. Она возможна только с глаголами, которые могут иметь и

прямое и косвенное дополнения в действительном залоге. Прямое дополнение обычно означает предмет (что?), а косвенное – лицо (кому?).

С такими глаголами в действительном залоге можно образовать две конструкции:

а) глагол + косвенное дополнение + прямое дополнение;

б) глагол + прямое дополнение + предлог + косвенное дополнение:

а) They sent Ann an invitation.- Они послали Анне приглашение.

б) They sent an invitation to Ann. - Они послали приглашение Анне.

В страдательном залоге с ними также можно образовать две конструкции – прямой и косвенный пассив, в зависимости от того, какое дополнение становится подлежащим предложения в Passive. К этим глаголам относятся: to bring приносить

to buy покупать to give давать to invite приглашать to leave
оставлять

to lend одалживать to offer предлагать to order приказывать to pay платить

to promise обещать to sell продавать to send посылать to show показывать

to teach учить to tell сказать и др.

Например: Tom gave Mary a book. Том дал Мэри книгу.

Mary was given a book. Мэри дали книгу. (косвенный пассив – более употребителен)

A book was given to Mary. Книгу дали Мэри. (прямой пассив – менее употребителен)

Выбор между прямым или косвенным пассивом зависит от смыслового акцента, вкладываемого в последние, наиболее значимые, слова фразы:

John was offered a good job. (косвенный пассив) Джону предложили хорошую работу.

The job was offered to John. (прямой пассив) Работу предложили Джону.

Глагол to ask спрашивать образует только одну пассивную конструкцию – ту, в которой подлежащим является дополнение, обозначающее лицо (косвенный пассив):

He was asked a lot of questions. Ему задали много вопросов.

Косвенный пассив невозможен с некоторыми глаголами, требующими косвенного дополнения (кому?) с предлогом to. Такое косвенное дополнение не может быть подлежащим в Passive, поэтому в страдательном залоге возможна только одна конструкция – прямой пассив, то есть вариант: Что? объяснили, предложили, повторили...Кому? Это глаголы: to address адресовать

to describe описывать to dictate диктовать to explain объяснять to mention
упоминать

to propose предлагать to repeat повторять to suggest предлагать to write
писать и др.

Например: The teacher explained the rule to the pupils. – Учитель объяснил правило ученикам. The rule was explained to the pupils. – Правило объяснили ученикам. (Not: The pupils was explained...)

Употребление Страдательного залога

В английском языке, как и в русском, страдательный залог употр. для того чтобы:

1. Обойтись без упоминания исполнителя действия (70% случаев употребления Passive) в тех случаях когда:

а) Исполнитель неизвестен или его не хотят упоминать:

He was killed in the war. Он был убит на войне.

б) Исполнитель не важен, а интерес представляет лишь объект воздействия и сопутствующие обстоятельства:

The window was broken last night. Окно было разбито прошлой ночью.

в) Исполнитель действия не называется, поскольку он ясен из ситуации или контекста:

The boy was operated on the next day. Мальчика оперировали на следующий день.

г) Безличные пассивные конструкции постоянно используются в научной и учебной литературе, в различных руководствах: The contents of the container should be kept in a cool dry place. Содержимое упаковки следует хранить в сухом прохладном месте.

2. Для того, чтобы специально привлечь внимание к тому, кем или чем осуществлялось действие. В этом случае существительное (одушевленное или неодушевленное.) или местоимение (в объектном падеже) вводится предлогом *by* после сказуемого в *Passive*.

В английском языке, как и в русском, смысловой акцент приходится на последнюю часть фразы. *He quickly dressed.* Он быстро оделся.

Поэтому, если нужно подчеркнуть исполнителя действия, то о нем следует сказать в конце предложения. Из-за строгого порядка слов английского предложения это можно осуществить лишь прибегнув к страдательному залогу. Сравните:

The flood broke the dam. (Active) Наводнение разрушило плотину. (Наводнение разрушило что? – плотину)

The dam was broken by the flood. (Passive) Плотина была разрушена наводнением. (Плотина разрушена чем? – наводнением)

Чаще всего используется, когда речь идет об авторстве:

The letter was written by my brother. Это письмо было написано моим братом.

И когда исполнитель действия является причиной последующего состояния:

The house was damaged by a storm. Дом был поврежден грозой.

Примечание: Если действие совершается с помощью какого-то предмета, то употребляется предлог *with*, например:

He was shot with a revolver. Он был убит из револьвера.

Перевод глаголов в форме *Passive*

В русском языке есть три способа выражения страдательного залога:

1. При помощи глагола "быть" и краткой формы страдательного причастия, причем в настоящем времени "быть" опускается:

I am invited to a party.

Я приглашён на вечеринку.

Иногда при переводе используется обратный порядок слов, когда русское предложение начинается со сказуемого: *New technique has been developed.* Была разработана новая методика.

2. Глагол в страдательном залоге переводится русским глаголом, оканчивающимся на –ся(-сь):

Bread is made from flour. Хлеб делается из муки.

Answers are given in the written form. Ответы даются в письменном виде.

3. Неопределенно-личным предложением (подлежащее в переводе отсутствует; сказуемое стоит в 3-м лице множественного числа действительного залога). Этот способ перевода возможен только при отсутствии дополнения с предлогом *by* (производитель действия не упомянут):

The book is much spoken about. Об этой книге много говорят.

I was told that you're ill. Мне сказали, что ты болен.

4. Если в предложении указан субъект действия, то его можно перевести личным предложением с глаголом в действительном залоге (дополнение с *by* при переводе становится подлежащим). Выбор того или иного способа перевода зависит от значения глагола и всего предложения в целом (от контекста):

They were invited by my friend. Их пригласил мой друг.(или Они были приглашены моим другом.)

Примечание 1: Иногда страдательный оборот можно перевести двумя или даже тремя способами, в зависимости от соответствующего русского глагола и контекста:

The experiments were made last year.

1) Опыты были проведены в прошлом году.

2) Опыты проводились в прошлом году.

3) Опыты проводили в прошлом году.

Примечание 2: При переводе нужно учитывать, что в английском языке, в отличие от русского, при изменении залога не происходит изменение падежа слова, стоящего перед глаголом (например в английском *she* и *she*, а переводим на русский - она и ей):

Примечание 3: Обороты, состоящие из местоимения *it* с глаголом в страдательном залоге переводятся неопределенно-личными оборотами:

It is said... Говорят... It was said... Говорили...
 It is known... Известно... It was thought... Думали, полагали...
 It is reported... Сообщают... It was reported... Сообщали... и т.п.

В таких оборотах it играет роль формального подлежащего и не имеет самостоятельного значения: It was expected that he would return soon. Ожидали, что он скоро вернется.

Согласование времен в английском предложении (Sequence of Tenses)

Если в главном предложении сказуемое выражено глаголом в одной из форм прошедшего времени, то в придаточном предложении употребление времен ограничено. Правило, которому в этом случае подчиняется употребление времен в придаточном предложении, называется согласованием времен.

Правило 1: Если глагол главного предложения имеет форму настоящего или будущего времени, то глагол придаточного предложения будет иметь любую форму, которая требуется смыслом предложения. То есть никаких изменений не произойдет, согласование времен здесь в силу не вступает.

Правило 2: Если глагол главного предложения имеет форму прошедшего времени (обычно Past Simple), то глагол придаточного предложения должен быть в форме одного из прошедших времен. То есть в данном случае время придаточного предложения изменится. Все эти изменения отражены в нижеследующей таблице:

| Переход из одного времени в другое | Примеры | |
|--|---|---|
| Present Simple » Past Simple | He can speak French – Он говорит по-французски. | Boris said that he could speak French – Борис сказал, что он говорит по-французски. |
| Present Continuous » Past Continuous | They are listening to him – Они слушают его | I thought they were listening to him – Я думал, они слушают его. |
| Present Perfect » Past Perfect | Our teacher has asked my parents to help him – Наш учитель попросил моих родителей помочь ему. | Mary told me that our teacher had asked my parents to help him – Мария сказала мне, что наш учитель попросил моих родителей помочь ему. |
| Past Simple » Past Perfect | I invited her – Я пригласил ее. | Peter didn't know that I had invited her – Петр не знал, что я пригласил ее. |
| Past Continuous » Past Perfect Continuous | She was crying – Она плакала | John said that she had been crying – Джон сказал, что она плакала. |
| Present Perfect Continuous » Past Perfect Continuous | It has been raining for an hour – Дождь идет уже час. | He said that it had been raining for an hour – Он сказал, что уже час шел дождь. |
| Future Simple » Future in the Past | She will show us the map – Она покажет нам карту. | I didn't expect she would show us the map – Я не ожидал, что она покажет нам карту. |

Изменение обстоятельств времени и места при согласовании времен.

Следует запомнить, что при согласовании времен изменяются также некоторые слова (обстоятельства времени и места).

this » that
 these » those
 here » there
 now » then
 yesterday » the day before
 today » that day

tomorrow » the next (following) day
last week (year) » the previous week (year)
ago » before
next week (year) » the following week (year)

Прямая и косвенная речь

Перевод прямой речи в косвенную в английском языке

Для того чтобы перевести прямую речь в косвенную, нужно сделать определенные действия. Итак, чтобы передать чьи-то слова в английском языке (то есть перевести прямую речь в косвенную), мы:

1. Убираем кавычки и ставим слово *that*

Например, у нас есть предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы передать кому-то эти слова, так же как и в русском, мы убираем кавычки и ставим слово *that* – «что».

She said that Она сказала, что....

2. Меняем действующее лицо

В прямой речи обычно человек говорит от своего лица. Но в косвенной речи мы не можем говорить от лица этого человека. Поэтому мы меняем «я» на другое действующее лицо. Вернемся к нашему предложению:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Так как мы передаем слова девушки, вместо «я» ставим «она»:

She said that she Она сказала, что она....

3. Согласовываем время

В английском языке мы не можем использовать в одном предложении прошедшее время с настоящим или будущим. Поэтому, если мы говорим «сказал» (то есть используем прошедшее время), то следующую часть предложения нужно согласовать с этим прошедшим временем. Возьмем наше предложение:

She said, "I will buy a dress". Она сказала: «Я куплю платье».

Чтобы согласовать первую и вторую части предложения, меняем *will* на *would*. см. таблицу выше.

She said that she would buy a dress. Она сказала, что она купит платье.

4. Меняем некоторые слова

В некоторых случаях мы должны согласовать не только времена, но и отдельные слова. Что это за слова? Давайте рассмотрим небольшой пример.

She said, "I am driving now". Она сказала: «Я за рулем сейчас».

То есть она в данный момент за рулем. Однако, когда мы будем передавать ее слова, мы будем говорить не про данный момент (тот, когда мы говорим сейчас), а про момент времени в прошлом (тот, когда она была за рулем). Поэтому мы меняем *now* (сейчас) на *then* (тогда) см. таблицу выше.

She said that she was driving then. Она сказала, что она была за рулем тогда.

Вопросы в косвенной речи в английском языке

Вопросы в косвенной речи, по сути, не являются вопросами, так как порядок слов в них такой же, как в утвердительном предложении. Мы не используем вспомогательные глаголы (*do, does, did*) в таких предложениях.

He asked, "Do you like this cafe?" Он спросил: «Тебе нравится это кафе?»

Чтобы задать вопрос в косвенной речи, мы убираем кавычки и ставим *if*, которые переводятся как «ли». Согласование времен происходит так же, как и в обычных предложениях. Наше предложение будет выглядеть так:

He asked if I liked that cafe. Он спросил, нравится ли мне то кафе.

Давайте рассмотрим еще один пример:

She said, "Will he call back?" Она сказала: «Он перезвонит?»

She said if he would call back. Она сказала, перезвонит ли он.

Специальные вопросы в косвенной речи

Специальные вопросы задаются со следующими вопросительными словами: what – что when – когда how – как why - почему where – где which – который

При переводе таких вопросов в косвенную речь мы оставляем прямой порядок слов (как в утвердительных предложениях), а на место if ставим вопросительное слово.

Например, у нас есть вопрос в прямой речи:

She said, "When will you come?". Она сказала: «Когда ты придешь?»

В косвенной речи такой вопрос будет выглядеть так:

She said when I would come. Она сказала, когда я приду.

He asked, "Where does she work?" Он спросил: «Где она работает?»

He asked where she worked. Он спросил, где она работает.

Сослагательное наклонение. Три типа условных предложений

Conditionals are clauses introduced with if. There are three types of conditional clause: Type 1, Type 2 and Type 3. There is also another common type, Type 0.

Type 0 Conditionals: They are used to express something which is always true. We can use when (whenever) instead of it. *If/When the sun shines, snow melts.*

Type 1 Conditionals: They are used to express real or very probable situations in the present or future. *If he doesn't study hard, he won't pass his exam.*

Type 2 Conditionals: They are used to express imaginary situations which are contrary to facts in the present and, therefore, are unlikely to happen in the present or future. *Bob is daydreaming. If I won the lottery, I would buy an expensive car and I would go on holiday to a tropical island next summer.*

Type 3 Conditionals: They are used to express imaginary situations which are contrary to facts in the past. They are also used to express regrets or criticism. *John got up late, so he missed the bus. If John hadn't got up late, he wouldn't have missed the bus.*

| | If-clause (hypothesis) | Main clause (result) | Use |
|--------------------------|--|--|--|
| Type 0 general truth | if + present simple | present simple | something which is always true |
| | If the temperature falls below 0 °C, water turns into ice. | | |
| Type 1 real present | if + present simple, present continuous, present perfect or present perfect continuous | future/imperative can/may/might/must/should/ could + bare infinitive | real - likely to happen in the present or future |
| | If he doesn't pay the fine, he will go to prison. If you need help, come and see me. If you have finished your work, we can have a break. If you're ever in the area, you should come and visit us. | | |
| Type 2 unreal present | if + past simple or past continuous | would/could/might + bare infinitive | imaginary situation contrary to facts in the present; also used to give advice |
| | If I had time, I would take up a sport. (but I don't have time - untrue in the present) If I were you, I would talk to my parents about it. (giving advice) | | |
| Type 3 unreal past | if + past perfect or past perfect continuous | would/could/might + have + past participle | imaginary situation contrary to facts in the past; also used to express regrets or criticism |
| | If she had studied harder, she would have passed the test. If he hadn't been acting so foolishly, he wouldn't have been punished. | | |

Conditional clauses consist of two parts: the if -clause (hypothesis) and the main clause (result). When the if - clause comes before the main clause, the two clauses are separated with a comma. When the main clause comes before the if - clause, then no comma is necessary.

e.g. a) *If I see Tim, I'll give him his book.*

b) *I'll give Tim his book if I see him.*

We do not normally use will, would or should in an if - clause. However, we can use will or would after if to make a polite request or express insistence or uncertainty (usually with expressions such as / don't know, I doubt, I wonder, etc.).

We can use should after if to talk about something which is possible, but not very likely to happen.

e.g. a) *If the weather is fine tomorrow, will go camping. (NOT: If the weather will be fine...)*

b) *If you will fill in this form, I'll process your application. (Will you please fill in... - polite request)*

c) *If you will not stop shouting, you'll have to leave. (If you insist on shouting... - insistence)*

d) *I don't know if he will pass his exams, (uncertainty)*

e) *If Tom should call, tell him I'll be late. (We do not think that Tom is very likely to call.)*

We can use unless instead of if... not in the if -clause of Type 1 conditionals. The verb is always in the affirmative after unless.

e.g. *Unless you leave now, you'll miss the bus. (If you don't leave now, you'll miss the bus.)*

(NOT: Unless you don't leave now, ...)

We can use were instead of was for all persons in the if - clause of Type 2 conditionals.

e.g. *If Rick was/were here, we could have a party.*

We use If I were you ... when we want to give advice.

e.g. *If I were you, I wouldn't complain about it.*

The following expressions can be used instead of if: provided/providing that, as long as, suppose/supposing, etc.

e.g. a) *You can see Mr. Carter provided you have an appointment. (If you have an appointment...)*

b) *We will all have dinner together providing Mary comes on time. (... if Mary comes ...)*

c) *Suppose/Supposing the boss came now, ...*

We can omit if in the if - clause. When if is omitted, should (Type 1), were (Type 2), had (Type 3) and the subject are inverted.

e.g. a) *Should Peter come, tell him to wait. (If Peter should come,...)*

b) *Were I you, I wouldn't trust him. (If I were you, ...)*

c) *Had he known, he would have called. (If he had known, ...)*

Сравнительно-сопоставительные конструкции и обороты в предложении

Все три формы прилагательных – основная (или положительная), сравнительная и превосходная используются в сравнительных конструкциях.

Положительная степень

(или основная форма прилагательного)

1 Одинаковое качество двух предметов (лиц, явлений) выражается прилагательными в положительной степени (основная форма) в конструкции с союзами **as...as** в значении *такой же ...как, так же...как*:

He is **as tall as** his brother.

This text is **as difficult as** that one.

Он **такой же высокий, как и** его брат.

Этот текст **такой же трудный, как и тот.**

Иногда употребляется конструкция с прилагательным **same** *тот же самый, одинаковый*: **the same...as** – *такой же, тот же самый*:

Mary is **the same age as** Jane.

Мэри того же возраста, что и Джейн.

2 Разное качество предметов выражается конструкцией **not so/as...as** в значении *не так...как, не такой...как*:

He is **not so (as) tall as** his brother.

Он не такой высокий, как его брат.

The problem is **not so simple as** it seems. *Эта проблема не такая простая, как кажется.*

Если после второго **as** следует личное местоимение в третьем лице, то обычно глагол повторяется:

I am **not as strong as** he is.

Я не такой сильный, как он.

Her sister is **not so pretty as** she is.

Ее сестра не такая хорошенькая, как она.

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

She is **not so beautiful as** you (are).

Она не такая красивая, как ты.

3 Если один из сравниваемых объектов превосходит другой вдвое (**twice** [twɑɪs]) или в несколько раз (... **times**) по степени проявления какого-либо качества, то употребляется следующая конструкция:

Your room is **twice as large as** mine.

Ваша комната в два раза больше моей.

This box is **three times as heavy as** that.

Этот ящик в три раза тяжелее того.

Когда второй объект сравнения не упомянут, то **as** после прилагательного не употребляется:

This grade is **twice as expensive**.

Этот сорт в два раза дороже.

He is **twice as old**.

Он в два раза старше.

А если один из объектов уступает по качеству в два раза, то употребляется **half** *половина, наполовину, в два раза меньше*. Обратите внимание на то, что стоящее за ним прилагательное в конструкции **as... as** имеет противоположное значение тому, что принято в русском языке:

Your flat is **half as large as** mine.

Ваша квартира вдвое меньше моей.

Moscow is **half as big as** New York.

Москва наполовину меньше Нью-Йорка.

В подобных сравнительных конструкциях союз **as...as** и последующее прилагательное могут вообще опускаться, что должно компенсироваться наличием соответствующего существительного:

Your flat is **three times the size of** mine.

Ваша квартира в три раза больше моей.

He is **half my age**.

Он в два раза моложе меня.

Сравнительная степень

1 При сравнении степени качества одного предмета с другим после прилагательного в СРАВНИТЕЛЬНОЙ степени употребляется союз **than** [Dxn] - *чем*, который при переводе на русский язык часто опускается:

He is **older than** I am.

Он старше, чем я. (меня)

This book is **more interesting than** that one.

Эта книга интереснее, чем та (книга).

Эта конструкция может содержать и количественный компонент сравнения:

My mother is **ten years younger than** my father.

Моя мама на 10 лет моложе отца.

Уменьшение качества выражается с помощью **less... than**:

I am **less musical than** my sister.

Я менее музыкален, чем моя сестра.

Если после **than** следует личное местоимение в третьем лице, то глагол обычно повторяется:

She has **more good marks than** he has.

У нее больше хороших отметок, чем у него.

А если следует личное местоимение в первом или втором лице, то глагол может опускаться:

He is **stronger than** you. *Он сильнее, чем ты.*

В этом случае, если нет второго сказуемого, после **than** обычно употребляется личное местоимение в объектном падеже **me/ him/ her/ them/ us**, а не в именительном:

You are taller **than I am**. или You are taller **than me**. *Ты выше, чем я (меня).*

I got up earlier **than she did**. или I got up earlier **than her**. *Я встал раньше ее (чем она).*

She runs quicker **than him**. *Она бежит быстрее (чем он).*

2 Для усиления сравнительной степени часто употребляются слова **much** [mʌʃ] или **far** [fɑː] со значением - *значительно, гораздо, намного*, а также **still** *еще*, **even** ['iːvən] *даже*, **by far** *намного, безусловно*. Причем **much more** [mʌʃ mɔː] и **far more** употребляется перед неисчисляемыми существительными, а **many more** перед исчисляемыми существительными :

My boyfriend is **much older than** me.

Мой друг гораздо старше меня.

This book is **far better than** that one.

Эта книга значительно лучше той.

It is **still colder** today.

Сегодня еще холоднее.

He has **much more free time than** I have.

У него гораздо больше свободного времени, чем у меня.

I have **many more books than** he (has).

У меня гораздо больше книг, чем у него.

3 При передаче зависимости одного качества от другого (обычно их параллельное возрастание или убывание) используется конструкция **the... the**, например:

The more you have, **the more** you want.

Чем больше ты имеешь, тем больше ты хочешь.

The longer I stay here **the better** I like it.

Чем дольше я нахожусь здесь, тем больше мне нравится.

Превосходная степень

Если один предмет или лицо превосходят остальные в каком-либо качестве, то употребляется прилагательное в превосходной степени с артиклем **the**. Речь обычно идет не о сравнении двух предметов (лиц, явлений), а трех или более.

"Why did you stay at that hotel?" – "It

"Почему вы остановились в той гостинице?" –

was **the cheapest** (that) we could find."

"Она была самая дешевая, которую мы могли найти".

Обычно при сравнении употребляется конструкция **the прилагательное... in**, если речь идет о местоположении, например:

Tom is **the cleverest** (boy) **in** the class.

Том – самый умный (парень) в классе.

What's **the longest** river **in** the world?

Какая самая длинная река в мире?

Или конструкция **the прилагательное... of**, например:

the happiest day **of** my life

счастливейший день моей жизни

He is **the best** **of** my friends.

Он лучший из моих друзей.

Pete is **the best** student **of** us all.

Пит лучший студент из всех нас.

She is **the prettiest** **of** them all.

Она самая хорошенькая из них.

После превосходной степени часто употребляется определительное придаточное предложение со сказуемым в **Present Perfect** (как вы помните, здесь речь идет о свершившемся факте в прошлом, значение которого продолжается до настоящего момента). Это предложение может вводиться относительным местоимением **that** *который*, но оно обычно опускается.

This is **the most interesting** book (that)

Это самая интересная книга, которую я когда-

I have ever read.

либо читал.

Типы придаточных предложений и способы их связи

TIME CLAUSES

They had booked tickets before they went to the cinema. They will go home when the film is over.

◆ We use the following time conjunctions to introduce time clauses.

when - as - while - before - after - since - until/till - whenever - as long as - by the time- as soon as -the moment that - no sooner ...than - hardly... when - once - immediately - the first/last/next time etc.

◆ When the time clause precedes the main clause, a comma is used.

e.g. *Whenever he is in town, he visits us.*

He visits us whenever he is in town.

Sequence of Tenses

◆ Time clauses follow the rule of the sequence of tenses. That is, when the verb of the main clause is in a present or future form, the verb of the time clause is in a present form. When the verb of the main clause is in a past form, the verb of the time clause is in a past form too.

Main clause

Time clause

present / future / imperative → present simple or present perfect

She takes off her shoes the moment that she gets home.

I'll call you as soon as I get to my hotel.

Turn off the lights before you leave.

past simple/ past perfect → past simple or past perfect

He took a shower after he had finished painting the room.

They had reserved a table before they went to the restaurant.

TIME CONJUNCTIONS

◆ **ago - before**

ago = before now

e.g. *My parents got married twenty years ago. (= twenty years before now)*

before = before a past time

e.g. *Helen and Mike got married last month.*

They had met six months before. (= six months before last month)

◆ **until/till - by the time**

until/till = up to the time when

e.g. *You must stay in the office until/till you finish/have finished the report.*

(= up to the time when you finish the report) They'll be at their summer house until/till Sunday.

(= up to Sunday)

by the time + clause = not later than the moment something happens

e.g. *I will have set the table by the time you come home. (= before, not later than the moment you come home)*

by = not later than

e.g. *I'll let you know my decision by Friday. (= not later than Friday)*

Note: a) **not... until/till**

e.g. *I won't have finished my work until/till/ before Thursday.*

b) Both until/till and before can be used to say how far away a future event is.

e.g. *There's only one week until/till/before my summer holidays.*

◆ **during - while/as**

during + noun = in the time period

e.g. *We learnt several interesting facts during the lecture.*

while/as + clause = in the time period

e.g. *We learnt several interesting facts while/as we were listening to the lecture.*

◆ **when = (time conjunction) + present tense**

e.g. *We'll order some pizzas when our friends get here.*

when = (question word) + will/would

e.g. *I'm not sure when his next book will be published.*

CLAUSES OF RESULT

Dolphins are so appealing (that) it is hard not to like them.

They are such intelligent creatures (that) they can communicate with each other.

Clauses of result are used to express the result of something. They are introduced with the following words/expressions:

as a result - therefore - consequently/as a consequence - so - so/such ... that etc.

◆ **as a result/therefore/consequently**

e.g. *The president was taken ill and, as a result/ therefore/consequently the summit meeting was cancelled.*

The president was taken ill. As a result/therefore/ consequently, the summit meeting was cancelled.

◆ **so** e.g. *It was hot, so I turned on the air-conditioning.*

◆ **such a/an + adjective + singular countable noun**

e.g. *It was such an interesting book (that) I couldn't put it down.*

◆ **such + adjective + plural/uncountable noun**

e.g. *They are such good friends (that) they've never had an argument.*

It was such expensive jewellery (that) it was kept in a safe.

◆ **such a lot of + plural/uncountable noun**

e.g. *She invited such a lot of guests to her party that there wasn't enough room for all of them.*

He has such a lot of money (that) he doesn't know what to do with it.

◆ **so + adjective/adverb**

e.g. *He is so devoted that he deserves praise.*

He speaks so quickly that I can't understand him.

◆ **so much/little + uncountable noun**

so many/few + plural noun

e.g. *There is so much traffic that we won't be on time. He pays so little attention to what I say that it makes me angry.*

He made so many mistakes that he failed. There are so few wolves left that we have to protect them.

CLAUSES OF REASON

Traffic is getting worse because/as more people are buying cars. Traffic is getting worse on account of the fact that more people are buying cars.

Causes of reason are used to express the reason for something. They are introduced with the following words/expressions:

because - as/since - the reason for/why - because of/on account of/due to - now that - for etc.

◆ **because** e.g. *I took a taxi because it was raining.*

Because it was raining, I took a taxi.

◆ **as/since (=because)** e.g. *They bought him a gift as/since it was his birthday. As/Since it was his birthday, they bought him a gift.*

◆ **the reason for + noun/-ing form**

the reason why + clause

e.g. *The reason for his resignation was (the fact) that he had been offered a better job. The fact that he had been offered a better job was the reason for his resigning. The reason why he resigned was (the fact) that he had been offered a better job.*

◆ **because of/on account of/due to + noun**

because of/on account of/due to the fact that + clause

e.g. *All flights were cancelled because of/on account of the thick fog.*

All flights were cancelled due to the thick fog. He asked for a few days off because of/on account of the fact that he was exhausted. He asked for a few days off due to the fact that he was exhausted.

◆ **now (that) + clause** e.g. *Now (that) they have children, they have less free time.*

◆ **for = because (in formal written style)**

A clause of reason introduced with *for* always comes after the main clause.

e.g. *The citizens of Harbridge were upset, for a new factory was to be built near their town.*

CLAUSES OF PURPOSE

They met in a café to discuss their holiday.

They met in a café so that they could discuss their holiday.

Clauses of purpose are used to express the purpose of an action. That is, they explain why someone does something. They are introduced with the following words/expressions:

to - in order to/so as to-so that/in order that - in case-for etc.

◆ **to - infinitive**

e.g. *She went shopping to look for some new clothes.*

◆ **in order to/so as to + infinitive (formal)**

e.g. *He did a postgraduate course in order to/so as to widen his knowledge of international politics.*

In negative sentences we use *in order not to* or *so as not to*. We never use *not to* alone.

e.g. *He wrote the number down in order not to/so as not to forget it.*

◆ **so that + can/will (present or future reference)**

e.g. *Emma has booked a first-class ticket so that she can travel in comfort.*

so that + could/would (past reference)

e.g. *He recorded the match so that he could watch it later.*

Note: *In order that* has the same structure as *so that*. However, it is not used very often as it is formal.

e.g. *We will send you the forms in order that you can make your application.*

◆ **in case + present tense (present or future reference)**

in case + past tense (past reference)

In case is never used with *will* or *would*.

e.g. *Take your credit card in case you run out of cash. He took a jumper in case it got cold.*

◆ **for + noun (when we want to express the purpose of an action)**

e.g. *He went to the doctor's for a check-up.*

for + -ing form (when we want to express the purpose or function of something)

e.g. *We use a spade for digging.*

Clauses of purpose follow the rule of the sequence of tenses, like time clauses.

e.g. *He borrowed some money so that he could pay his phone bill.*

Note: We can express negative purpose by using:

a) **prevent + noun/pronoun + (from) + -ing form**

e.g. *She covered the sofa with a sheet to prevent it (from) getting dirty.*

b) **avoid + -ing form**

e.g. *They set off early in the morning to avoid getting stuck in traffic.*

EXCLAMATIONS

Exclamations are words or sentences used to express admiration, surprise, etc.

To form exclamatory sentences we can use *what (a/an)*, *how*, *such*, *so* or a negative question.

◆ **so + adjective/adverb**

e.g. *This cake is so tasty! He works so hard!*

◆ **such + a/an (+ adjective) + singular countable noun**

e.g. *This is such an original design!*

◆ **such (+ adjective) + uncountable/plural noun**

e.g. *You gave me such valuable information!*

She's wearing such elegant clothes!

◆ **what + a/an (+ adjective) + singular countable noun**

e.g. *What a lovely view!*

What an unusual pattern! What a day!

◆ **what (+ adjective) + uncountable/plural noun**

e.g. *What expensive furniture!*

What comfortable shoes!

◆ **how + adjective/adverb**

e.g. *How clever he is! How well she behaved!*

◆ **negative question (+ exclamation mark)**

e.g. *Isn't she a graceful dancer!*

CLAUSES OF CONTRAST

He prefers to make things by hand although/even though he could use a machine.

Clauses of contrast are used to express a contrast. They are introduced with the following words/phrases:

but - although/even though/though - in spite of/despite - however - while/whereas - yet - nevertheless - on the other hand

◆ **but** e.g. *It was cold, but she wasn't wearing a coat.*

◆ **although/even though/though + clause**

Even though is more emphatic than although. Though is informal and is often used in everyday speech. It can also be put at the end of a sentence.

e.g. *Although/Even though/Though it was summer, it was chilly.*

It was chilly although/even though/though it was summer.

It was summer. It was chilly, though.

◆ **in spite of/despite + noun/-ing form**

e.g. *In spite of/Despite his qualifications, he couldn't get a job.*

He couldn't get a job in spite of/despite (his) being qualified.

in spite of/despite the fact that + clause

e.g. *In spite of/Despite the fact that he was qualified, he couldn't get a job.*

◆ **however/nevertheless** A comma is always used after however/nevertheless.

e.g. *The man fell off the ladder. However/Nevertheless, he wasn't hurt.*

◆ **while/whereas**

e.g. *She is tall, while/whereas her brother is rather short.*

◆ **yet (formal)/still**

e.g. *The fire was widespread, yet no property was damaged. My car is old. Still, it is in very good condition.*

◆ **on the other hand**

e.g. *Cars aren't environmentally friendly.*

On the other hand, bicycles are. / Bicycles, on the other hand, are.

CLAUSES OF MANNER

They look as if/as though they are in a hurry.

Clauses of manner are introduced with as if/as though and are used to express the way in which something is done/said, etc.

◆ We use **as if /as though** after verbs such as act, appear, be, behave, feel, look, seem, smell, sound, taste to say how somebody or something looks, behaves, etc.

e.g. *He is acting as if/as though he's had bad news.*

We also use **as if /as though** with other verbs to say how somebody does something.

e.g. *She talks as if/as though she knows everything.*

◆ We use **as if /as though + past tense** when we are talking about an unreal present situation. Were can be used instead of was in all persons.

e.g. *He spends his money as if/as though he was I were a millionaire. (But he isn't.) He behaves as if/as though he owned the place. (But he doesn't.)*

Note: We can use like instead of as if/as though in spoken English.

e.g. *She looks like she's going to faint, (informal spoken English).*

RELATIVE CLAUSES

A camel is an animal which/that lives in hot countries.

A computer is something which/ that we use for storing information.

A firefighter is someone who/that puts out fires and whose job is very risky.

Relative clauses are introduced with a) relative pronouns (who(m), which, whose, that) and b) relative adverbs (when, where, why).

We use:

◆ **who/that to refer to people.**

◆ **which/that to refer to objects or animals.**

Who/which/that can be omitted when it is the object of the relative clause; that is, when there is a noun or subject pronoun between the relative pronoun and the verb. It cannot be omitted when it is the subject of the relative clause. We can use whom instead of who when it is the object of the relative clause. Whom is not often used in everyday English.

e.g. a) *I saw a friend. I hadn't seen him for years.*

I saw a friend (who/whom/that) I hadn't seen for years. (Who/whom/that is the object, therefore it can be omitted.)

b) *I met a woman. She was from Japan.*

I met a woman who/that was from Japan. (Who/that is the subject, therefore it cannot be omitted.)

◆ **whose instead of possessive adjectives** (my, your, his, etc.) with people, objects and animals in order to show possession.

e.g. a) *That's the boy — his bicycle was stolen yesterday.*

That's the boy whose bicycle was stolen yesterday.

b) *That's the building —its windows were smashed.*

That's the building whose windows were smashed.

◆ We usually avoid using prepositions before relative pronouns.

e.g. a) *The person to whom the money will be entrusted must be reliable, (formal English — unusual structure)*

b) *The chair that you are sitting on is an antique. (usual structure)*

c) *The chair you are sitting on is an antique. (everyday English)*

◆ Which can refer back to a whole clause.

e.g. *He helped me do the washing-up. That was kind of him. He helped me do the washing-up, which was kind of him. (Which refers back to the whole clause. That is, it refers to the fact that he helped the speaker do the washing-up.)*

◆ We can use the structure all/most/some/a few/half/none/two, etc. + of + whom/which.

e.g. a) *He invited a lot of people. All of them were his friends.*

He invited a lot of people, all of whom were his friends.

b) *He has a number of watches. Three of them are solid gold.*

He has a number of watches, three of which are solid gold.

◆ That is never used after a comma or preposition.

e.g. a) *The Chinese vase, which is on the coffee table, is very expensive. (NOT: ...that is on the coffee table ...)*

b) *The bank in which the money was deposited is across the street. (NOT: The bank in that the money...)*

◆ We use that with words such as all, everything, something, anything, no(thing), none, few, little, much, only and with the superlative form.

e.g. *Is this all that you can do for me? (more natural than ...all which you can do ...) The only thing that is important to me is my family. It's the best song that I've ever heard.*

who/that (people)

subject — cannot be omitted

who/whom/that(people)

object — can be omitted

which/that (objects, animals) subject — cannot be omitted
object — can be omitted
whose (people, objects, animals) possession — cannot be omitted

RELATIVE ADVERBS

We use:

◆ **where** to refer to place, usually after nouns such as place, house, street, town, country, etc. It can be replaced by **which/that + preposition** and, in this case, which/that can be omitted.

e.g. *The house where he was born has been demolished.*

The house (which/that) he was born in has been demolished.

◆ **when** to refer to time, usually after nouns such as **time, period, moment, day, year, summer**, etc. It can either be replaced by **that** or can be omitted.

e.g. *That was the year when she graduated.*

That was the year (that) she graduated.

◆ **why** to give reason, usually after the word **reason**. It can either be replaced by **that** or can be omitted.

e.g. *The reason why she left her job was that she didn't get on with her boss.*

The reason (that) she left her job was that she didn't get on with her boss.

IDENTIFYING/NON-IDENTIFYING CLAUSES

There are two types of relative clause: identifying relative clauses and non-identifying relative clauses. An identifying relative clause gives necessary information and is essential to the meaning of the main sentence. It is not put in commas. A non-identifying relative clause gives extra information and is not essential to the meaning of the main sentence. It is put in commas.

Identifying relative clauses are introduced with:

◆ **who, which, that.** They can be omitted if they are the object of the relative clause.

e.g. a) *People are prosecuted. (Which people? We don't know. The meaning of the sentence is not clear.)*

People who/that lie in court are prosecuted. (Which people? Those who lie in court. The meaning of the sentence is clear.)

b) *The papers are missing. (Which papers? We don't know. The meaning of the sentence is not clear.)*

The papers (which/that) you gave me to check are missing. (Which papers? The ones you gave me to check. The meaning of the sentence is clear.)

◆ **whose, where, when, (the reason) why.** Whose cannot be omitted. Where can be omitted when there is a preposition. When and why can either be replaced by **that** or can be omitted.

e.g. a) *The man was angry. (Which man? We don't know. The meaning of the sentence is not clear.)*

The man whose car was damaged was angry. (Which man? The one whose car was damaged. The meaning of the sentence is clear.)

b) *The shop is near my house. (Which shop? We don't know.)*

The shop where I bought this shirt is near my house. OR The shop I bought this shirt from is near my house. (Which shop? The one I bought this shirt from.)

c) *The day was the happiest day of my life. (Which day? We don't know.)*

The day (when/that) I got married was the happiest day of my life. (Which day? The day I got married.)

d) *I was upset. This is the reason. (The reason for what? We don't know.)*

I was upset. This is the reason (why/that) I didn't call you. (The reason I didn't call you.)

Non-identifying relative clauses are introduced with:

◆ **who, whom, which.** They cannot be omitted or replaced by **that**.

e.g. a) *Jenny Ladd is my favourite author. (The meaning of the sentence is clear.) Jenny Ladd, who has written a lot of successful books, is my favourite author. (The relative clause gives extra information.)*

b) *My cousin Peter is a doctor. (The meaning of the sentence is clear.)*

My cousin Peter, who(m) you have just met, is a doctor. (The relative clause gives extra information.)

c) *His flat is modern and spacious.*

His flat, which he bought two years ago, is modern and spacious.

◆ **whose, where, when.** They cannot be omitted.

e.g. a) *The bride looked stunning. (The meaning of the sentence is clear.)*

The bride, whose wedding dress was designed by Valentino, looked stunning. (The relative clause gives extra information.)

b) *Stratford-upon-Avon is visited by thousands of tourists every year.*

Stratford-upon-Avon, where Shakespeare was born, is visited by thousands of tourists every year.

c) *The best time to visit the island is in May. The best time to visit the island is in May, when it isn't too crowded.*

LINKING WORDS

Linking words show the logical relationship between sentences or parts of a sentence.

Positive Addition

and, both ... and, too, besides (this/that), moreover, what is more, in addition (to), also, as well as (this/that) furthermore etc.

She is both intelligent and beautiful.

Negative Addition

neither... nor, nor, neither, either

Neither John nor David goes to university.

Contrast

but, although, in spite of, despite, while, whereas, ever though, on the other hand, however, yet, still etc.

Sarah is kind but not very reliable.

Giving Examples

such as, like, for example, for instance, especially, in particular etc.

All the food was delicious, but the steak in particular was excellent.

Cause/Reason

as, because, because of, since, for this reason, due to, so, as a result (of) etc.

I stayed in bed because I felt ill.

Condition

if, whether, only if, in case of, in case, provided (that providing (that), unless, as/so long as, otherwise, or (else on condition (that) etc.

We took an umbrella with us in case it rained.

Purpose

to, so that, so as (not) to, in order (not) to, in order that, in case etc.

I took some paper and a pen so that I could make notes.

Effect/Result

such/so ... that, so, consequently, as a result, therefore, for this reason etc.

It was so cold that we decided to light a fire.

Time

when, whenever, as, as soon as, while, before, until/till after, since etc.

We did not leave until/till the babysitter arrived.

Place

where, wherever

We can't decide where to go on holiday this year.

Exception

except (for), apart from

The party was good fun, apart from the problem with the stereo.

Relatives

who, whom, whose, which, what, that

That's the horse which/that won the Grand National.

Listing Points/Events

To begin: initially, first, at first, firstly, to start/begin with, first of all etc.

First of all, we greeted the guests.

To continue: secondly, after this/that, second, afterwards, then, next etc.

Then, we offered them drinks.

To conclude: finally, lastly, in the end, at last, eventually etc.

Finally, we served them the meal.

Summarising

in conclusion, in summary, to sum up, on the whole, all in all, altogether, in short etc.

To sum up, I firmly believe that animals have the right to a happy life.

1.2 Чтение и перевод учебных текстов

№1

YOUR FIRST INTERVIEW

With unemployment so high, and often scores of applicants chasing every job, you have to count yourself lucky to be called for an interview. If it's your first, you're bound to be nervous. (In fact if you're not nervous maybe your attitude is wrong!) But don't let the jitters side-track you from the main issue - which is getting this job. The only way you can do that is by creating a good impression on the person who is interviewing you. Here's how:

DO: † Find out as much as you can about the job beforehand. Ask the job centre or employment agency for as much information as possible; † Jot down your qualifications and experience and think about how they relate to the job. Why should the employer employ you and not somebody else? † Choose your interview clothing with care; no one is going to employ you if you look as though you've wandered out of a disco. Whether you like it or not, appearance counts. † Make sure you know where the interview office is and how to get there. Be on time, or better, a few minutes early. † Bring a pen; you will probably be asked to fill in an application form. Answer all the questions as best you can. And write neatly. The interviewer will be looking at the application during the interview; he or she must be able to read it. † Have a light meal to eat, and go to the toilet. If you don't, you may well be thinking about your inside during the interview.

DON'T: † Ever walk into the interview chewing gum, sucking on a sweet or smoking. † Forget to bring with you any school certificates, samples of your work or letters of recommendation from your teachers or anyone else you might have worked part-time for. † Have a drink beforehand to give you courage. † The interview is designed to find out more about you and to see if you are suitable for the job. The interviewer will do this by asking you questions. The way you answer will show what kind of person you are and if your education, skills and experience match what they're looking for.

DO: † Make a real effort to answer every question the interviewer asks. Be clear and concise. Never answer 'Yes' or 'No' or shrug. † Admit it if you do not know something about the more technical aspects of the job. Stress that you are willing to learn. † Show some enthusiasm when the job is explained to you. Concentrate on what the interviewer is saying, and if he or she asks if you have any questions, have at least one ready to show that you're interested and have done your homework. † Sell yourself. This doesn't mean exaggerating (you'll just get caught out) or making your experience or interests seem unimportant (if you sell yourself short no one will employ you). † Ask questions at the close of the interview. For instance, about the pay, hours, holidays, or if there is a training programme.

DON'T: † Forget to shake hands with the interviewer. † Smoke or sit down until you are invited to. † Give the interviewer a hard time by giggling, yawning, rambling on unnecessarily or appearing cocky or argumentative. † Ever stress poor aspects of yourself, like your problem of getting up in the morning. Always show your best side: especially your keenness to work and your sense of responsibility.

After the interview:

Think about how you presented yourself: could you have done better? If so, and you do not get the job, you can be better prepared when you are next called for an interview. Good luck!

READING: According to the text below, are the following statements true or false?

1. Good-looking people are often more successful than others.
2. British Airways does not allow its pilots to work if they are 20 per cent overweight.
3. Attractive women have problems reaching managerial positions.
4. Morphopsychology is sometimes used as the only criterion when selecting candidates.
5. Employers' attitudes to 'unfair' recruitment practices have not changed.

№2

Structure of the Business Letter

We can't imagine business without communication. Business is made through communication. It can be face-to-face conversation organized in the office or at the restaurant or business correspondence. It can be held with the help of regular mail or E-mail.

A business letter is the principal means used by a business firm to keep in touch with its customers. According to the purpose of the letter there may be different kinds, e.g. a letter of request, a memo (memorandum), a letter of advice, an invitation letter, a congratulation letter, a letter of thanks (gratitude), a letter of apology, an enquiry letter, a letter of guarantee, a letter of complaint, a letter of claim, an order letter, etc.

There are special rules to organize a business letter in a right way. The business letter consists of several parts.

First you should write your own name and address (in the right up corner), telephone numbers, and then write down the title, name and address of the recipient. Always type the date, in the logical order of day, month, year (*10th November 20...*).

It is important to use the correct title of the person you are addressing to:

Dr. – means doctor (a person, who has Doctor's degree or PhD);

Professor – if you are addressing the professor;

Mr. / Sir – if you are addressing a male, but is not sure in his title;

Mrs. – if you are addressing a female (married);

Miss – if you are addressing a female (single);

Ms – if you are addressing a female (married or unmarried businesswoman);

Madam – addressing a female if you are not sure in her family status.

The salutation is the greeting with which every letter begins. **Opening salutation** is typed in the left-hand corner. There are several types of opening salutation:

Dear Sirs – to a company;

Dear Sir – to a man if you do not know his name;

Dear Madam – to a woman if you do not know her name;

Dear Sir or Madam – to a person if you know neither the name, nor sex;

Gentlemen – the most common salutation in the United States.

If your correspondent is known to you personally the warmer and more friendly greeting, *Dear Mr ...* is preferred.

The message forms the body of the letter and is the part that really matters.

Some letters are very short and may consist of only one paragraph. Many others have three paragraphs: *Introduction* (why are you writing?), *Details* (facts, information, instructions), *Action* (what action will you take?).

Finishing the letter is a polite way of bringing a letter to a close and you should write one of the following phrases:

Yours sincerely; Truly yours, Yours faithfully sign the letter and put your (title), name and surname.

Business letters have to be written (typed) accurately in plain language.

Post-Reading

1. Explain the following.

- 1) face-to-face conversation
- 2) the principal means
- 3) the salutation
- 4) the message
- 5) plain language

2. Match the following attributes on the left with a suitable noun on the right.

- | | |
|--------------|-------------|
| 1. logical | a. address |
| 2. capital | b. sirs |
| 3. mailing | c. order |
| 4. dear | d. greeting |
| 5. customary | e. letter |

3. Match the English word combinations with the Russian equivalents.

- | | |
|--------------------------|---------------------------------|
| 1. to sign a letter | a. поддерживать контакт |
| 2. to refer to a letter | b. иметь значение для кого-либо |
| 3. to enclose documents | c. подписать письмо |
| 4. to keep in touch with | d. расположить адрес |
| 5. to match a style | e. прилагать документы |
| 6. to matter to somebody | f. соответствовать стилю |
| 7. to set out an address | g. ссылаться на письмо |

4. Complete the sentences with the words: *to mean* (значить; подразумевать); *meaning* (значение; смысл); *means* (средство; способ); *by means of* (посредством)

1. Business letters may be defined as a _____ through which information is communicated in writing in the process of business activities.

2. One word can have several _____ (s).

3. Doing business _____(s) working out agreements with other people.

4. Students are selected for scholarships _____ an open competition.

5. What does business _____?

5. Answer the questions below.

- What is a business letter?
- What types of business letters do you know?
- What parts does a business letter consist of?
- Why is the language style very important for business letter writing?

6. Find in the text the information about the parts of a business letter and describe them:

- a) the date;
- b) the name and address;
- c) the salutation;
- d) the message;
- e) the complimentary closure;
- f) the signature.

№3

An Academic Conference

The best way to exchange ideas, learn new things and expand your network is to become involved in groups relevant to your craft. This can be through user groups for a particular software environment you work with, or professional associations.

There are plenty of websites and forums that enable professionals to engage with one another online, but nothing seals a bond like face-to-face activities.

The ability to communicate your ideas to audiences will raise your profile to new levels.

The Academic Conference presents a challenge to interaction with other scientists. They regularly take part in conferences and discussions around the world.

A researcher receives an email about the opportunity to submit a proposal to be a presenter at the conference.

An academic conference or symposium is a conference for scholars and scientists to present and discuss their work. Together with academic or scientific journals, conferences provide an important channel for exchange of information among researchers.

Conferences are usually composed of various presentations. They tend to be short and concise, with a time span of about 10 to 30 minutes. The work may be bundled in written form as academic papers and published as the conference proceedings. They are published to inform a wider audience of the material presented at the conference.

A conference usually includes a keynote speaker (основной докладчик). The keynote lecture is longer, lasting up to an hour and a half. Conferences also feature panel discussions, round tables on various issues and workshops.

Prospective presenters are usually asked to submit a short abstract of their presentation. Nowadays, presenters usually base their talk around a visual presentation that displays key figures and research results.

At some conferences, social or entertainment activities such as tours and receptions can be part of the programme. Business meetings for learned societies (научное общество) or interest groups can also be part of the conference activities.

Academic publishing houses may set up displays at large conferences. Academic conferences fall into three categories:

- a) the themed conference, a small conference organised around a particular topic;
- b) the general conference, a conference with sessions on a wide variety of topics, often organised by regional, national, or international learned societies, and held annually or on some other regular basis;
- c) the professional conference, large conferences not limited to academics (научные работники) but with academically related issues.

Traditional conferences mean participants have to travel and stay in a particular place. This takes time. And an online conference uses the Internet, and participants can access the conference from anywhere in the world and can do this at any time, using browser software. Participants are given a password to access the conference and seminar groups.

The conference is announced by way of a Call for Abstracts, which lists the topics of the meeting and tells prospective presenters how to submit their abstracts.

Submissions take place online. An abstract is a brief summary of a research article, and is often used to help the reader quickly ascertain the purpose of the paper.

An academic abstract typically outlines four elements of the work:

- a) the research focus (statement of the problem) – an opening sentence placing the work in context, and one or two sentences giving the purpose of the work ;
- b) the research methods used – one or two sentences explaining what was (or will) be done;
- c) the results of the research – one or two sentences indicating the main findings;
- d) the main conclusions – one sentence giving the most important consequence of the work.

The typical abstract length ranges from 100 to 500 words.

Post-Reading

1. Explain the following.

- 1) to submit a proposal
- 2) scholars and scientists
- 3) tend to be short and concise
- 4) a time span
- 5) the conference proceedings

6) submissions

2. Match the pairs of synonyms from A and B and translate them.

A

1. brief
2. scientist
3. paper
4. because of
5. summary
6. have a tendency

B

- a. article
- b. due to
- c. abstract
- d. scholar
- e. tend
- f. concise

3. Match the verb on the left with a suitable item on the right. Use each item once.

1. run
2. participate
3. announce
4. introduce
5. publish
6. come
7. display

- a. to a conclusion
- b. a deadline for papers
- c. a keynote speaker
- d. in a panel discussion
- e. on the screen
- f. conference proceedings
- g. a workshop

4. Translate the words in brackets.

1. Our university hosted an (научная конференция) last week.
2. Write your (аннотация) after the rest of the (статья) is completed.
3. (Статьи) accepted for the conferences were published in the (материалы конференции).
4. This (научное общество) offers its membership to those who have an interest in civil engineering.

5 The conference committee decided to postpone the (крайний срок) for submitting (тезисы) by one week.

5. Answer the questions below.

- What types of academic conferences are there?
- What are presenters usually asked to do?
- What is a call for abstracts?
- What does an academic abstract outline?

6. Find in the text the information about the organisation of academic conference and describe it:

- a) a keynote lecture;
- b) the submission of abstracts;
- c) social and entertainment activities at conferences;
- d) types of academic conferences;
- e) a call for abstracts.

№ 4

INNOVATION

The term innovation derives from the Latin word *innovatus* (to renew or change). Although the term is broadly used, innovation generally refers to the creation of better or more effective products, processes, technologies, or ideas that are accepted by markets, governments, and society. Innovation differs from invention or renovation in that innovation generally signifies a substantial positive change compared to incremental changes.

Inter-Disciplinary Views. Due to its widespread effect, innovation is an important topic in the study of economics, business, entrepreneurship, design, technology, sociology, and engineering. In society, innovation aids in comfort, convenience, and efficiency in everyday life. For instance, the benchmarks in railroad equipment and infrastructure added to greater safety, maintenance, speed, and weight capacity for passenger services. These innovations included changing from wood to steel cars, from iron to steel rails, stove-heated to steam-heated cars, gas lighting to electric lighting, diesel-powered to electric-diesel locomotives. By mid-20th century, trains were making longer, more

comfortable, and faster trips at lower costs for passengers. Other areas that add to everyday quality of life include: the innovations to the light bulb from incandescent to compact fluorescent and LEDs which offer longer-lasting, less energy-intensive, brighter technology; adoption of modems to cellular phones, paving the way to smart phones which meets anyone's internet needs at any time or place; cathode-ray tube to flat-screen LCD televisions and others.

Business and Economics. In business and economics, innovation is the catalyst to growth. With rapid advancements in transportation and communications over the past few decades, the old world concepts of factor endowments and comparative advantage which focused on an area's unique inputs are outmoded for today's global economy. Now, as Harvard economist Michael Porter points out competitive advantage, or the productive use of any inputs, which requires continual innovation, is paramount for any specialized firm to succeed. Economist Joseph Schumpeter, who contributed greatly to the study of innovation, argued that industries must incessantly revolutionize the economic structure from within, that is innovate with better or more effective processes and products, such as the shift from the craft shop to factory. In addition, entrepreneurs continuously look for better ways to satisfy their consumer base with improved quality, durability, service, and price which come to fruition in innovation with advanced technologies and organizational strategies.

One prime example is the explosive boom of Silicon startups out of the Stanford Industrial Park. In 1957, dissatisfied employees of Shockley Semiconductor, the company of Nobel laureate and co-inventor of the transistor William Shockley, left to form an independent firm, Fairchild Semiconductor. After several years, Fairchild developed into a formidable presence in the sector.

Eventually, these founders left to start their own companies based on their own, unique, latest ideas, and then leading employees started their own firms. Over the next 20 years, this snowball process launched the momentous startup company explosion of information technology firms. Essentially, Silicon Valley began as 65 new enterprises born out of Shockley's eight former employees.

Organizations. In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share, and others. All organizations can innovate, including for example hospitals, universities, and local governments. For instance, former Mayor Martin O'Malley pushed the City of Baltimore to use CitiStat, a performance-measurement data and management system that allows city officials to maintain statistics on crime trends to condition of potholes. This system aids in better evaluation of policies and procedures with accountability and efficiency in terms of time and money. In its first year, CitiStat saved the city \$13.2 million. Even mass transit systems have innovated with hybrid bus fleets to real-time tracking at bus stands. In addition, the growing use of mobile data terminals in vehicles that serves as communication hubs between vehicles and control center automatically send data on location, passenger counts, engine performance, mileage and other information. This tool helps to deliver and manage transportation systems.

Sources of Innovation. There are several sources of innovation. General sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc. These also include internet research, developing of people skills, language development, cultural background, Skype, Facebook, etc. In the simplest linear model of innovation the traditionally recognized source is manufacturer innovation. This is where an agent (person or business) innovates in order to sell the innovation. Another source of innovation, only now becoming widely recognized, is end-user innovation. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. End-user innovation is, by far, the most important and critical source of innovation. In addition, the famous robotics engineer Joseph F. Engelberger asserts that innovations require only three things: 1) a recognized need; 2) competent people with relevant technology; and 3) financial support.

Innovation by businesses is achieved in many ways, with much attention now given to formal research and development (R&D) for "breakthrough innovations." R&D help spur on patents and other scientific innovations that leads to productive growth in such areas as industry, medicine, engineering, and government. Yet, innovations can be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes.

The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice – but there are many exceptions to each of these trends.

An important innovation factor includes customers buying products or using services. As a result, firms may incorporate users in focus groups (user centred approach), work closely with so called lead users (lead user approach) or users might adapt their products themselves. Regarding this user innovation, a great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities. In most of the times user innovators have some personal record motivating them. Sometimes user-innovators may become entrepreneurs, selling their product, they may choose to trade their innovation in exchange for other innovations, or they may be adopted by their suppliers.

Nowadays, they may also choose to freely reveal their innovations, using methods like open source. In such networks of innovation the users or communities of users can further develop technologies and reinvent their social meaning.

Notes:

1. Renovation – 1) восстановление, реконструкция; 2) обновление, освежение.
2. Incremental – поэтапный (напр. о внедрении технических средств).
3. Benchmark – эталон, стандарт.
4. LED – (light-emitting diode) светодиод, СИД.
5. Cathode-ray tube – электронно-лучевая трубка, ЭЛТ.
6. Flat-screen LCD television – ЖК-телевидение.
7. Comparative advantage – сравнительное преимущество/отличие.
8. Inputs – вложения, затраты, инвестиции.
9. Start(-)up – "стартап" (недавно созданная фирма, обычно интернеткомпания).
10. Performance-measurement – измерение производительности.
11. Mass transit – общественный транспорт.
12. Data terminal – терминал данных.
13. End-user – конечный пользователь.
14. Research and development (R&D) – научно-исследовательские и опытноконструкторские работы; НИР и ОКР.

№5

АННОТАЦИЯ НАУЧНОЙ СТАТЬИ (Abstract)

Аннотацией называется краткое и вместе с тем исчерпывающее изложение содержания научной статьи, помещаемое непосредственно после заглавия и понятное возможно более широкому кругу читателей. Как правило, аннотация не содержит каких-либо формул или цифровых данных, имеет объем, не превышающий 1200-1600 печатных знаков, и является законченной логической единицей, дающей читателю возможность обоснованно решить, следует ему читать данную научную статью или нет. По сравнению с остальным текстом научной статьи аннотация набирается более мелким жирным шрифтом (bold face, lower case print) и по объему вводимой информации занимает промежуточное положение между заглавием (Title) и введением (Introduction).

В аннотации помещаются сведения об общем направлении, задачах и целях исследования, приводится более конкретное описание тематики работ, выполненных данным автором, поясняется метод исследования, кратко излагаются полученные теоретические и экспериментальные результаты и формулируются общие выводы, которые можно сделать на основании этих результатов. По своему содержанию и методам исследования аннотации научных статей подразделяются на три основных типа:

(а) Аннотации научных статей, излагающих результаты оригинальных теоретических и (или) экспериментальных исследований, выполненных авторами;

(б) Аннотации обобщающих научных статей, посвященных распространению полученных результатов на другие области и занимающих промежуточное положение между оригинальными исследованиями и обзорами литературы;

(в) Аннотации обзорных научных статей.

Примером аннотации научной статьи, в которой излагаются результаты выполненной автором оригинальной исследовательской работы, может являться следующий текст:

ТЕХТ 1

Supersonic Aerodynamic Characteristics of a Tail-Control Cruciform Maneuverable Missile With and Without Wings

The aerodynamic characteristics for a winged and a wingless cruciform missile are examined. The body was an ogive-cylinder with a forebody and had cruciform tails that were trapezoidal in planform. Tests were made both with and without cruciform delta wings for different Mach numbers, roll attitudes, angles of attack, and tail control deflections. The obtained experimental results indicate that the winged missile with its more linear aerodynamic characteristics and higher lift-curve slope, should provide the highest maneuverability over a large operational range. The wingless missile, with a lower lift-curve slope and more nonlinear characteristics but with lower minimum drag, might be more suitable for missions where acceleration time is important and where lift can be generated from high dynamic pressure incurred at low altitudes or at higher Mach numbers.

Примером аннотации обобщающей научной статьи, посвященной распространению уже известных результатов на близкие или соседние области исследований, может служить следующий текст

ТЕХТ 2

Prospects for Advanced Rocket-Powered Launch Vehicles

The potential for advanced rocket-powered launch vehicles to meet the challenging cost operational, and performance demands of space transportation in the early 21st century is examined. Space transportation requirements from recent studies underscoring the need for growth in capacity in support of an increasing diversity of space activities and the need for significant reductions in operational and life-cycle costs are reviewed. Fully reusable rocket powered concepts based on moderate levels of evolutionary advanced technology are described. These vehicles provide a broad range of attractive concept alternatives with the potential to meet demanding operational and cost goals and the flexibility to satisfy a variety of vehicle architecture, mission, vehicle concept, and technology options.

Приводимый ниже текст может служить примером аннотации обзорной научной статьи:

ТЕХТ 3

An Overview of Ejector Theory

A summary/overview of ejector augmentor theory is presented. The results of the study are presented first in a description of the fundamental considerations relevant to ejector augmentor design and performance and second in a discussion of the physical Phenomena associated with the various components comprising an ejector augmentor: primary nozzles, secondary inlet, mixing section and diffuser. In the theoretical discussion a limit value of static augmentation ratio which depends only on the ratio of Primary to secondary stagnation pressure is formulated, and is shown that the best published experimental results approach 90% of that limit value. Conclusions regarding theoretical ejector technology based on this study are made and recommendations for needed theoretical ejector technology research and development programs are presented.

В результате ознакомления с содержанием аннотаций (и, при необходимости, обращения к соответствующей шорной литературе переводчик выясняет, что в первом случае (Текст 1) речь идет об оригинальном исследовании, посвященном определению сверхзвуковых аэрокосмических характеристик для крылатого и бескрылого вариантов высокоманевренной управляемой ракеты нормальной крестообразной схемы с хвостовыми рулями. Во втором случае (Текст 2) исследование носит обобщающий характер и в основном посвящено сопоставительному анализу наиболее перспективных для начала XXI века схем полностью спасаемых ракет-носителей. В третьем случае (Текст 3) исследование носит обзорный характер и посвящено рассмотрению современного состояния теоретических и экспериментальных

исследований в области газовых эжекторов. В результате обращения к соответствующей опорной литературе переводчик может выяснить, то в данном случае речь идет об устройствах увеличения тяги, работающих по принципу струйного насоса, т.е. подсоса внешнего воздуха газовой струей воздушно-реактивного двигателя.

Исходя из приведенных выше примеров, а также из результатов анализа достаточно большого массива аннотаций современных научных статей по аэрокосмической тематике, можно прийти к заключению, что основной лексико-стилистической особенностью аннотации является наличие большого количества так называемых конечных парольных форм типа:

...is/are arrived at, developed, inferred, discussed introduced, formulated, outlined, made, considered summarised и т.д.

Для аннотаций оригинальных научных статей, содержащих результаты научных исследований, выполненных непосредственно автором, характерны следующие типовые структурные формы и обороты:

(1) The results of the theoretical (experimental) study of... are presented / Приводятся результаты теоретического (экспериментального) исследования...

(2) It is shown that .../Показано, что...

(3) A theoretical (experimental) dependence of... vs... is formulated / Формулируется теоретическая (полученная экспериментально) зависимость... от...

(4) Recommendations for ... are presented/Приводятся рекомендации по...

(5) Conclusions regarding ... are made (arrived at/Делаются выводы о том, что...

Аннотации обобщающих научных статей по своим лексико-стилистическим особенностям занимают промежуточное положение между аннотациями оригинальных и обзорных научных статей и, помимо характерных для этих двух категорий типовых структурных форм, могут также содержать специфические для данной категории типовые структурные формы, такие как:

(1) In this general paper the role of... in... is discussed/В данной обобщающей научной статье рассматривается роль... в...

(2) The extension of... and possibility of its practical application to ... are considered / Рассматриваются распространение ... на ... и возможность его практического приложения к...

(3) A generalized version of... for ... is introduced/Вводится обобщенный вариант... для...

(4) Subject matter related to ... as well as to ... is considered/Обсуждаются вопросы, относящиеся как к ..., так и к...

Для аннотаций обзорных научных статей, содержащих обзор (или сопоставительный анализ) результатов, полученных другими исследователями, характерны следующие типовые структурные формы и обороты:

(1) A review of... essential for ... is presented/Приводится обзор..., представляющих интерес для ...

(2) Present status and theoretical (experimental, test) results of ... are summarised/Рассматривается современное состояние и приводятся результаты теоретических исследований (экспериментальной проверки, натурных испытаний)...

(3) The current research programs for... are outlined/Приводится обзор проводимых в настоящее время исследований по...

(4) The factors (parameters) considered include .../Рассмотрено влияние таких факторов (параметров), как...

(5) Special attention is given to ... methods (techniques, solutions) used by... for .../Особое внимание уделяется ...методам (способам решения), применяемым... для...

(6) A bibliography of ... references is included/Библиография включает... наименований

Из рассмотренных примеров следует, что при передаче характерных для аннотаций типовых структурных форм а русский язык сказуемое, как правило, переходит с последнего места на первое. Приведенные 15 типовых структурных форм являются наиболее частотными для рассмотренных трех категорий аннотаций научных статей, публикуемых AIAA, IEEE, ACM и NASA.

При составлении каталогов, библиографий, тематических подборок литературы, выполнении работ по информационному обеспечению научных исследований часто возникает необходимость в определении категории и примерного содержания научной статьи по ее внешним признакам, без вникания в сущность вопросов, излагаемых в и аннотации и других разделах статьи.

Внешними признаками оригинальной научной статьи могут являться: наличие снабженного сквозной нумерацией развитого математического аппарата; большой объем иллюстративно-графических материалов; сравнительно небольшая библиография, в состав которой входят предыдущие публикации автора и объем которой не превышает 8-10 наименований. Авторами оригинальных научных статей обычно оказываются работники низших и средних иерархических уровней (Design Engineer, Research Engineer, Analytical Engineer, Structural Engineer, System Engineer, Member of the Technical Staff).

Внешними признаками обобщающей научной статьи являются: отсутствие сквозной нумерации у имеющегося математического аппарата, который обычно имеет иллюстративный характер; большой объем текстового и сравнительно небольшой объем иллюстративно-графического материала; развитая библиография, включающая до 25-30 наименований, в том числе одну - две работы автора. Авторами обобщающих научных статей обычно являются работники среднего иерархического уровня (Senior Engineer, Lead Engineer, Technical Coordinator, Group Leader, Company Officer, Technical Manager, Research Manager).

Внешними признаками обзорной научной статьи являются: отсутствие раздела принятых обозначений, отсутствие математического аппарата; большой объем текстового и сравнительно небольшой объем иллюстративно-графического материала, очень развитая библиография, включающая до 150-200 наименований. Авторами обзорных научных статей большей частью являются руководители среднего и высшего иерархических уровней (Chief Engineer, Chief Scientist, Project Manager, Program Manager, Technical Director, Research Director, Deputy Director, Associate Director, Director-General).

РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ АННОТАЦИИ К СТАТЬЕ НА АНГЛИЙСКОМ ЯЗЫКЕ

Аннотация — это независимый от статьи источник информации. Ее пишут после завершения работы над основным текстом статьи. Она включает характеристику основной темы, проблемы, объекта, цели работы и ее результаты. В ней указывают, что нового несет в себе данный документ в сравнении с другими, родственными по тематике и целевому назначению. Рекомендуемый объем — 150-200 слов.

Аннотация выполняет следующие функции:

- позволяет определить основное содержание статьи, его релевантность и решить, следует ли обращаться к полному тексту публикации;
- предоставляет информацию о статье и устраняет необходимость чтения ее полного текста в случае, если статья представляет для читателя второстепенный интерес;
- используется в информационных, в том числе автоматизированных, системах для поиска документов и информации.

Аннотации должны быть оформлены по международным стандартам и включать следующие моменты:

- вступительное слово о теме исследования;
- цель научного исследования;
- описание научной и практической значимости работы;
- описание методологии исследования;
- основные результаты, выводы исследовательской работы.
- ценность проведенного исследования (какой вклад данная работа внесла в соответствующую область знаний);
- практическое значение итогов работы.

В аннотации не должен повторяться текст самой статьи (нельзя брать предложения из статьи и переносить их в аннотацию), а также ее название.

В аннотации должны излагаться существенные факты работы, и не должна содержать материал, который отсутствует в самой статье.

В тексте аннотации следует употреблять синтаксические конструкции, свойственные языку научных и технических документов, избегать сложных грамматических конструкций. Он должен быть лаконичен и четок, без лишних вводных слов, общих формулировок.

Чтобы перевести аннотацию, лучше воспользоваться онлайн переводчиком (мы рекомендуем translate.google.ru), после чего исправить полученный текст вручную. Но, ни в коем случае не стоит представлять непроверенный перевод.

Обратите внимание, если полученный в результате автоматического перевода текст очень сложно понять, возможно, это знак того, что аннотация написана очень сложным языком. Избегайте слишком длинных предложений и старайтесь составлять предложения по стилю ближе к нормальной разговорной речи.

Заглавие на английском языке

В переводе заглавия статьи на английский язык не должно быть никаких транслитераций с русского языка, кроме непереводаемых названий собственных имен, приборов и других объектов, имеющих собственные названия; также не используется непереводаемый сленг, известный только русскоговорящим специалистам. Это также касается авторских резюме (аннотаций) и ключевых слов.

Необходимо указать:

- фамилию и инициалы автора;
- ученую степень, звание, должность;
- полное наименование организации которой автора статьи работает или учится;

Фамилия – дается в транслитерации

| Русская буква | Английская(ие) буква(ы) | Русская буква | Английская(ие) буква(ы) |
|---------------|-------------------------|---------------|-------------------------|
| А | A | Р | R |
| Б | B | С | S |
| В | V | Т | T |
| Г | G | У | U |
| Д | D | Ф | F |
| Е | E | Х | KH |
| Ё | E | Ц | TS |
| Ж | ZH | Ч | CH |
| З | Z | Ш | SH |
| И | I | Щ | SCH |
| Й | Y | Ъ | опускается |
| К | K | Ы | Y |
| Л | L | Ь | опускается |
| М | M | Э | E |
| Н | N | Ю | YU |
| О | O | Я | YA |
| П | P | | |

Перевод ученых степеней и званий на английский язык

| <i>Научные отрасли</i> | <i>Branches of science</i> |
|-------------------------------|-----------------------------------|
| кандидат биологических наук | Candidate of biological sciences |
| кандидат исторических наук | Candidate of historical sciences |
| кандидат культурологии | Candidate of culturology |

| | |
|-------------------------------------|--|
| кандидат педагогических наук | Candidate of pedagogic sciences |
| кандидат психологических наук | Candidate of psychological sciences |
| кандидат социологических наук | Candidate of sociological sciences |
| кандидат технических наук | Candidate of technical sciences |
| кандидат физико-математических наук | Candidate of physico-mathematical sciences |
| кандидат филологических наук | Candidate of philological sciences |
| кандидат философских наук | Candidate of philosophical sciences |
| кандидат химических наук | Candidate of chemical sciences |
| кандидат экономических наук | Candidate of economic sciences |
| кандидат юридических наук | Candidate of juridical sciences |
| кандидат политических наук | Candidate of political sciences |
| соискатель | Degree-seeking student |
| аспирант | Post-graduate student |

При переводе степени доктора наук заменяем слово **Candidate** на слово **Doctor**.

| | |
|------------------------------|---|
| академик | Academician |
| профессор | Professor |
| доцент | Assistant Professor |
| старший преподаватель | Senior lecturer |
| ассистент | Lecturer |
| любой научный сотрудник | Researcher |
| председатель | Chair (of...) |
| директор | Director (of...) |
| заместитель директора | Deputy Director |
| член РАН | Member of Russian Academy of Sciences |
| член-корреспондент РАН | Corresponding Member of Russian Academy of Sciences |
| ответственный секретарь | Assistant Editor |
| заведующий лабораторией | Head of (the) laboratory (of...) |
| заведующий отделом, кафедрой | Head of (the) chair (of...) |
| старший научный сотрудник | Senior Researcher |
| ведущий научный сотрудник | Leading Researcher |

Для перевода специализированных материалов и терминов рекомендуем объемный, оснащенный примерами и богатым с точки зрения словарного состава и лексической сочетаемости словарь АБВУ Lingvo <http://www.abbyy.ru/business/lingvo-windows/>

№6

Making a Presentation

A presentation is the practice of showing and explaining the content of a topic to an audience or learner. In the business world, there are sales presentations, informational and motivational presentations, interviews, status reports, image-building, and training sessions.

Students are often asked to make oral presentations. You might have been asked to research a subject and use a presentation as a means of introducing it to other students for discussion.

Before you prepare for a presentation, it is important that you think about your objectives.

There are three basic purposes of giving oral presentations: to inform, to persuade, and to build goodwill.

Decide what you want to achieve:

inform – to provide information for use in decision making;

persuade – to reinforce or change a receiver's belief about a topic;

build relationships – to send some messages which have the simple goal of building good-will between you and the receiver.

Preparation

A successful presentation needs careful background research. Explore as many sources as possible, from press cuttings to the Internet. Once you have completed your research, start writing for speech bearing in mind the difference between spoken and written language. Use simple, direct sentences, active verbs, adjectives and the pronouns “you” and “I”.

Structuring a Presentation

A good presentation starts with a brief **introduction** and ends with a brief conclusion. The introduction is used to welcome your audience, introduce your topic/ subject, outlines the structure of your talk. The introduction may include an icebreaker such as a story, an interesting statement or a fact. Plan an effective opening; use a joke or an anecdote to break the ice. The introduction also needs an objective, that is, the purpose or goal of the presentation. It informs the audience of the purpose of the presentation too.

Next, **the body** of the presentation comes. Do not write it out word for word. All you want is an outline. There are several options for structuring the presentation:

- 1) Timeline: arrangement in a sequential order.
- 2) Climax: the main points are delivered in order of increasing importance.
- 3) Problem/ Solution: a problem is presented, a solution is suggested.
- 4) Classification: the important items are the major points.
- 5) Simple to complex: ideas are listed from the simplest to the most complex; it can also be done in a reverse order.

After the body, comes **the closing**. A strong ending to the presentation is as important as an effective beginning. You should summarise the main points. This is where you ask for questions, provide a wrap-up (summary), and thank the participants for attending.

Each successful presentation has three essential objectives: the three Es – to educate, to entertain, to explain.

The main objective of making a presentation is to relay information to your audience and to capture and hold their attention. Adult audience has a limited attention span of about 45 minutes. In that time, they will absorb about a third of what you said, and a maximum of seven concepts. Limit yourself to three or four main points, and emphasise them at the beginning of your speech, in the middle, and again at the end to reiterate your message. You should know your presentation so well that during the actual presentation you should only have to briefly glance at your notes.

People process information in many ways. Some learn visually, others learn by listening, and the kinesthetic types prefer to learn through movement. It’s best to provide something for everyone. Visual learners learn from pictures, graphs, and images. Auditory learners learn from listening to a speaker. And, kinesthetic learners like to be involved and participate.

Post-Reading

1. Explain the following.

- 1) to build goodwill
- 2) to persuade
- 3) background research
- 4) outlines the structure
- 5) to break the ice
- 6) attention span
- 7) to briefly glance

2. Match the pairs of synonyms from A and B and translate them.

A

1. objective
2. inform
3. point
4. conclusion
5. reiterate

B

- a. item
- b. repeat
- c. purpose; aim; goal
- d. provide information
- e. opening; beginning

6. wrap-up f. closing; ending

7. introduction g. summary

3. Match the noun on the left with a suitable item on the right. Use each item once.

1. The solutions a. was in written form.
2. Goodwill b. often glanced at his notes.
3. The content c. was built with my colleagues.
4. The speaker d. were suggested to do it better.

4. Read the text and find the English for:

пояснить цель выступления

растопить лед; установить доверительные отношения

от простого к сложному

завладеть вниманием аудитории и удерживать его

повторять основную мысль

5. Translate the words in brackets.

- 1) The information in your presentation is (важна) to the audience.
- 2) His (задача) is to get a university education.
- 3) The (содержание) of his speech is new.
- 4) He is trying to (убедить) local business to invest in the project.
- 5) That was a chance to create (доброжелательные отношения) within your company.
- 6) This is the (основное содержание) of your presentation.
- 7) The buying process is a series of (последовательных) steps.

6. Answer the questions below.

- Have you ever made any presentations?
- What is the purpose of giving oral presentations?
- Do you know how to structure a presentation?
- Do you sometimes have to speak in public? On what occasions?
- What ends do presentations usually serve?

1.3 Подготовка к практическим занятиям (запоминание иноязычных лексических единиц и грамматических конструкций)

Грамматические конструкции представлены на стр. 11 – 38.

Запомните слова и выражения, необходимые для освоения тем курса:

Представление и знакомство

1.

| | |
|---|--|
| - Hi, Sarah! What's up? - I just got a new job! - Really? What's the job? - A brand-manager at Global Fashion. - That's great! Good luck with your new job! | / Привет, Сара! Как дела? / Я только что нашла новую работу! / Правда? И что за работа? / Бренд-менеджер в компании «Глобал Фешн». / Здорово! Удачи с твоей новой работой! |
|---|--|

2.

| | |
|---|---|
| - Hi, Nick! What's new? - Oh, I just got a promotion at work! They bumped me up to Sales Director. - Really? That's great news! Congratulations! - Thanks. | / Привет, Ник! Что нового? / Я только что получил повышение по работе. Меня повысили до директора по продажам. / Правда? Это хорошие новости! Поздравляю! / Спасибо. |
|---|---|

3.

| | |
|--|--|
| - Hi, Pam! How're you? - Good, thanks. - I've got news for you! Jack and I are getting married next month! | / Привет, Пэм! Как дела? / Спасибо, хорошо. / У меня для тебя новости! Мы с Джеком собираемся пожениться в следующем месяце! |
|--|--|

| | |
|--|--|
| - Oh, really! That's wonderful news! I'm glad for you! | / Правда? Отличные новости! Я рада за вас. |
|--|--|

4.

| | |
|---|---|
| - Hi! How are you doing? - I'm good! Yourself? - I'm also good, thanks. I hear you got a new job! - That's right! - So, how is it? Do you like it? - It's OK, but it pays less than my last job. | / Привет! Как поживаешь? / Хорошо. Ты как? / Также хорошо, спасибо. Я слышал, ты нашел новую работу! / Это верно. / И как? Тебе нравится? / Нормально, но платят меньше, чем на предыдущей работе. |
|---|---|

5.

| | |
|--|--|
| — Gosh, Kate! Is that you? It's been a long time! How've you been? — I'm fine. Yourself? — Good, thanks. It is so good to see you! You look great! You haven't changed a bit! — Neither have you. So, how's life? What's new? — Sorry, I'm in a bit of a rush right now. Mmm... How about we go out for a drink some night? What do you say? — Sounds good! Do you have my number? — No. — Here it is. 698 765 46 34. — Great! I'll call you tomorrow afternoon to make a time for this weekend. | / Боже! Кейт! Ты ли это? Давно не виделись! Как ты? / Прекрасно! А ты? / Хорошо, спасибо. Отлично выглядишь. Ты совсем не изменилась / Ты тоже не изменилась. Как жизнь? Что нового? / Прости, но я сейчас немного спешу. Ммм... Как насчет того, чтобы сходить куда-нибудь как-нибудь вечером? Что скажешь? / Отличная мысль! У тебя есть мой номер? / Нет. / Записывай. 698 765 4634. / Отлично! Я позвоню тебе завтра днем, и мы договоримся о времени на выходные. |
|--|--|

6.

| | |
|---|---|
| — Hey, Paul! How are you? — I'm good. Yourself? I haven't seen you around lately. Where have you been? — Oh, I was out of town. I spent three weeks in Switzerland. — Was it for business or travel? — I was visiting my friends in Geneva. | / Привет, Пол! Как дела? / Хорошо. А у тебя? Тебя не видно в последнее время. Где ты был? / Меня не было в городе. Я провел три недели в Швейцарии. / Это была деловая поездка или отпуск? / Я навещал друзей в Женеве. |
|---|---|

7.

| | |
|--|--|
| — Jessica! Hello! — Hi! How are you? — Good, thanks. You look great! It's been ages since I last saw you. — Three years exactly. — Right. You haven't changed a bit! So, what's up? What's been happening in your life? — Not much has been going on. Same old. | / Джессика! Привет! / Привет! Как дела? / Спасибо, хорошо. Ты выглядишь прекрасно! Сто лет тебя не видел. / Три года, если точно. / Верно. Ты совсем не изменилась. Ну, как дела? Что происходит? / Ничего особенно и не произошло. Все по-старому. |
|--|--|

8.

| | |
|--|--|
| — Hey, Peter! — Hey! What's up? You are so tan! Where have you been? — I just got back from Australia. | / Привет, Питер! / Привет! Как дела? Ты такой загорелый! (А ты загорел!) Где это ты был? / Я только вернулся из Австралии. / Из Австралии? Круто! Что ты там делал? |
|--|--|

| | |
|--|--|
| — Australia?! Cool! What did you do there? | / Это была еще одна поездка для занятий серфингом. Ты же знаешь, что я большой фанат серфинга. |
| — It was another surf-trip. You know, I'm a huge fan of surfing. | / Ну и как ? |
| — How was it? | / О, это было потрясающе! Знаешь, отдых всегда проходит быстро. |
| — Oh, it was fantastic! You know, it's never long enough. | |

9.

| | |
|---|---|
| - Hi! What's your name? | / Привет! Как вас зовут ? |
| - Carol. What's yours? | / Кэрол. А вас как зовут ? |
| - Peter. Where are you from, Carol? | / Питер. Откуда вы, Кэрол? |
| - I'm from the US. And you? | / Я из США. А вы? |
| - I'm from Russia. Nice to meet you, Carol. | / Я из России. Приятно с вами познакомиться, Кэрол. |
| - Nice to meet you. | / Взаимно. |

10.

| | |
|--|---|
| - Hi! I'm George. And you are...? | / Привет! Меня зовут Джордж. А вы...? |
| - I'm Gina. | / Я Джина. |
| - How are you, Gina? | / Как ваши дела, Джина? |
| - Good, thanks. | / Спасибо, хорошо. |
| - Where are you from? | / Откуда вы? |
| - I'm from Britain. How about you? Where are you from? | / Из Великобритании. А вы? Откуда вы? |
| - And I'm from Israel. Nice to meet you, Gina. | / А я из Израиля. Приятно познакомиться, Джина. |
| - Nice to meet you. | / Взаимно. |
| - Is this your first time here? | / Вы здесь в первый раз? |
| - No, it's my second time. | / Нет, второй. |
| - Where are you staying here? | / Где вы остановились? |
| - I'm staying at a hotel. | / В отеле. |

11.

| | |
|--|---|
| - Hi! What's your name? | / Привет! Как тебя зовут ? |
| - Jess. It's short for Jessica. And you are...? | / Джесс. Это сокращенное от Джессика. А тебя...? |
| - I'm Brant. How are you doing, Jess? | / Брант. Как поживаешь, Джесс? |
| - I'm fine! Yourself? | / Прекрасно! А ты? |
| - Good, thanks. Where are you staying? | / Хорошо, спасибо. Где ты остановилась? |
| - I'm staying at a hotel. It's up there on the hill. Where are you staying? | / Я остановилась в отеле. Он там, на холме. А где ты остановился? |
| - My hotel is right here, across the road. | / Мой отель здесь рядом, через дорогу. |
| - Where are you from? | / Откуда ты? |
| - I'm from Holland. How about you? Where are you from? | / Я из Голландии. А ты откуда? |
| - I'm from Australia. | / Я из Австралии. |
| - Australia?! I thought you were French. I heard you speak French to your friend over there. | / Австралия?! Я подумал, что ты француженка. Я слышал, как ты разговаривала по-французски со своей подружкой вон там. |
| - I am French, but I live in Australia. | / Я и есть француженка, но живу в Австралии. |

12.

| | |
|--|---|
| - Hi! How're you? | / Привет! Как дела? |
| - Good, thanks. What's your name? | / Хорошо, спасибо. Как вас зовут? |
| - Sveta. What's yours? | / Света. А вас как? |
| - I'm Peter. Nice to meet you. | / Меня Питер. Приятно с вами познакомиться. |
| - Nice to meet you. | / Взаимно. |
| - Are you Russian? | / Вы русская? |
| - Yes, I am. | / Да. |
| - Where are you from in Russia? | / Где вы живете в России? |
| - I'm from Nizhniy Novgorod. | / В Нижнем Новгороде. |
| - I have some friends in Nizhniy Novgorod. | / У меня есть друзья в Нижнем Новгороде. |
| - Oh, really? And where are you from? | / Правда? А вы откуда? |
| - I'm from Norway. | / Из Норвегии. |

13.

| | |
|---|---|
| - Hi! How're you? | / Привет! Как дела? |
| - Good, thanks. | / Спасибо, хорошо. |
| - What's your name? | / Как вас зовут? |
| - Kate. | / Кейт. |
| - And I'm Paolo. Where are you from, Kate? | / А меня Паоло. Откуда вы, Кейт? |
| - I'm from Moscow, Russia. | / Из России, из Москвы. |
| - Really? I've been there once. | / Правда? Я был там однажды. |
| - And where are you from? | / А вы откуда? |
| - I'm from Italy. | / Я из Италии. |
| - Oh, I love Italy. I've been there six or seven times. | / О, я обожаю Италию. Я была там 6 или 7 раз. |
| - That's great! | / Это здорово! |
| - Where do you live in Italy? | / Где вы живете в Италии? |
| - I live in Venice. | / Я живу в Венеции. |
| - Well, Venice is a beautiful place. | / Венеция — это красивое место. |

14.

| | |
|---|--|
| - Hi! What's your name? | / Привет! Как вас зовут ? |
| - Nick. What's yours? | / Ник. А вас как? |
| - Sandra. Nice to meet you. | / Сандра. Приятно познакомиться. |
| - Nice to meet you. Where are you from? | / Взаимно. Откуда вы? |
| - I'm from Germany. And you? / | / Из Германии. А вы? |
| - I'm from the US. | / Я из США. |
| - Is this your first time in Moscow? | / Вы в первый раз в Москве? |
| - No, I've been here a couple of times. | / Нет, я был здесь пару раз. |
| - Are you here on business or vacation? | / Вы здесь по делам или на отдыхе ? |
| - I'm here for work. How about you? | / Я здесь по работе. Как насчет вас? (А вы?) |
| - I'm here on vacation. | / Я здесь на отдыхе. |
| - Do you like it here? | / Вам здесь нравится? |
| - Yeah! I like it a lot! | / Очень нравится! |
| - Where are you staying here? | / Где вы остановились? |
| - I'm staying with some friends of mine. How about you? | / Я остановилась у друзей. А вы ? |
| - I'm staying at the Hayatt. It's the new hotel next to Red Square. | / Я остановился в «Хаяте». Это новый отель рядом с Красной площадью. |
| - It must be very expensive. | / Должно быть, он очень дорогой. |
| - It is very expensive. You can't find a cheap hotel in Moscow. | / Он действительно очень дорогой. В Москве нет дешевых отелей. |

15.

| | |
|-------------------------|--------------------------|
| - Hi! What's your name? | / Привет! Как вас зовут? |
|-------------------------|--------------------------|

| | |
|---|--|
| <p>- David. What's yours? - Fred. Nice to meet you. - Nice to meet you. Where are you from? - I'm from Canada. And you? - I'm from Sweden. - Is this your first time in Shanghai? - Yes, this is my first time. - Are you here on business or vacation? - I'm here for a business convention. How about you? Are you here on business or vacation? - Both. We've come here for the film festival. I'm also looking for some property to buy.</p> <p>- Are you here by yourself? - No, I'm here with my wife. She's gone shopping.</p> <p>- Where are you staying? / - We're staying at the Marriott.</p> | <p>/ Дэвид. А вас? / Фред. Приятно познакомиться. / Взаимно. Откуда вы? / Я из Канады. А вы? / Я из Швеции. / Вы первый раз в Шанхае? / Да, первый. / Вы здесь по делам или на отдыхе? / Я приехал на бизнес-конференцию. А вы? Вы здесь по делам или на отдыхе? / И то и другое. Мы приехали на кинофестиваль, и еще я хочу купить недвижимость. / Вы здесь один? / Нет, с женой. Она отправилась по магазинам. / Где вы остановились? / Мы остановились в «Мариотте».</p> |
|---|--|

16.

| | |
|--|---|
| <p>- Hello! I'm Liz. And you are.....? - I'm Henry. How are you doing, Liz? - Good, thanks. - Are you staying in this hotel? - Yes, I am. Are you staying here too? - No. Hotels are expensive here. I'm renting an apartment in the city center. - Oh, OK! Are you here by yourself? - No, I'm here with my family. How about you? - I'm here with a friend. - Is this your first time in Colombo? - Actually, yes. This is my first time. - Do you like it here? - Yeah! It's a nice place. It's too hot though.</p> <p>- How long will you be in Sri Lanka? - Until the end of next week. - Will you stay in Colombo the whole time? - No, we'll stay here two more days and then we'll go to the Hikkaduwa resort. - Oh, it's a long way from here. - Five hours by car. OK, it was nice chatting with you. I've got to get going now. / - OK. Have a good time!</p> | <p>/ Привет! Меня зовут Лиз. А вас? / Я Генри. Как ваши дела, Лиз? / Хорошо, спасибо. / Вы остановились в этом отеле? / Да. Вы тоже здесь остановились? / Нет. Отели здесь дорогие. Я снимаю квартиру в центре города. / Ясно. Вы здесь один? / Нет, я здесь с семьей. А вы? / Я здесь с другом. / В первый раз в Коломбо? / В общем, да. В первый раз. / Вам здесь нравится? / Да! Хорошее место. Только слишком жарко. / Сколько вы пробудете в Шри-Ланке? / До конца следующей недели. / И все это время будете в Коломбо? / Нет, мы пробудем здесь еще два дня, а потом поедem на курорт Хиккадува. / О, это далеко отсюда. / Пять часов на машине. Ладно, приятно было с вами поболтать. Мне пора идти. / Ладно. Хорошо вам провести время!</p> |
|--|---|

17.

| | |
|---|---|
| <p>- Hi! How are you? - Good, thanks. - I think I saw you yesterday at reception.</p> <p>- Yeah, I was trying to book tickets for a water-park. My kids want to go splash around.</p> | <p>/ Здравствуйте! Как ваши дела? / Спасибо, хорошо. / Мне кажется, я видела вас вчера на ресепшине. / Да, я пытался заказать билеты в аквапарк. Мои дети хотят поплескаться в воде.</p> |
|---|---|

| | |
|--|--|
| <p>- Which one do you want to go to? There are three water parks in Dubai.</p> <p>- I hear Wild Wadi is pretty good.</p> <p>- Are you staying in this hotel?</p> <p>- Yes, we are.</p> <p>- In that case you should go to Ice-Land. It's closer, and then it's new. Wild Wadi is rather old.</p> <p>- OK, thank you. We'll go to Ice-Land then. Do we need to book tickets in advance?</p> <p>- No, you usually buy tickets there.</p> <p>- Do you live in Dubai?</p> <p>- No, I actually work here for my husband's company. Your English is very good. Where are you from? Are you Russian?</p> <p>- That's right. I'm from Saint Petersburg.</p> <p>- Really? I've been there once. Ten years ago. It's a beautiful city. You speak very good English for a Russian person. Where did you learn it?</p> <p>- I spent some time in the US. And now I'm working for an American company. OK. Thanks again for your recommendation.</p> <p>- You are welcome. Have a nice day!</p> | <p><i>/ В какой аквапарк вы хотите поехать? В Дубае три аквапарка.</i></p> <p><i>/ Я слышал, что «Вайлд Вади» — неплохой аквапарк.</i></p> <p><i>/ Вы проживаете в этом отеле?</i></p> <p><i>/ Да.</i></p> <p><i>/ В таком случае вам следует поехать в «Ай-сленд». Он ближе, и потом, он более новый. «Вайлд Вади» довольно старый.</i></p> <p><i>/ Хорошо, спасибо. Тогда мы поедem в «Айсленд». Нам надо бронировать билеты заранее?</i></p> <p><i>/ Нет, обычно вы покупаете билеты в аквапарке.</i></p> <p><i>/ Вы живете в Дубае?</i></p> <p><i>/ Нет, я здесь работаю в компании моего мужа. Вы хорошо говорите по-английски. Откуда вы? Вы русский?</i></p> <p><i>/ Верно. Я из Санкт-Петербурга.</i></p> <p><i>/ Правда? Я была там однажды. Десять лет назад. Это красивый город. Вы хорошо говорите по-английски для русского человека. Где вы его учили?</i></p> <p><i>/ Я жил какое-то время в США. А сейчас я работаю в американской компании.</i></p> <p><i>Спасибо еще раз за вашу рекомендацию.</i></p> <p><i>/ Пожалуйста. Хорошего дня.</i></p> |
|--|--|

2. Деловая переписка

1. Обращение

Dear Sirs, Dear Sir or Madam

Dear Mr, Mrs, Miss or Ms

Dear Frank,

2. Вступление, предыдущее общение.

Thank you for your e-mail of (date)...

Further to your last e-mail...

I apologise for not getting in contact with you before now...

Thank you for your letter of the 5th of March.

With reference to your letter of 23rd March

With reference to your advertisement in «The Times»

3. Указание причин написания письма

I am writing to enquire about

I am writing to apologise for

I am writing to confirm

I am writing in connection with

We would like to point out that...

4. Просьба

Could you possibly...

(если вам не известно имя адресата)

(если вам известно имя адресата; в том случае когда вы не знаете семейное положение женщины следует писать Ms, грубой ошибкой является использование фразы “Mrs or Miss”) (В обращении к знакомому человеку)

Спасибо за ваше письмо от (числа)

Отвечая на ваше письмо...

Я прошу прощения, что до сих пор не написал вам...

Спасибо за ваше письмо от 5 Марта

Относительно вашего письма от 23 Марта

Относительно вашей рекламы в Таймс

Я пишу вам, чтобы узнать...

Я пишу вам, чтобы извиниться за...

Я пишу вам, что бы подтвердить...

Я пишу вам в связи с ...

Мы хотели бы обратить ваше внимание на ...

Не могли бы вы...

I would be grateful if you could ...

I would like to receive

Please could you send me...

5. Соглашение с условиями.

I would be delighted to ...

I would be happy to

I would be glad to

6. Сообщение плохих новостей

Unfortunately ...

I am afraid that ...

I am sorry to inform you that

We regret to inform you that...

7. Приложение к письму дополнительных материалов

We are pleased to enclose ...

Attached you will find ...

We enclose ...

Please find attached (for e-mails)

8. Высказывание благодарности за проявленный интерес.

Thank you for your letter of

Thank you for enquiring

We would like to thank you for your letter of ...

9. Переход к другой теме.

We would also like to inform you ...

Regarding your question about ...

In answer to your question (enquiry) about ...

I also wonder if...

10. Дополнительные вопросы.

I am a little unsure about...

I do not fully understand what...

Could you possibly explain...

11. Передача информации

I'm writing to let you know that...

We are able to confirm to you...

I am delighted to tell you that...

We regret to inform you that...

12. Предложение своей помощи

Would you like me to...?

If you wish, I would be happy to...

Let me know whether you would like me to...

13. Напоминание о намеченной встрече или ожидание ответа

I look forward to ...

hearing from you soon

meeting you next Tuesday

seeing you next Thursday

14. Подпись

Kind regards,

Yours faithfully,

Yours sincerely,

Я был бы признателен вам, если бы вы ...

Я бы хотел получить.....

Не могли бы вы выслать мне...

Я был бы рад ...

Я был бы счастлив...

Я был бы рад...

К сожалению...

Боюсь, что...

Мне тяжело сообщать вам, но ...

К сожалению, мы вынуждены сообщить вам о...

Мы с удовольствием вкладываем...

В прикрепленном файле вы найдете...

Мы прилагаем...

Вы найдете прикрепленный файл...

Спасибо за ваше письмо

Спасибо за проявленный интерес...

Мы хотели бы поблагодарить вас за...

Мы так же хотели бы сообщить вам о...

Относительно вашего вопроса о...

В ответ на ваш вопрос о...

Меня также интересует...

Я немного не уверен в ...

Я не до конца понял...

Не могли бы вы объяснить...

Я пишу, чтобы сообщить о ...

Мы можем подтвердить ...

Мы с удовольствием сообщаем о ...

К сожалению, мы вынуждены сообщить вам о...

Могу ли я (сделать)...?

Если хотите, я с радостью...

Сообщите, если вам понадобится моя помощь.

Я с нетерпением жду,

когда смогу снова услышать вас

встречи с вами в следующий Вторник

встречи с вами в Четверг

С уважением...

Искренне Ваш (если имя человека Вам не известно)

(если имя Вам известно)

3. Наука и образование

analysis - анализ, исследование;

critical analysis — критический анализ;

advanced research — перспективные исследования;

basic research — фундаментальные исследования;

to be engaged in research — заниматься научно-исследовательской работой;

This researches cover a wide field — исследования охватывают широкую область;

after the study of the matter — после изучения этого вопроса;

humane studies — гуманитарные науки;

history and allied studies — история и родственные ей предметы;

a new study of Shakespeare — новая работа /книга/ о Шекспире;

pilot study - предварительное, экспериментальное исследование

desk study - чисто теоретическое исследование;

thorough examination — а) всестороннее исследование; б) тщательное изучение (материала);

to carry on an investigation — проводить исследовательскую работу;

the scientific method of inquiry — научный метод исследования;

we must apply ... to find a solution — мы должны применить..., чтобы решить;

comparative [experimental] method of investigation — сравнительный [экспериментальный] метод исследования;

his method is to compare different versions — его метод состоит в сопоставлении разных вариантов;

there are several methods of doing this — существует несколько способов сделать это;

ampliative inference — индуктивный метод;

a method that is attended by some risk — метод, связанный с некоторым риском;

convenient method — подходящий метод;

to approximate to a solution of the problem — подходить к решению задачи;

to use ... approach(to) - подход interdisciplinary approach — подход с точки зрения различных наук;

we began the work by collecting material — Мы начали работу со сбора материала;

we have two problems before us — перед нами две задачи;

data for study — материал исследования;

laboratory data — данные лабораторных исследований;

adequacy of data — достоверность данных;

acceptance of a theory — согласие с какой-л. теорией;

application of a theory in actual practice — применение теории в практической деятельности;

the backbone of a theory — основа теории;

to back up a theory with facts — подкрепить теорию фактами;

to construct a theory — создать теорию;

the results of the experiment contradicted this theory/agreed with the theory — результаты опыта шли вразрез с этой теорией/согласовывались с теорией;

professor – профессор;

lecturer – лектор;

researcher – исследователь;

research – исследование;

graduate - имеющий учёную степень; выпускник;

post-graduate или post-graduate student – аспирант;

masters student – магистрант;

PhD student – докторант;

master's degree - степень магистра;

bachelor's degree - бакалаврская степень;
degree – степень;
thesis - диссертация; исследовательская работа;
dissertation – диссертация;
lecture – лекция;
higher education - высшее образование;
semester – семестр;
student union - студенческий союз;
tuition fees - плата за обучение;
university campus - университетский район; кампус;

4. Чтение и перевод научной литературы по направлению исследования **КОМПЬЮТЕРНОЕ ОБОРУДОВАНИЕ**

laptop - лэптоп; ноутбук; портативный компьютер;
desktop computer (часто используется сокращение desktop) - персональный компьютер;
tablet computer (часто используется сокращение tablet) – планшет;
PC (сокращённо от personal computer) - персональный компьютер;
screen – экран;
keyboard – клавиатура;
mouse – мышка;
monitor – монитор;
printer – принтер;
wireless router - беспроводной роутер; маршрутизатор;
cable – кабель;
hard drive - жёсткий диск;
speakers – громкоговорители;
power cable - кабель питания;

ЭЛЕКТРОННАЯ ПОЧТА

Email - электронная почта;
to email - посылать письма по электронной почте;
to send an email – послать;
email address - адрес электронной почты, email;
username - имя пользователя;
password – пароль;
to reply – ответить;
to forward – переслать;
new message - новое сообщение;
attachment – приложение;

ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРА

to plug in - подключить что-либо к компьютеру;
to unplug - отсоединить; вытащить из розетки;
to switch on или to turn on – включить;
to switch off или to turn off – выключить;
to start up - запустить систему;
to shut down - выключить систему;
to restart – перезагрузить;

ИНТЕРНЕТ

the Internet – интернет;
website – сайт;
ISP (сокращённо от internet service provider) - поставщик услуг интернета;
Firewall - система защиты доступа; средство сетевой защиты;
web hosting - Web-хостинг;

wireless internet или WiFi – беспроводной;
to download – скачивать;
to browse the Internet - плавать в интернете;

file – файл;
folder – папка;
document – документ;
hardware - элементы электронных устройств; жарг. железо;
software - программное обеспечение;
network – сеть;
to scroll up - прокрутить вверх;
to scroll down - прокрутить вниз;
to log on – войти;
to log off – выйти;
space bar - клавиша для пробела;
virus – вирус;
antivirus software - антивирусная программа;
processor speed - скорость процессора;
memory – память;
word processor - текстовый процессор;
database - база данных;
spreadsheet - электронная таблица;
to print – распечатать;
to type – печатать;
lower case letter - нижний регистр (клавиатуры);
upper case letter или capital letter - заглавные буквы;

5. Аннотирование научных статей

Основные штампы (key-patterns) аннотаций на английском и русском языках

1. The article (paper, book, etc.) deals with... - Эта статья (работа, книга и т.д.) касается...
2. As the title implies the article describes.... - Согласно названию, в статье описывается...
3. It is specially noted... - Особенно отмечается...
4. A mention should be made... - Упоминается...
5. It is spoken in detail... - Подробно описывается...
6. ...are noted - Упоминаются...
7. It is reported... - Сообщается...
8. The text gives a valuable information on.... - Текст дает ценную информацию...
9. Much attention is given to... - Большое внимание уделяется...
10. The article is of great help to ... - Эта статья окажет большую помощь...
11. The article is of interest to... - Эта статья представляет интерес для...
12. It (the article) gives a detailed analysis of - 12. Она (статья) дает детальный анализ...
13. It draws our attention to... - Она (статья, работа) привлекает наше внимание к...
14. The difference between the terms...and...should be stressed - Следует подчеркнуть различие между терминами ...и...
15. It should be stressed (emphasized) that... - Следует подчеркнуть, что...
16. ...is proposed - Предлагается...
17. ...are examined - Проверяются (рассматриваются)
18. ...are discussed - Обсуждаются...
19. An option permits... - Выбор позволяет...
20. The method proposed ... etc. - Предлагаемый метод... и т.д.
21. It is described in short ... - Кратко описывается ...
22. It is introduced - Вводится ...

23. It is shown that - Показано, что ...
24. It is given ... - Дается (предлагается) ...
25. It is dealt with - Рассматривается ...
26. It is provided for ... - Обеспечивается ...
27. It is designed for - Предназначен для ...
28. It is examined, investigated ... - Исследуется ...
29. It is analyzed ... - Анализируется ...
30. It is formulated - Формулируется ...
31. The need is stressed to employ... - Подчеркивается необходимость

использования...

32. Attention is drawn to... - Обращается внимание на ...

33. Data are given about... - Приведены данные о ...

34. Attempts are made to analyze, formulate ... - Делаются попытки проанализировать, сформулировать ...

35. Conclusions are drawn.... - Делаются выводы ...

36. Recommendations are given ... - Даны рекомендации ...

Образцы клише для аннотаций на английском языке

- The article deals with ...
- As the title implies the article describes ...
- The paper is concerned with...
- It is known that...
- It should be noted about...
- The fact that ... is stressed.
- A mention should be made about ...
- It is spoken in detail about...
- It is reported that ...
- The text gives valuable information on...
- Much attention is given to...
- It is shown that...
- The following conclusions are drawn...
- The paper looks at recent research dealing with...
- The main idea of the article is...
- It gives a detailed analysis of...
- It draws our attention to...
- It is stressed that...
- The article is of great help to ...
- The article is of interest to ...
- is/are noted, examined, discussed in detail, stressed, reported, considered.

6. Основные правила презентации научно-технической информации

Начало презентации

Good morning / afternoon / evening ladies and gentlemen

Доброе утро / день / вечер дамы и господа

My name is... I am ...

Меня зовут ... Я являюсь ...

Today I would like to talk with you about ...

Сегодня я хотел бы поговорить с вами о...

My aim for today's presentation is to give you information about ...

Цель моей сегодняшней презентации – проинформировать вас о...

I have been asked to comment on what I think of the way ...

Меня попросили сказать / прокомментировать, что я думаю о способе ...

| | |
|---|--|
| Please feel free to interrupt me if there are any questions. | Пожалуйста, не стесняйтесь прерывать меня, если возникнут любые вопросы. |
| If you have any questions, please feel free to ask me at the end of the presentation. | Если у вас есть какие-либо вопросы, пожалуйста, задайте их по окончании презентации. |

Сообщение о плане презентации

| | |
|--|--|
| At the outset ... | Вначале ... |
| First of all, ... / Above all, ... | Прежде всего ... |
| First I would like to talk about ... | Сначала я хотел бы сказать о ... |
| I'd like to start by saying ... | Я бы хотел начать с ... |
| Before discussing ... | Перед тем как обсуждать ... |
| Describing this process, it is necessary to start with ... | Описывая этот процесс, необходимо начать с ... |
| Firstly, we must become accustomed to the terminology, which uses ... | Сначала мы должны ознакомиться с терминологией, которую использует ... |
| I'd like to come to the right point ... | Я бы хотел сразу приступить к делу ... |
| I am going to divide my review / report / article into 3 areas / parts ... | Я собираюсь разделить свой обзор / доклад / статью на 3 части ... |
| I will begin with a definition of ..., then go on to a brief review ... | Я начну с определения ..., затем перейду к краткому обзору ... |
| Let us start by mentioning a few facts ... | Давайте начнем с упоминания некоторых фактов ... |
| Then I would like to take a look at... | Затем я хотел бы взглянуть на ... |
| Following that we should talk about ... | Вслед за этим мы должны поговорить о ... |
| Lastly we are going to discuss ... | В заключение мы обсудим ... |
| I would like to talk to you today about _____ for ___ minutes. | Сегодня я хотел бы поговорить с вами о _____ в течение _____ минут. |
| We should be finished here today by _____ o'clock. | Мы должны закончить сегодня к _____ часам. |

Управление презентацией

| | |
|---|---|
| Now we will look at ... | Сейчас мы посмотрим на ... |
| I'd like now to discuss... | Я бы хотел обсудить сейчас ... |
| Before moving to the next point I need to ... | Прежде чем перейти к следующему вопросу, мне необходимо ... |
| Let's now talk about... | Давайте сейчас поговорим о ... |
| Let's now turn to... | Давайте перейдем сейчас к ... |
| Let's move on to... | Давайте перейдем к ... |
| That will bring us to our next point ... | Это приведет нас к нашему следующему пункту ... |
| Moving on to our next point ... | Переходим к нашему следующему пункту ... |
| Let us now turn to ..., namely to ... | Теперь перейдем к ..., а именно к ... |
| We come now to the description of ... | Теперь мы подошли к описанию ... |
| Let's switch to another topic ... | Перейдем на другую тему ... |
| Let us now proceed to consider how ... | Давайте перейдем к рассмотрению того, как ... |
| Firstly ... | Во-первых ... |
| Secondly ... | Во-вторых ... |
| Thirdly ... | В-третьих ... |
| I'd like to describe in detail ... | Я бы хотел подробно описать ... |
| Let's face the fact ... | Давайте обратимся к факту ... |
| Consider another situation. | Рассмотрим другую ситуацию ... |
| Let's go back a bit to ... | Давайте немного вернемся к ... |

| | |
|--|---|
| It will take up too much time / space ... | Это займет слишком много времени / места ... |
| This point will be discussed later / after ... | Этот вопрос будет обсуждаться позднее / после ... |
| Lastly ... | Наконец / в заключение ... |
| Eventually we must confess ... | В конечном итоге, мы должны признаться ... |
| Now we come to the final phase of ... | Теперь перейдем к заключительному этапу ... |
| One more question remains to discuss ... | Остается еще один вопрос для обсуждения ... |
| And the last point, ... | И последний вопрос / замечание, ... |
| A final remark. | Последнее замечание. |
| Подведение итогов | |
| I would just like to sum up the main points again ... | Я бы еще раз хотел подвести итоги основных пунктов ... |
| If I could just summarize our main points before your questions. So, in conclusion ... | Я хочу только подвести итоги наших главных пунктов перед тем, как вы начнете задавать вопросы. Итак, в заключение ... |
| Finally let me just sum up today's main topics ... | В заключение, позвольте мне подвести итоги сегодняшних основных тем ... |
| Concluding what has been said above, I want to stress that ... | Подводя итог тому, что было сказано выше, я хочу подчеркнуть, что ... |
| I will sum up what has been said ... | Я подытожу все сказанное ... |
| To conclude this work ... | В завершение этой работы ... |
| To summarize, the approach to ... described here is ... | Резюмируем: подход к ..., описанный здесь, состоит в ... |
| We arrived at the conclusion that ... | Мы пришли к заключению, что ... |
| We shouldn't rush to a conclusion ... | Мы не должны делать поспешный вывод ... |
| We find the following points significant ... | Мы находим важными следующие моменты ... |
| We can draw just one conclusion since ... | Мы можем сделать лишь один вывод, поскольку ... |
| As a summary I would like to say that ... | В качестве обобщения, я бы хотел сказать, что ... |
| Finally, the results are given in ... | И, наконец, результаты представлены в ... |
| Уточнения | |
| I'm sorry, could you expand on that a little? | Простите, можно немножко поподробнее? |
| Could you clarify your question for me? | Могли бы вы прояснить этот вопрос для меня? |
| I'm sorry I don't think I've understood your question, could you rephrase it for me? | Извините, по-моему, я не понял вашего вопроса. Могли бы вы изложить его иначе (перефразировать) для меня? |
| I think what you are asking is ... | Я думаю то, о чем вы спрашиваете, это ... |
| If I've understood you correctly you are asking about ... | Если я правильно вас понял, вы спрашиваете о ... |
| So you are asking about ... | Итак, вы спрашиваете о ... |
| Thus ... | Таким образом ... |
| Thus we see ... | Таким образом, мы видим ... |
| In consequence ... | В результате ... |
| In consequence of ... | Вследствие ... |
| Turning now to possible variants ... | Переходя теперь к возможным вариантам ... |
| We can further divide this category into two types ... | В дальнейшем мы можем разделить эту категорию на два типа ... |
| >We can now go one step further ... | Теперь мы можем продвинуться на шаг вперед ... |
| That is why we have repeatedly suggested that ... | Вот почему мы неоднократно предлагали ... |

| | |
|---|--|
| However this conclusion may turn out to be hasty, if ... | Однако этот вывод может оказаться поспешным, если ... |
| Maybe we could get definite results at an earlier date ... | Возможно, мы могли бы получить определенные результаты на более раннюю дату (раньше) ... |
| No definite conclusions have so far been reached in these discussions ... | В ходе этих дискуссий так и не были сделаны какие-либо определенные выводы ... |
| Results are encouraging for ... | Результаты обнадеживающие, поскольку ... |
| Results from such research should provide ... | Результаты такого исследования должны обеспечить ... |
| That yields no results ... | Это не дает никаких результатов ... |
| The logical conclusion is that ... | Логическим заключением является то, что ... |
| The result was astounding ... | Результат был ошеломляющим ... |
| The results are not surprising ... | Результаты неудивительны ... |
| Then eventually I came to the conclusion that ... | Затем, со временем, я пришел к выводу, о том что ... |
| There are two important consequences of ... | Есть два важных следствия ... |
| The first step is to develop ... | Первый шаг состоит в том, чтобы разработать ... |
| The second phase of is that ... | Второй этап ... в том, чтобы ... |
| There are two main stages in the procedure ... | В данной процедуре есть два главных этапа ... |
| Although I think that ... | Хотя я полагаю, что ... |
| I strongly believe that ... | Я решительно полагаю, что ... |
| In order to understand ... | Для того чтобы понять ... |
| It has to be said that ... | Необходимо сказать, что ... |
| Many experts are coming to believe that only ... | Многие эксперты все больше приходят к убеждению, что только ... |
| Some experts, however, think that ... | Некоторые эксперты, однако, думают, что ... |
| Someone may say that ... | Кто-то может сказать, что ... |
| Though we used to think ... | Хотя мы привыкли полагать ... |
| It is generally considered that ... | Обычно полагают, что ... |
| We should realize that ... | Мы должны осознавать, что ... |
| Now we understand why it is so hard to ... | Теперь мы понимаем, почему так трудно ... |
| Consider how it can be done ... | Рассмотрим, как это может быть сделано ... |
| At first glance it would seem that ... | На первый взгляд могло бы показаться, что ... |
| It can be viewed in a different light ... | Можно иначе смотреть на это ... |
| It has been assumed that ... | Предполагалось, что ... |
| Let us assume for a moment that ... | Предположим на минуту, что ... |
| Suppose, for example, that ... | Предположим, например, что ... |
| Though it might seem paradoxical, ... | Хотя это могло бы показаться парадоксальным ... |
| You might know that ... | Вы, возможно, знаете, что ... |
| But it can be claimed that ... | Но можно утверждать, что ... |
| Let us not forget that ... | Давайте не будем забывать, что ... |
| This simplified approach ignores the importance of ... | Этот упрощенный подход игнорирует важность ... |

1.4 Самостоятельное изучение тем курса (для заочной формы обучения)

Самостоятельное изучение тем курса предполагает изучение тем практических занятий, представленных в разделе 1, 2, 3 данных методических указаний студентами заочной формы обучения в межсессионный период.

II. Другие виды самостоятельной работы

2.1 Выполнение самостоятельного письменного домашнего задания

2.1.1 Подготовка к ролевой игре

Студенты получают ролевые карточки. Им необходимо обдумать свою роль, стратегию своей роли, вопросы и ответы.

1. Вы устраиваетесь на работу. Ответить на вопросы интервьюера. You are applying for a job as ... (a manager, a book-keeper, an accountant, a financial analyst assistant, any job you want). Practice the following interview questions.

1. Can you tell me a little about yourself?
2. What kind of training or experience do you have in this field?
3. Do you have a job now?
4. What are your responsibilities?
5. Why do you want to change your job?
6. Why did you leave your last job?
7. What do you think are your strong points (greatest strengths)?
8. What do you consider to be your weak points (greatest weaknesses)?
9. Why are you interested in this job?
10. Do you want to work full-time or part-time?
11. What salary do you want?
12. Do you have any questions?

Образец интервью:

Andrew Brandon has a job interview.

Interviewer: Good morning, Mr. Brandon. My name is Ms. Martin. Please have a seat.

Andrew: Good morning, Ms. Martin. It's pleasure to meet you.

I.: You've applied for the Saturday position, haven't you?

A.: Yes, Ms. Martin.

I.: Can you tell me what made you reply to our advertisement?

A.: Well, I am looking for a part-time job to help me through university. I think that I'd be really good at this kind of work.

I.: Do you know exactly what you would be doing as a shop assistant?

A.: Well, I imagine I would be helping customers, keeping a check on the supplies in the store, and preparing the shop for business.

I.: What sort of student do you regard yourself as? Do you enjoy studying?

A.: I suppose I'm a reasonable student. I passed all my exams and I enjoy my studies a lot.

I.: Have you any previous work experience?

A.: No. I've been too busy with all the subjects to get a good result. But last summer holidays I worked part-time at a take-away food store.

I.: Now, do you have any questions you'd like to ask me about the position?

A.: Yes. Could you tell me what hours I'd have to work?

I.: We open at 9.00, but you would be expected to arrive at 8.30 and we close at 6.00 pm. You would be able to leave then. I think I have asked you everything I wanted to. Thank you for coming to the interview.

A.: Thank you, Ms. Martin. When will I know if I have been successful?

I.: We'll be making our decision next Monday. We'll give you a call.

A.: Thank you. Goodbye.

I.: Goodbye, Mr. Brandon.

2. Беседа – устройство на работу. Ответьте на вопросы интервьюера. Job Interview. Decide the best response to your interviewer's questions.

1. Why should we hire you and not someone with experience?
 - a) I offer energy, intelligence and loyalty.

- b) First come, first served.
 - c) You need to hire me to get the answer.
2. What do you consider loyalty to a firm?
- a) No stealing stationery.
 - b) Confidentiality and dependability.
 - c) Coming to work.
3. What are your weaknesses?
- a) I can't resist chocolate cake.
 - b) Expecting others to be as honest as I am.
 - c) Always arriving late for meetings.
4. Why do you want this job?
- a) It is a job with prospects.
 - b) It pays well.
 - c) My friend works here; he likes the company.
5. Where would you like to be in five years?
- a) I don't know.
 - b) Running the company.
 - c) In a challenging position with responsibility.
6. Why do you want to work for this company?
- a) I've been unemployed for too long.
 - b) Well, I've heard that it's a company that pays its employees well.
 - c) It's a company with future.
7. How did you hear about this vacancy?
- a) I researched your company and rang Human Resources.
 - b) A friend of a friend told me about it.
 - c) My brother works here.
8. Have you looked at our website?
- a) Yes. It is very comprehensive.
 - b) Not yet, but I will after the interview.
 - c) Do you have a website?
9. We need someone now, not in three months. Could you begin earlier if you were offered the job?
- a) My present company will not allow it.
 - b) Well, that is a question I didn't expect.
 - c) If I were offered this job, I would try.
10. Do you like working with your current boss?
- a) No. I think he can't manage people.
 - b) No. He is too aggressive and lazy.
 - c) No. However, I've learnt a lot from him.
11. During the busy summer period we all work every weekend. Would you have a problem with this?
- weekend.
- a) I would hope to arrange a system so that not everyone has to work every weekend.
 - b) I'm a team player and would be prepared to work when necessary.
 - c) I have holidays booked and enjoy my free time too much.
12. Why do you think we should employ you?
- a) Some other company will if you don't.
 - b) I believe you won't find anyone better than me.
 - c) I believe I'm the best person for the job.

2.1.2 Подготовка к практико-ориентированному заданию

1. Составьте деловое письмо, выдержите структуру и стиль: Напишите письмо – поздравление: Вы только что узнали, что Мистер Грин назначен новым управляющим директором компании «Браун и Грин ЛТД». Отправьте свои искренние поздравления по этому поводу. Пожелайте успехов на новом посту. Выразите надежду на плодотворное сотрудничество с этой фирмой в будущем.

Примерный ответ:

Dear Mr N. Green,
 I have just read of your promotion to Production Manager of “Brown and Green LTD”. Let me offer my warmest congratulations.
 I don't have to tell you that all of us here wish you the best of luck in your new position.
 We are sure that we'll establish good trade relations with you and our cooperation will be to the mutual benefit of the companies.

Yours faithfully,
 I. Petrov

2. Составьте деловое письмо, выдержите структуру и стиль: Письмо – сообщение. Сообщите вашему деловому партнеру, что ваш менеджер по продажам придет к ним 4 Мая. Попросите организовать для него посещение вашего предприятия. Сообщите, что он уполномочен заключить контракт на закупку их продукции. Поблагодарите заранее.

Useful Phrases

| | |
|---|--|
| We would be very much obliged ... | Мы были бы весьма признательны ... |
| I shall be grateful to you ... | Мы будем Вам благодарны ... |
| We shall appreciate it if... | Мы будем Вам признательны, если ... |
| We are indebted to the Chamber of Commerce and Industry for your address. | Мы обязаны за Ваш адрес Торгово-промышленной палате. |
| We owe your address to ... a certain company. | Мы обязаны за Ваш адрес ... такой-то фирме. |
| Please let us know... | Просим Вас сообщить нам ... |
| We would ask (request) you to ... | Мы просили бы Вас ... |
| We'd be obliged if... | Мы были бы обязаны, если бы ... |
| We'd be glad to have your latest catalogue. | Мы были бы рады получить Ваш последний каталог. |
| Kindly inform us of the position of the order. | Просим Вас ставить нас в известность о ходе выполнения заказа. |
| We confirm our consent to the alterations. | Подтверждаем свое согласие с данными изменениями. |
| Please acknowledge receipt of our Invoice. | Просим Вас подтвердить получение нашего счета-фактуры. |

3. Составьте деловое письмо, выдержите структуру и стиль: Письмо – приглашение. Напишите приглашение от имени ректора УГГУ на конференцию, на которой будут обсуждаться вопросы об использовании нового компьютерного оборудования на открытых карьерах. Конференция состоится в понедельник 20 мая 2019 с 9.00 до 17.00 в УГГУ. Попросите дать ответ.

Примерный ответ:

Dear Charles Milton,
 I would like to invite you to a seminar that I'm confident will interest you.
 The 3D Technologies Seminar held at the Moscow Crocus Congress Centre on June 13 will feature lectures by several key programmers and designers in the field of 3D modeling, with topics including trilinear filtering, anti-aliasing and mipmapping.
 I am enclosing 3 tickets for you. I hope that you decide to attend and I am looking forward to seeing you there.
 Best regards,

Igor Petrov,
Managing Director Ltd. The company "Center"

4. Составьте деловое письмо, выдержите структуру и стиль: Письмо – заказ. Напишите письмо менеджеру отеля и закажите 1 комнату с ванной для менеджера по сбыту Мистера Мартина, указав, что он прибудет по делам фирмы с 30 октября по 9 ноября. Попросите подтвердить заказ как можно быстрее.

Useful Phrases

I would like to reserve a single room / double room / twin room / suite for 2. Я хотел бы номер на одного / на двоих / номер с двумя кроватями / люкс на 2.

I would like a room with a bath / shower / balcony / sea view. Я хотел бы номер с ванной / душем / балконом / видом на море.

Does the room have internet access / air conditioning / television? В номере есть интернет / кондиционер / телевизор?

Please confirm my booking via fax / e-mail. Прошу подтвердить мою бронь по факсу / электронной почте.

Please send me the price list for the transfer services (airport, etc.). Пожалуйста, пришлите мне цены на трансферы (в / из аэропорта и пр.).

The arrival date is ... – дата прибытия ...

Please include breakfast – Прошу включить завтрак в стоимость.

Does the room have a shared bathroom? - Туалет и ванная в номере общие?

I would like to make a reservation - Я хотел бы забронировать номер.

I have a reservation under ... - У меня забронирован номер на фамилию ...

I need to change my reservation for the following dates: arrival - ..., departure - ... Please confirm my new reservation if the room is (rooms are – если номеров несколько) available for these dates. Мне нужно изменить даты моего бронирования на следующие: дата приезда - ... дата отъезда - ... Пожалуйста, подтвердите бронирование на эти даты, если у вас есть свободные номера.

Please be informed that it will be a late arrival. We plan to arrive at _____ o'clock p.m. Please keep our room till that time. Пожалуйста, имейте ввиду, что мы приедем поздно. Планируемое время прибытия _____ (в 12-часовом формате). Пожалуйста, оставьте за нами забронированный номер.

Please be informed that it will be an early arrival. We would like to check in at _____. Please inform us if it possible. Пожалуйста, обратите внимание, что мы прибываем рано. Мы хотели бы заселиться в _____ (время в 12-часовом формате). Если это возможно, пожалуйста, подтвердите.

What is the price per night? - Какова цена за 1 ночь?

Is breakfast included? - Входит ли в стоимость завтрак?

Can you offer me any discount? - Вы можете сделать скидку?

What time do I need to check out? - Во сколько я должен освободить номер?

Would it be possible to have a late check-out? - Возможно ли освободить номер попозже?

Could you send me some photos of the room? - Не могли бы вы выслать мне несколько фотографий номера?

5. Составьте деловое письмо, выдержите структуру и стиль: Письмо – извинение. Известите вашего делового партнера, что к сожалению вы не можете осуществить поставку, о которой договаривались раньше, в поставленный срок в связи с забастовкой на вашем заводе. Вы сожалеете, что не своевременная поставка заказа причинит им большие неудобства. Вы предлагаете осуществить эту поставку за пол-цены и компенсировать причиненные неудобства. Выразите уверенность, что такая ситуация больше не повториться и сообщите, что точный срок данной поставки сообщите электронной почтой в течение 2 дней.

Примерный ответ:

Dear Bernard Bishop,
This is to acknowledge that we are in receipt of your notice, whereby you informed us that the goods shipped

to you on June 25, 2011 did not conform to our agreement dated 16 May, 2011.
 We regret this unintentional mistake on our part. In this fault our service department.
 While we recognize that the time for performing under this agreement has expired, we are requesting that you
 extend the time to July 20, 2011, in order that we may cure the defect by replacing the shipment with goods that conform to our agreement.
 Please accept our apology for this inconvenience. We will be looking forward to your response.
 Very truly yours,
 Igor Petrov,
 Managing Director

6. Составьте деловое письмо, выдержите структуру и стиль: Письмо – запрос. Вы узнали из газеты «Таймс» от 25 января 2007 о производстве нового магнитофона «Филипс». Попросите выслать дополнительную информацию, в том числе сведения о стоимости, размерах скидки в случаях оптовой закупки, сроках поставки и условиях оплаты. Срочно попросите ответить.

Useful Phrases

| | |
|---|---|
| We are interested in... and would ask you to send us your offer (tender, quotation) for these goods (for this machine, for this equipment). | Мы заинтересованы в ... и просили бы Вас выслать нам Ваше предложение на этот товар (котировку и на эту машину, на это оборудование) ... Нам требуются ... |
| We require ... We are regular buyers of... Please send us samples of your goods stating your lowest prices and best terms of payment. | Мы являемся постоянными покупателями ... Просим Вас выслать нам образцы Вашего товара с указанием Ваших крайних цен и лучших условий платежа. |
| Please let us know if you can send us your quotation for... (if you can offer us...) | Просим Вас сообщить нам, сможете ли Вы сделать нам предложение на ... (сможете ли Вы предложить нам ...) |
| Please inform us by return at what price, on what terms and when you could deliver... | Просим Вас сообщить нам обратной почтой, по какой цене, на каких условиях и в какой срок Вы могли бы поставить ... |
| We are interested in ... advertised by you in... | Мы заинтересованы в ... разрекламированной Вами в ... |
| We have seen your machine, Model 5 at the exhibition and... | Мы видели Вашу машину модели № 5 на выставке и ... |
| We have read your advertisement in... | Мы прочитали Ваше рекламное объявление в ... |
| We have received your address from ... | Мы получили Ваш адрес от ... |
| We learn from ... that you are exporters of... | Мы узнали от .., что Вы являетесь экспортерами ... |

7. Составьте деловое письмо, выдержите структуру и стиль: Письмо – жалоба. С сожалением сообщите, что из полученной партии товара, вы не сможете принять 2 контейнера, т.к. качество товара в них не соответствует стандарту качества. Сообщите, что вынуждены вернуть эту часть товара и хотите получить взамен товар надлежащего качества. Попросите поскорее вам ответить.

Useful phrases and sentences

| | |
|---|--|
| We regret to inform you that you have supplied goods below the standard we expected from the samples. | С сожалением сообщаем Вам, что Вы поставили товар, качество которого ниже стандарта, ожидавшегося нами судя по образцам. |
| The bulk of the goods delivered is not up to sample (is inferior to sample). | Большая часть поставленного Вами товара по качеству ниже образца. |

| | |
|---|---|
| <p>Unfortunately, we find that you have sent us the wrong goods. We have had an analysis made and the report says that the chemical content is ... % less than guaranteed. We cannot accept these containers as they are not the size and shape we ordered.</p> <p>Although the quality of the goods is not up to sample, we are prepared to accept them if you reduce the price by 12 %.</p> <p>We much regret that we have to complain about the insufficient (inadequate) packing (or carelessness in packing, or packing of the wrong type, i.e. unsuitable to local conditions).</p> <p>The packing inside the case was too loose with the result that there was some shifting of the contents and several things have been broken; the attached list will give you all the details.</p> <p>We hope you will pay more attention to packing to avoid any breakage in future.</p> <p>A number of cases arrived in a badly damaged condition, the lids were broken and the contents were crushed. As the period of guarantee has not expired yet, we ask you to replace the machine by another one. We cannot make use of the goods and are very sorry to have to return them to you. We regret that unless we hear from you soon, we shall have to cancel our order.</p> | <p>К сожалению мы обнаружили, что Вы поставили нам не тот товар. Мы произвели анализ, и из акта видно, что ее (напр, руды) химическое содержание на ... % хуже, чем гарантировано. Мы не можем принять эти контейнеры, так как и по размеру и по форме они отличаются от заказанных нами. Хотя качество товара не соответствует образцу, мы готовы принять его, если Вы снизите цену на 12 %.</p> <p>Мы очень сожалеем, что нам приходится заявлять Вам жалобу о недостаточной упаковке (или о небрежности при упаковке, или об упаковке, не соответствующей местным условиям).</p> <p>Упаковка внутри ящика была не совсем жесткой, в результате чего содержимое, ящика перемещалось, и часть его была сломана. Из прилагаемого списка Вы можете узнать все подробности.</p> <p>Мы надеемся, что впредь Вы будете уделять больше внимания упаковке, с тем чтобы избегать каких-либо поломок.</p> <p>Ряд ящиков прибыли в сильно поврежденном состоянии, были сломаны крышки и попорчено (помято) содержимое.</p> <p>Поскольку еще не истек срок гарантии, просим Вас заменить данную машину другой.</p> <p>Мы не можем использовать этот товар и, к сожалению, должны вернуть его Вам.</p> <p>Мы сожалеем, но если в ближайшем будущем мы не получим от Вас известий, нам придется аннулировать наш заказ.</p> |
|---|---|

8. Составьте деловое письмо, выдержите структуру и стиль: Напишите рекомендательное письмо Мистеру Кристину Рейли, которого вы хорошо знаете о том, что ваш хороший друг Мистер Энтони Дуглас примерно в конце сентября приезжает в Лондон и что ему очень хотелось бы познакомиться с Мистером Рейли и осмотреть его завод по производству мебели для офисов. Сообщите, что Мистер Дуглас является управляющим директором компании по производству лаков и красок «Дуглас и сын ЛТД». Они открывают новый отдел фирмы и хотели бы узнать во что обойдется обставить новые офисы. Упомяните, что таким образом Мистер Дуглас может стать новым клиентом Мистера Рейли. Передайте наилучшие пожелания Мистеру Рейли и его жене.

Примерный ответ:

Reference for Mr Alexandr Ivanov

Alexandr Ivanov joined the Ltd. The company "Center" in July 2008. Since then he has proved to be a most reliable and effective member of the sales team.

Alexandr is professional and efficient in his approach to work and very well-liked by his colleagues and executive clients. He is well-presented and able to work both independently and as part of a team.

His contribution to all areas of company activity in which he has been involved have been much appreciated.

I believe that Alexandr will make a valuable addition to any organization that he may join. We deeply regret his decision to move on and I recommend him without hesitation.

I would gladly answer any request for further information.

Sincerely,

Igor Petrov

Managing Director

2.1.3 Подготовка к опросу

Подготовьте высказывания на иностранном языке:

1. Расскажите, что вы знаете о получении степени магистра, истории возникновения присуждения степеней.

Примерный ответ:

Master's Degrees

Students and employers demand for advanced education and certification within professional fields of study has sparked much of the growth in master's degree enrollments.

The master's degree is designed to provide additional education or training in the student's specialised branch of knowledge. Master's degrees are offered in many different fields, and there are two main types of programs: academic and professional.

Academic Master's: The master of arts (M.A.) and the master of science (M.S.) degrees are usually awarded in the traditional arts, sciences, and humanities disciplines. The M.S. is also awarded in technical fields such as engineering and agriculture. Original research, research methodology, and field investigation are emphasised. These programs are usually completed in one or two academic years of full-time study. They may lead directly to the doctoral level.

Professional Master's: These degree programs are designed to lead the student from the first degree to a particular profession. They do not lead to doctoral programs. Such master's degrees are often designated by specific descriptive titles, such as master of business administration (M.B.A.), master of social work (M.S.W.), master of education (M.Ed.), or master of fine arts (M.F.A.). Other subjects of professional master's programs include journalism, international relations, architecture, and urban planning. Professional master's degrees are oriented more toward direct application of knowledge than toward original research.

They often require that every student take a similar or identical program of study that lasts from one to three years, depending on the institution and the field of study.

History of Academic Degree

An academic degree is a college or university diploma, often associated with a title and sometimes associated with an academic position, which is usually awarded.

The most common degrees awarded today are Bachelor's, Master's and Doctoral degrees. Most higher education institutions generally offer certificates and programs of Master of Advanced Studies, which is known as a *Diplôme d'études supérieures spécialisées* under its original French name.

The modern academic system of academic degrees evolved and expanded in the medieval university, spreading everywhere across the globe. No other European institution has spread over the entire world in the way in which the traditional form of the European university has done. The degrees awarded by European universities – the bachelor's degree, the licentiate, the master's degree, and the doctorate – have been adopted in the most diverse societies throughout the world.

The doctorate (Latin: *doceo*, I teach) appeared in medieval Europe as a license to teach at a medieval university. Its roots can be traced to the early church when the term "doctor" referred to the Apostles, church father and other Christian authorities who taught and interpreted the Bible.

Originally the terms "master" and "doctor" were synonymous, but over time the doctorate came to be regarded as a higher qualification than the master degree.

In the medieval European universities, candidates who had completed three or four years of study in the prescribed texts of the trivium (grammar, rhetoric, and logic), and the quadrivium (mathematics, geometry, astronomy and music), together known as the Liberal Arts, and who had successfully passed examinations held by their master, would be admitted to the degree of bachelor of arts.

Further study would earn one the Master of Arts degree. Master of Arts was eligible to enter study under the "higher faculties" of Law, Medicine or Theology, and earn first a bachelor's and then master or doctor's degrees in these subjects. Thus a degree was only a step on the way to becoming a fully qualified master – hence the English word "graduate", which is based on the Latin gradus ("step").

Today the terms "master", "doctor" (from the Latin "teacher") and "professor" signify different levels of academic achievement, but in the Medieval university they were equivalent terms, the use of them in the degree name being a matter of custom at a university. (Most universities conferred the Master of Arts, although the highest degree was often termed Master of Theology or Doctor of Theology depending on the place).

The earliest doctoral degrees (theology - Divinitatis Doctor (D.D.), philosophy - Doctor of philosophy (D.Phil., Ph.D.) and medicine - Medicinæ Doctor (M.D., D.M.) reflected the historical separation of all University study into these three fields. Over time the D.D. has gradually become less common and studies outside theology and medicine have become more common (such studies were then called "philosophy", but are now classified as sciences and humanities - however this usage survives in the degree of Doctor of Philosophy).

2. Прочитайте текст и выделите существенно значимую научную и второстепенную информацию.

Summary Making

Summaries are often found in academic work. A summary is the shortest account of the main content and conclusions of the original text. In fact it is enumeration of the main thematic point of the original paper which is made up of the words and phrases borrowed from the text and your own wording of them into a very small number of sentences.

When writing a summary, you may adhere to the following plan:

- 1) the heading;
- 2) the theme of the paper;
- 3) the key problems (thematic points) discussed;
- 4) the conclusion at which the author arrives.

The manner of presenting the material is very concise and it tends to be critical. The summary writer appreciates the material from his point of view and uses as a rule a wide range of clichés, which can be divided into several groups:

- 1) those introducing the heading and the author:

The article (text) is head-lined ...

The head-line of the article (I have read) is ...

The article is entitled ...

The author of the article (text) is ...

The article is written by ...

- 2) those introducing the leading theme of the original paper:

The text deals with ...

The article is devoted to...

The chapter is about..

The article touches upon...

- 3) those drawing the reader's attention to the major points of the contents:

The author emphasizes the idea of...

The author points out that ...

Attention is drawn to the fact...

In the opinion of the author it is .

- 4) those introducing secondary information:

Further the author reports

The author states...

The article goes on to say...

According to the text ...

5) those forming a conclusion to which the reader's attention is drawn:

The author comes to the conclusion that...

The author concludes by saying ...

The basic approach of the author is that, etc.

Примерный ответ:

Science: The Endless Resource

Our future demands investment in our people, institutions and ideas. Science is an essential part of that investment, an endless and sustainable resource with extraordinary dividends. The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in the youth. These responsibilities are the proper concern of the Government, for they vitally affect health, jobs and national security

The bedrock wisdom of this statement has been demonstrated time and again in the intervening half century. The return from public investments in fundamental science has been enormous, both through the knowledge generated and through the education of an unmatched scientific and technical workforce. Discoveries in mathematics, physics, chemistry, biology and other fundamental sciences have seeded and have been driven by important advances in engineering, technology, and medicine.

The principal sponsors and beneficiaries of scientific enterprise are people.

Their continued support, rooted in the recognition of science as the foundation of a modern knowledge-based technological society, is essential. This investment has yielded a scientific enterprise without peer, whether measured in term of discoveries, citations, awards and prizes, advanced education, or contributions to industrial and informational innovation. Scientific strength is a treasure which we must sustain and build on for the future.

To fulfill our responsibility to future generations by ensuring that our children can compete in the global economy, we must invest in the scientific enterprise at a rate commensurate with its growing importance to society. That means we must provide physical infrastructure that facilitates world class research, including access to cutting-edge scientific instrumentation and to world-class information and communication systems. We must provide the necessary educational opportunities for each of our citizens. Failure to exercise our responsibility will place our children's future at risk.

Science does indeed provide an endless frontier. Advancing that frontier and exploring the cosmos we live in helps to feed our sense of adventure and our passion for discovery. Science is also an endless resource: in advancing the frontier, our knowledge of the physical and living world constantly expands. The unfolding secrets of nature provide new knowledge to address crucial challenges, often in unpredictable ways. These include improving human health, creating breakthrough technologies that lead to new industries and high quality jobs, enhancing productivity with information technologies and improved understanding of human interactions, meeting our national security needs, protecting and restoring the global environment, and feeding and providing energy for a growing population.

The challenges of the twenty-first century will place a high premium on sustained excellence in scientific research and education. We approach the future with a strong foundation, built by the wise and successful stewardship of this enterprise over many decades, and with an investment strategy that was framed as three interconnected strategic goals:

- Long term economic growth that creates jobs and protects the environment;
- A government that is more productive and more responsive to the needs of its citizens;
- World leadership in basic science, mathematics, and engineering.

Our policies in these areas should be working to prepare the future.

Our future demands investment in our people, institutions and ideas.

Science is an essential part of that investment. The Government should accept new responsibilities for promoting the flow of new scientific knowledge. The bedrock wisdom of this statement has been demonstrated time and again in the intervening half century. The principal sponsors and beneficiaries of scientific enterprise are people. Scientific strength is a treasure which we must sustain and build on for the future. To fulfill our responsibility to future generations, we must invest in the scientific enterprise at a rate commensurate with its growing importance to society. Science does

indeed provide an endless frontier. We approach the future with an investment strategy that was framed as interconnected strategic goals: long term economic growth; a more productive government and world leadership in basic science, mathematics, and engineering. The challenges of the twenty-first century will place a high premium on sustained excellence in scientific research and education. Our policies in these areas should be working to prepare the future.

Summary

The text under discussion is entitled *Science: The Endless Resource*. It deals with the role of science in modern life. First, it is stressed the Government should accept new responsibilities for promoting the flow of new scientific knowledge. Attention is drawn to the fact that fundamental science discoveries have seeded important advances in the society, scientific knowledge being an endless resource affecting health, jobs and national security. It is reported that unfolding secrets of nature provides new knowledge to address crucial challenges. The text goes on to say that we must provide physical infrastructure and educational opportunities that facilitate world class research. The author concludes that challenges of the twenty-first century will place a high premium on excellence in scientific research and education. To my mind, the main idea of the text is to show that science is the foundation of a modern knowledge-based technological society.

3. Составьте аннотацию научной статьи.

Примерный ответ:

Laser-based lidar (light detection and ranging) has also proven to be an important tool for oceanographers. While satellite pictures of the ocean surface provide insight into overall ocean health and hyperspectral imaging provides more insight, lidar is able to penetrate beneath the surface and obtain more specific data, even in murky coastal waters. In addition, lidar is not limited to cloudless skies or daylight hours. “One of the difficulties of passive satellite-based systems is that there is watersurface reflectance, water-column influence, water chemistry, and also the influence of the bottom”, said Chuck Bostater, director of the remote sensing lab at Florida Tech University (Melbourne, FL). “In shallow waters we want to know the quality of the water and remotely sense the water column without having the signal contaminated by the water column or the bottom”. A typical lidar system comprises a laser transmitter, receiver telescope, photodetectors, and range-resolving detection electronics. In coastal lidar studies, a 532-nm laser is typically used because it is well absorbed by the constituents in the water and so penetrates deeper in turbid or dirty water (400 to 490 nm penetrates deepest in clear ocean water). The laser transmits a short pulse of light in a specific direction. The light interacts with molecules in the air, and the molecules send a small fraction of the light back to telescope, where it is measured by the photodetectors.

Abstract (Summary). The text focuses on the use of laser-based lidar in oceanography. The ability of lidar to penetrate into the ocean surface to obtain specific data in murky coastal waters is specially mentioned. Particular attention is given to the advantage of laser-based lidars over passive satellite-based systems in obtaining signals not being contaminated by the water column or the bottom. A typical lidar system is described with emphasis on the way it works. This information may be of interest to research teams engaged in studying shallow waters.

2.2 Дополнительное чтение профессионально ориентированных текстов и выполнение заданий на проверку понимания прочитанного

№1

Job Application Forms

When you apply for a job, you will be asked to send your CV (resume), together with a letter or e-mail of application. It is important to know how to write a good resume, or a summary of background

and qualifications, and a letter of application (a cover letter, a letter of interest). All these skills can improve your chances for employment.

If you are applying for a new work place you have to send your CV (curriculum vitae) or Resume, the Application (Cover) Letter, and the Letter of Recommendation that are expected in such cases.

Most applicants for white-collar jobs get in touch with employers by mail (email). A letter to an employer should be type-written. In the application letter, introduce yourself and explain why you are writing. Briefly indicate an experience and skills you have that relate to the kind of job you are seeking.

Include your address and telephone number so that the employer can reach you. If you contact an employer by telephone, try to provide the same information that you would cover in a letter.

A resume or a CV is a summary of your history and professional qualifications. Most employers consider several applicants for each job opening.

Thus, the employer has to consider two sets of qualifications if he wants to choose from among the applicants: professional qualifications and personal characteristics. A candidate's education, experience and skills are included in the professional qualifications. These can be listed in a resume or summary of your background.

Employers often receive a lot of applications for a job, so it is very important to make sure that your CV and job application letter create the right impression and present your personal information in a brief, well-structured, and attractive way. A CV should be clear, with a limited number of main sections, so that an employer can pinpoint the information they are looking for quickly and easily.

You do not need to give a lot of details.

The resume usually consists of the following parts: Personal, Education, Work Experience, Interests and Skills, Hobbies.

Here is how you should organize your resume:

1. Your name, address and phone number go at the top.

2. Under **Personal** you write:

a) when and where you were born;

b) your marital status (married, single or divorced), your children;

c) citizenship.

3. Under **Education** you describe:

a) University (school) you finished and the years of study (for example 2010-2014 The State University of Architecture and Civil Engineering of Voronezh);

b) the diplomas and degrees obtained, also mention the subject (e.g. The State University of Voronezh, Economics);

c) a higher degrees (e.g. Master; Ph.D), and the university which granted it.

4. **Work Experience:**

List the jobs, the years you worked, the position you held. This should be presented in the chronological order starting from the last job.

If you are a research scientist or deal with studies, you should list publications and mention in brackets their total number.

In case you have no work experience in the field, mention your summer jobs, extracurricular activities, awards.

5. **Interests and Skills:**

Include the foreign languages you speak, computer skills, extensive travel, particular interests or professional membership (for example, if you are after a job in computer programming, mention it).

6. The last is **Hobbies:**

It is good to mention here a hobby that can help get the job you are after (e.g. playing chess, reading).

It should be noted that a resume (CV) can be structured differently and may vary in length from one page to three.

Send your Resume, along with an Application (Cover) Letter and a Letter of Recommendation to a specific person. The person should be the top person in the area where you want to work. Refer him (her) to your Resume and ask for an interview.

The samples of a Resume (CV), an Application (Cover) Letter (a Letter of Interest) and a Letter of Recommendation:

Application Letter

8 September, 2014

Dear Mr. Jones,

I am writing to apply for the job (position) of an accountant advertised in yesterday's "Financial Times". I enclose my Resume and a Letter of Recommendation from Mr. J. Smith of Smith and Sponsor Bank, Manchester.

I have recently moved to your town and feel that my qualifications would enable me to be a productive member of your company.

I am available for an interview.

I look forward to hearing from you.

Yours sincerely

Letter of Recommendation

19 November, 2014

Dear Mr. Jones,

Having known Mrs. Biggins for three years as a staff-member of my department, I am pleased to write this Letter of Recommendation for her.

During the years that Mrs. Biggins worked with us she always excelled in whatever activity she undertook.

It is important to mention here that she has good working knowledge of French and German and speaks both languages fluently. I also want to emphasize her computer skills.

Mrs Biggins has my fullest support and I would be pleased to provide further information if necessary.

Yours sincerely,

Post-Reading

1. Explain the following.

- 1) to apply for a job
- 2) a summary of background and qualifications
- 3) a white-collar job
- 4) job opening
- 5) two sets of qualifications
- 6) to pinpoint the information
- 7) extracurricular activities

2. Match the English word combinations with the Russian equivalents.

- | | |
|--------------------------------|--|
| 1. as advertised | a) в вашем распоряжении для интервью |
| 2. broaden my experience | b) ждать ответа |
| 3. my CV is enclosed | c) основываться на объявлении в газете |
| 4. available for the interview | d) расширить свой опыт |
| 5. hearing from you | e) прилагать свое резюме |

3. Fill the gaps with the suitable words: *position, wide, to apply, fluently, ideally, in.*

I wish _____ the position of a salesman as advertised _____ Tuesday's Herald Tribune. This is a _____ for which I believe I am _____ suited. I speak Spanish _____ and have _____ experience of working abroad.

4. Answer the questions below.

- What information does an application letter usually include?
- Why is it important to send both an application letter and a CV to the job a person applies for?
- In what cases do people have to write a resume?
- How is a resume structured?
- Should the resume you write be a detailed personal history or a summary of your personal history and qualifications?

Job interview

Study the most common sample questions at the job interview and the answers to them (pay attention to comments given in brackets).

1. How would you describe yourself? (Also: What are your strengths / positive traits? Why should we hire you?)

- I consider myself hardworking / reliable / dependable / helpful / outgoing / organised / honest/ cooperative.

- I'm a team-player / an experienced team-leader / a seasoned (experienced) professional / a dedicated worker.

- I'm good at dealing with people / handling stress.

- I pay attention to details.

- I understand my customers' needs.

- I learn quickly and take pride in my work.

- I love challenges and getting the job done.

2. What kind of qualifications do you have?

- I graduated in IT from the University of London.

- I hold a master's degree (MA) / a bachelor's degree (BA) in Modern Languages from the University of New York.

- I took a one year accounting training program at Oxford College.

- I haven't done any formal training for this job, but I have worked in similar positions and have ten years of experience in this field.

3. Why did you leave your last job?

- I was laid off / made redundant, because the company relocated / downsized / needed to cut costs.

- I resigned from my previous position, because I didn't have enough room to grow with my employers.

- I wanted to focus on finding a job that is nearer to home / that represents new challenges / where I can grow professionally / that helps me advance my career.

4. What do you do in your current role?

- I'm responsible for the day-to-day running of the business / for recording and conveying messages for the departments.

- I ensure that high standard of customer care is maintained.

- I liaise with the Business Development and Business Services Units.

- I deal with incoming calls and correspond with clients via e-mails.

- I'm in charge of the high-priority accounts.

5. What relevant experience do you have? (It might be a good idea to revise Present Perfect Simple and Continuous to talk about experiences you've had/ actions that you started in the past and are still in progress.)

- I have worked as a Sales Representative for several years.

- I have good organizational skills as I have worked as an Event Organizer / Personal Assistant for the last six years.

- I have great people skills: I've been working in Customer Service and been dealing with complaints for five years.

6. Why would you like to work for us?

- I would like to put into practice what I learned at university.

- I would like to make use of the experience I have gained in the past ten years.

- I believe that your company will allow me to grow both professionally and as a person.

- I've always been interested in E-Commerce / Marketing / Computer Programming and your company excels (is one of the best) in this field.

7. What are your weaknesses / negative traits?

- I'm a perfectionist and I may be too hard on myself or my co-workers sometimes.

- I might need to learn to be more flexible when things are not going according to plan. This is something I'm working on at the moment.

- I occasionally focus on details instead of looking at the bigger picture. I'm learning how to focus on the overall progress as well.

8. When can you commence employment with us? (When can you start work?)

- I will be available for work in January, next year.

- I can start immediately.

- I have to give three weeks' notice to my current employer, so the earliest I can start is the first of February.

9. Do you have any questions?

- What would be the first project I'd be working on if I was offered the job?

- Who would I report to? Who would I be working closely with?

- Are there any benefits your company offers its employees?

- When will I get an answer? How soon can I start?

Additional sample questions

Questions about your Qualifications

>>What can you do for us that someone else can't do?

>>What qualifications do you have that relate to the position?

>>What new skills or capabilities have you developed recently?

>>Give me an example from a previous job where you've shown initiative.

>>What have been your greatest accomplishments recently?

>>What is important to you in a job?

>>What motivates you in your work?

>>What have you been doing since your last job?

>>What qualities do you find important in a coworker?

Questions about your Career Goals

>>What would you like to be doing five years from now?

>>How will you judge yourself successful? How will you achieve success?

>>What type of position are you interested in?

>>How will this job fit in your career plans?

>>What do you expect from this job?

>>Do you have a location preference?

>>Can you travel?

>>What hours can you work?

>>When could you start?

Questions about your Work Experience

>>What have you learned from your past jobs?

>>What were your biggest responsibilities?

>>What specific skills acquired or used in previous jobs relate to this position?

>>How does your previous experience relate to this position?

>>What did you like most/least about your last job?

>>Whom may we contact for references?

Questions about your Education

>>How do you think your education has prepared you for this position?

>>What were your favorite classes/activities at school?

>>Why did you choose your major?

>>Do you plan to continue your education?

E-mail writing has become a large part of modern communication, particularly in business. The world has become much smaller now that we have the ability to send and receive e-mail messages over great distances at an incredible speed. However e-mail was originally used as an informal means of communication. Therefore business e-mail letters are less formal in style than ordinary business letters.

E-mail is short for electronic mail. E-mail correspondence gets from one place to another in a matter of minutes. Connecting to the Internet provides you with e-mail services and an e-mail address which looks like this: *nickname@someplace.com* (@ means *at*, and *com* indicates the domain, in this case, a company). The Internet is a communication network that links computers all around the world via modems. Companies send documents from one place to another in minutes. E-mail is an up-to-date method of transmitting data, text files, and digital photos from one computer to another over the Internet. And now e-mails have become one of the most widely used forms of business and personal communication. E-mails are quick, so they are good for chatting, inviting people out, keeping in touch and doing business.

E-mails do not necessarily contain all the elements important for business letters. So e-mails are usually shorter and it takes less time to compile and send them. The e-mail language is much closer to spoken English than traditional business correspondence style.

Information about the sender and the receiver (addressee) appears at the top in a special frame – so the writer doesn't have to use traditional greetings. *Mr Black*, *Dear Peter*, *Peter* are all acceptable ways of starting an e-mail.

As e-mails are designed for speed, they usually avoid the formal expressions used in letters, and people often do not write in complete sentences using abbreviations. A message should be short to fit on one screen, whenever possible, thus keeping all important information visible at once. Be sure your message is easy to answer.

You can end your e-mail with:

Best wishes

All best wishes

Best regards

Regards

Yours

To people you know well, you can end with:

All the best

Best

People often sign e-mail with their first name.

There are a few important points to remember when composing e-mail, particularly when the e-mail's recipient is someone who does not know you.

- Include a meaningful subject line; this helps clarify what your message is about.
- Open your e-mail with a greeting like *Dear Dr. Jones*, or *Ms. Smith*.
- Use standard spelling and punctuation.
- Don't write unnecessarily long e-mails (4 or 5 paragraphs). Write clear, short paragraphs.
- In business e-mails, try not to use abbreviations such as PLS (please) and BTW (by the way).
- Finish with a closing decision, hope or apology.
- Include a Signature Block in every e-mail – your name, title, business address, telephone number, fax numbers, e-mail address and website address.

Be polite and give as many contact details as possible so that the reader can contact you in different ways.

Even in today's modern age of the Internet, it is still necessary to send and receive faxes. Most companies, large or small, have a fax machine. This allows them to send facsimiles of any document. A fax message is the message that is sent or received over a fax machine (phone lines are used) or online fax service. The word *fax* comes from the word *facsimile* standing for *perfect copy*.

The original document is scanned with a fax machine; the information is then transmitted as electrical signals through the telephone system. A fax message is often sent when particular official

correspondence needs to be sent or received urgently and it is not possible to send the documents via email.

Post-Reading

1. Explain the following.

- 1) an e-mail message
- 2) in a matter of minutes
- 3) a communication network
- 4) an up-to-date method
- 5) personal communication
- 6) a sender and a receiver
- 7) subject line
- 8) a Signature Block

2. Match the pairs of synonyms from A and B and translate them.

| A | B |
|------------|---------------|
| 1. current | a. transmit |
| 2. send | b. reply |
| 3. include | c. contain |
| 4. answer | d. up-to-date |

3. Make the sentences complete by translating the words in brackets.

1. We have come to deliver a (сообщение).
2. They have supplied (современный) equipment.
3. I sent the documents (с помощью) fax.
4. I will be able to (пересылать) that email to you.

4. Complete the sentences choosing the best variant corresponding to the contents of the text.

1. The most widely used form of communication is ...
 - a) a fax message.
 - b) an email.
 - c) a business letter.
2. The symbol @ is followed by ...
 - a) the person's name.
 - b) headers and footers.
 - c) the domain.
3. A fax machine processes a text as a ...
 - a) a graphic image.
 - b) a bit map.
 - c) electrical signals.
4. A fax messages faces a competition from ...
 - a) modern technologies.
 - b) e-mails.
 - c) business letters.

5. Answer the questions below.

What are the advantages and disadvantages of e-mails?

Are e-mail letters as formal in style as ordinary letters?

What are the rules for writing e-mails?

What is the structure of an e-mail?

Do you know what the symbol @ means?

What is the procedure of sending a fax message?

Modern academic education in our country comprises four stages: Bachelor's degree, Specialist's degree, Master's degree, Postgraduate degree. Academic degrees abroad differ in many ways which is the point of our further discussion.

A degree is an academic qualification awarded on completion of a higher education course (a first degree, usually known as Bachelor's degree) or a piece of research (a higher/further degree, doctorate and so on). There exists considerable diversity of degrees in various countries. But in spite of the lack of equivalence of degrees some similarities can be found among certain groups of countries, particularly those of the British Commonwealth, continental Europe, America and the Far East.

One can distinguish the principal types of academic degrees – bachelor, master, and doctor which represent different levels of academic achievements. The naming of degrees eventually became linked with the subject studied, arts is used for the humanities, science – for natural and exact sciences.

The Bachelor's Degree is the oldest and best known academic degree. Some varieties of bachelor's, or baccalaureate, degrees are Bachelor of Arts (BA) degree and Bachelor of Science (BSc). Abbreviations vary between institutions. Other baccalaureate degrees offered by most universities are Bachelor of Education, Bachelor of Music, Bachelor of Business Administration, Bachelor of Divinity, Bachelor of Home Economics.

The Bachelor's degree can be attained by students who pass their university examinations, or in some cases other examinations of equivalent level. This normally involves at least three years of full-time study after passing the advanced level certificate of education at the age of about eighteen, so most people who become BA, BSc, etc. do so at the age of at least twenty-one. First degrees in medicine require six years of study, some others four.

It is now quite usual for students in subject such as engineering to spend periods during their degree courses away from their academic studies, in industrial location so that they may get practical experience. A student of a foreign language normally spends a year in a country where that language is spoken. Bachelors' degrees are usually awarded on the basis of answers to several three-hour examinations together with practical work or long essays or dissertations written in conjunction with class work. Degrees are classified. About a tenth (or less) of candidates win first-class, honours degrees, three quarters - second-class, and the rest - third class, or pass without fail. A person studying for a degree at a British university is called ***an undergraduate***.

About 33 per cent of students continue to study for ***degrees of Master*** (of Arts, Science, Education, Business Administration, Music, Fine Arts, Philosophy, etc.). About 45 varieties of Master of Arts and 40 varieties of Master of Science degrees are reported. The degree of Master in general requires one or two further years of study, with examination papers and substantial dissertation. Bachelors' and Masters' degree can be conferred "with honours" in various classes and divisions, or "with distinction". This is indicated by the abbreviation "(Hons)" and is often a prerequisite for progression to a higher level of study.

A minority (about 15 per cent) goes on further, preparing theses which must make original contributions to knowledge, for the most advanced degree of ***Doctor of Philosophy (Phd) or Doctor of Science (DSc)***. Abbreviations for degrees can place the level either before or after the faculty or discipline depending on the institution. For example, DSc and ScD both stand for the doctorate of science.

Doctor's degrees in many foreign countries are of two distinct types: ***professional or practitioner's degrees, and research degrees***.

The former represent advanced training for the practice of various professions, chiefly in medicine and law. The principal ones are Doctor of Sc. Medicine, Doctor of Dental Science of Dental Surgery, Doctor of Veterinary Medicine, Doctor of Pharmacy, and Doctor of Jurisprudence. These degrees carry on implication of advanced research.

Quite different in character are the research doctorates which represent prolonged periods of advanced study, usually at least three years beyond the baccalaureate, accompanied by a dissertation designed to be a substantial contribution to the advancement of knowledge. The most important of these is the Doctor of Philosophy, which represents advanced research in any major field of knowledge.

Second in importance and much more recent as a research degree is the Doctor of Sc. Education (Ed.D.) It was first awarded by Harvard in 1920, but was preceded by the equivalent Doctor of Pedagogy first conferred by New York University in 1891. The only other earned doctorates of the research type currently conferred by 10 or more institutions are the Doctor of the Science of Law and the Doctor of Business Administration.

Postgraduate Training Programs

All further education which comes after baccalaureate can be regarded as postgraduate education. It presupposes carrying a lot of research work, acquiring knowledge of new methodologies and new trends. It may lead to either a Master's degree (a three-year program of study) or PhD (usually a two-year course of study).

Postgraduate programmes are either research degrees or taught courses. Taught courses last one or more years and are either designed so that you deepen your knowledge gained from your first degree or for you to convert your expertise to another field of study. Examples of these include changing to law to become a solicitor and training to become a teacher.

Degrees by instruction are very similar to undergraduate courses in that most of the time is devoted to attending lectures. This may take up the first eight or nine months of the course and is followed by written examinations. A period of research lasting from two or three months usually follows and the results of it are presented in the form of a thesis. Finally, an oral examination is held, lasting perhaps an hour or two, to test the knowledge accumulated throughout the year. Most programmes, which involve classes and seminars lead up to a dissertation.

Research course is quite a different type of study from a taught course. First of all it lasts longer, for about three years providing Master's or doctorate qualifications. They allow you to conduct investigations into your own topic of choice and are of use in jobs where there are high levels of research and development.

The most well-known research qualification is the Doctor of Philosophy (PhD, a three-year study programme). There is a shorter version called a Master of Philosophy (MPhil) which takes the minimum amount of time of two years. Both of these qualifications require the students to carry out a piece of innovative research in a particular area of study. Also possible is the research based on Master of Science (MSc.) and Master of Arts (MA) degrees. A recent development is the Master of Research (MRes), which provides a blend of research and taught courses in research methods and may be taken as a precursor to a PhD.

It is a common practice for students to be registered initially for the MPhil and to be considered for transfer to the PhD after the first year of study, subject to satisfactory progress and to a review of the proposed research. All research degree programmes involve an element of research training designed to ensure that students are equipped with the necessary skills and methodological knowledge to undertake original research in their chosen field of study. The training programme includes the development of generic skills relevant to the degree programme and a future career. Although the training element is not a formal part of the assessment for the degree, it constitutes an important basis for research and may take up a significant part of the first year.

The start of a research degree involves a very extensive survey of all previous works undertaken in that area. At the same time, if a student is planning to carry out any practical experimentations, the necessary equipment must be obtained.

This preliminary part of the study can take up to six months, but it is important to note that the process of keeping up to date with other work going on in the subject must continue throughout the entire period of the research.

The next stage of a research course usually involves collecting information in some way. This might be through experimentation, in the case of arts, social sciences or humanities degree. The important thing is that something new must be found.

This second part of the procedure takes about two years in the case of a PhD. The research is written up in the form of a thesis during the final six months of the three-year period. Typically, this will

contain an introduction, methodology, results and discussion. As in the case with taught degrees, the research must then be examined orally. Occasionally, if the examiners are not completely happy with the work they may ask the candidate to rewrite parts of the thesis. Hopefully, a good supervisor will make sure this does not happen!

№4

Find a synonym in the box for the words or phrases in green in the sentences below.

establish reform naturalist headquarters

prestigious supervise expedition atlas

1. The researchers need to **start** a new laboratory.
2. A scientist's job is often considered **to have respect and give you influence**.
3. There is a need for **improvements** in our society.
4. The **journey to explore and do scientific research** was made in 1872.
5. Look up this city in the **book of maps**.
6. Could you **manage** the people on this project?
7. He's a **person who studies animals and plants**.
8. The **central office** can be found in Moscow.

The Russian Academy of Sciences (RAS)

In 1724, Peter the Great established the Academy of Sciences as part of his push for reform to strengthen Russia. He wished to make the country as economically and politically independent as possible and he was aware of how important scientific thought, along with education and culture, was to this. However, unlike other foreign organisations at that time, the Academy was a state institution, which Peter intended should offer scientists from any country the opportunity to do their research in complete freedom, as well as providing the opportunity for students to study under these famous people. The Academy officially opened in 1725.

Over the next three decades, work was done in many fields, among them, work on electricity and magnetism theory. Research enabled the development of mining, metallurgy, and other branches of Russian industry. Work was done in geodesy and cartography and 1745 saw the first atlas of Russia created.

From its earliest days, the Academy carried out mathematical research, which added greatly to the development of calculus, hydrodynamics, mechanics, optics, astronomy, and made discoveries in various fields, such as chemistry, physics and geology. In addition, expeditions in 1733-1742 and 1760-1770 helped contribute to the discovery of Russia's natural resources.

The 19th century was a time of many more contributions from the Academy. The Academy's naturalists were involved in voyages of discovery, including that of F.F. Bellingshausen and M.P. Lazarev in 1820, when Antarctica was discovered. In the fields of mathematics and physics, progress was furthered by N.I. Lobachevsky and his theory of non-Euclidean geometry as well as by P.L. Chebyshev who made progress in the field of probability, statistics and Number Theory. Other notable achievements were the invention of the radio, the creation of the periodic table of the chemical elements, the discovery of viruses and the cell mechanisms of immunity. In the 1890s and early 1900s, LP. Pavlov carried out experiments which resulted in the discovery of classical conditioning or conditioned reflexes. Clearly, throughout the 18th and 19th centuries and into the 20th century, the Russian Academy led the way in Russian science.

In 1925, the name of the Academy changed to the Academy of Sciences of the USSR. One of the achievements of the Academy was to help set up scientific research centres in all Soviet republics. The Academy also gave scientists the opportunity to work and study in different parts of the USSR and abroad. In 1934, its headquarters were moved to Moscow. At that time, it had 25 member institutions. The Academy continued to grow, reaching a high point of 260 member institutions. In 1991, after the breakup of the USSR, the Academy's name was changed to the Russian Academy of Sciences (RAS).

Today, the RAS supervises the research of a large group of institutions within Russia which focus on different research areas, including philosophy, botany, anthropology, palaeontology and archaeology

as well as nuclear physics, astrophysics, mathematics, computer engineering and many others. A special Internet system, called the Russian Space Science Internet (RSSI), which links over 3000 members, has also been set up.

Becoming a member of the RAS is not easy. Only scientific researchers who have done outstanding work or who have great potential are chosen to become members.

Last but not least, the RAS gives awards to members who have made significant discoveries. Its highest award is the Lomonosov Medal, named after the outstanding Russian scientist, writer and polymath of the 18th century. Many RAS award winners have later gone on to be awarded prestigious Nobel Prizes.

Read the text and decide if the following statements are true or false.

1. Peter the Great set up educational and cultural centres.
2. The Academy was unusual in not being a private interest.
3. The 19th century was a time of numerous expeditions to find Antarctica.
5. In the 20th century, the Academy changed name several times and moved its central office.
5. Nowadays, members are obliged to communicate via the Internet.

The Russian Academy of Sciences (RAS)

1. Основанная в 1724 году Петром Великим, Академия была открыта в 1725 году его вдовой Екатериной I и называлась Петербургской академией наук.

2. Академия предоставляла учёным из разных стран абсолютную свободу в проведении научных исследований.

3. С первых дней в Академии проводились исследования в области математики, которые внесли большой вклад в развитие математического анализа, гидродинамики, механики, оптики, астрономии, и привели к открытиям в таких областях, как химия, физика и геология.

4. Век девятнадцатый был веком многочисленных и важных открытий и члены Академии наук играли ведущую роль в развитии российской науки.

5. Среди выдающихся научных достижений числятся такие, как изобретение радио, создание Периодической системы элементов, открытие вирусов и клеточного механизма иммунитета.

6. Сегодня Российская академия наук координирует работу большой группы научно-исследовательских институтов по всей России, где ведутся научные исследования во многих областях.

7. Институт космических исследований Российской академии наук осуществил проект по созданию компьютерной сети, называемой Российской космической научной сетью Интернет, объединяющей более 3000 членов.

Russian Nobel Prize winners in Physics and Chemistry

Match these words with their definitions.

1. superfluidity
 2. laser
 3. violence
 4. exception
 5. semiconductor
 6. heterostructure
 7. optoelectronics
 8. superconductor
- a. being able to transmit electrical current without resistance at very low or high temperatures
 - b. something which does not follow the normal pattern
 - c. material that can transmit electricity but not as well as metal
 - d. branch of electronics involving devices dealing with electromagnetic radiation
 - e. characteristic of matter which can flow endlessly without resistance
 - f. when there is just one boundary between material that can transmit electricity

- g. angry physical force
- h. device that produces intense, concentrated beam of light

Russian Nobel Prize winners in Physics and Chemistry

Because of its long history of supporting scientific research and education, Russia has produced a number of internationally recognised leaders in physics and chemistry.

The Russian Academy of Sciences (or the USSR Academy of Sciences, as it was called before 1991), played a major part in all their careers. With one exception, all were members of the Academy, carrying out their research and publishing their findings with the Academy's support.

1956 In 1956, Nikolay N. Semyonov was the first Russian to receive a Nobel Prize for Chemistry for his research into the mechanism of chemical reactions. He was trained as a physicist and chemist. During his career, working alone or with other distinguished scientists like Pyotr L. Kapitsa, he made many important discoveries and contributions to chemistry and physics. In 1931, Semyonov became the first director of the Institute of Chemical Physics of the Academy and was also one of the founders of the Moscow Institute of Physics and Technology (MIPT).

1958 The collaboration of Pavel A. Cherenkov, Igor Y. Tamm and Ilya M. Frank resulted in the discovery and description of the Cherenkov-Vavilov effect, a phenomenon which is very important in nuclear physics. For their work they received the Nobel Prize in 1958. All three of the scientists were professors at universities and the Academy's institutes and greatly influenced future generations of scientists.

1962 After receiving his doctoral degree from Leningrad University at the exceptionally young age of 19, Lev D. Landau went on to study abroad. When he returned to Russia, he became head of two of the Academy's institutes. Like Semyonov, he was also involved in founding the MIPT. He received the Nobel Prize for Physics in 1962, for his phenomenological theory of superfluidity in helium.

1964 Nikolay G. Basov and Aleksandr M. Prokhorov worked together on a project which led to the development of the laser and their receiving the 1964 Nobel Prize. Both worked at the Lebedev Institute of Physics (Basov was the Director from 1973-1988) and also taught at universities. Even though Prokhorov never became a member of the Academy, the Academy's General Physics Institute was renamed the A.M. Prokhorov General Physics Institute in his honour.

1978 Pyotr L. Kapitsa went to England after he had completed his studies at Petrograd Polytechnic Institute. He studied at Cambridge and also worked on various projects there. He returned to Russia in 1934 and continued his career there. He was also one of the founders of the MIPT. In addition, Kapitsa was a member of the Soviet National Committee of the Pugwash movement, a group of international scientists who wanted to use science for the good of humankind and not for violence and war. Kapitsa won the Nobel Prize for Physics in 1978, for his work on low-temperature physics.

2000 Zhores I. Alferov has been active in physics since graduating from the Electrotechnical Institute in Leningrad. He received the Nobel Prize for Physics in 2000, for the development of the semiconductor heterostructures used in high-speed electronics and optoelectronics.

2003 More recently, Russian Nobel Prize winners in 2003 were Vitaly L. Ginsburg and Alexei A. Abrikosov. Ginsburg, who holds a doctoral degree from Moscow State University, became the director of the Academy's Physics Institute after Igor Tamm. Ginsburg was influenced by Landau, with whom he had worked, and by Tamm, who had been his teacher. Alexei Abrikosov was educated at Moscow State University. He worked at the Landau Institute for Theoretical Physics for over 20 years (1965-1988) and also taught at Moscow State University during that time. They received the Nobel Prize for Physics for pioneering contributions to the theory of superconductors and superfluids.

Read the text and answer the questions in your own words.

1. How many Nobel Prize winners were members of the Academy?
2. Which scientists were among those who founded the Moscow Institute of Physics and Technology?
3. Which scientists, apart from Lev Landau, had things or places named after them?
4. Which scientists left the country to further their studies?
5. Who was the director of the Academy's Physics Institute before Vitaly Ginsburg?

Russian Nobel Prize winners in Physics and Chemistry

1. Николай Семёнов был первым русским учёным, получившим в 1956 году Нобелевскую премию по химии за разработку теории химических цепных реакций.

2. В 1958 году Павел Черенков, Игорь Тамм и Илья Франк получили Нобелевскую премию по физике за открытие и описание феномена, названного эффектом Вавилова-Черепкова, и имеющего большое значение для ядерной физики.

3. Лев Ландау был награжден Нобелевской премией в области физики в 1962 году за разработку теории сверхтекучести гелия II.

4. Николай Прохоров и Александр Басов в 1964 году получили Нобелевскую премию в области физики за новаторские исследования в области квантовой электроники, которые привели к созданию лазера.

5. За фундаментальные изобретения и открытия в области физики низких температур Пётр Капица был награждён в 1978 году Нобелевской премией.

6. Жорес Алфёров в 2000 году получил Нобелевскую премию по физике за разработку полупроводниковых гетероструктур, используемых в высокочастотной оптоэлектронике.

7. Виталий Гинзбург и Алексей Абрикосов разделили Нобелевскую премию по физике, полученную в 2003 году за создание теории сверхпроводимости и сверхтекучести.

№5

Complete the sentences below with words and phrases from the box.

accumulation of quantities integral calculus vital latter
chord distinction methodology infinitesimal differential calculus
vast tangent coordinate sake

1. A line segment joining two points on a curve is a
2. A ... is a line or surface that touches another.
3. The area of maths used to determine areas, volumes and lengths is called
4. The area of maths relating to changes in variable is called ...
5. If something is close to zero it is ...
6. You need to eat well for the ... of your health.
7. There is a ... amount of knowledge to learn in sciences.
8. There are two theories - one from ancient times and a modern one. The ... the modern one, is widely accepted now.
9. She claimed the ... of having solved the equation.
10. A ... is a number that identifies a position relative to a straight line.
11. ... is the system of methods followed in an area of study.
12. ... measures areas under a curve, distance travelled, or volume displaced.
13. If something is ..., it is of the utmost importance.

Gottfried Leibniz

Gottfried Leibniz was born and lived most of his life in Germany, he made visits to both Paris and London, for the sake of learning and study, but spent the vast majority of his working life as an employee of German royalty, as a philosopher, engineer and mathematician. It is for the latter that he is best remembered. His greatest achievement was as an inventor of calculus, the system of notation which is still in use today. Leibniz is remembered as an inventor, not the inventor of calculus. In England, Isaac Newton claimed the distinction, and was later to accuse Leibniz of plagiarism, that is, stealing somebody else's ideas but stating that they are original. Modern-day historians however, regard Leibniz as having arrived at his conclusions independently of Newton. They point out that there are important differences in the writings of both men. Newton, it must be said, was very protective of his achievements and jealous of others' success. It is important to mention that Leibniz published his writings on calculus three years before Newton published his most important work.

Leibniz was the first to use function to represent geometric concepts. Among other terms. Leibniz used what is now everyday language in mathematics to describe these concepts. Words such as tangent and chord, were first used by Leibniz. He also saw that linear equations in algebra could be arranged

into matrices. It was in this significant piece of work on calculus that he introduced mathematics and the world to the word coordinate. He also made important advances in algebra and logic in ways that still today, three hundred years later, have an impact on mathematics.

Leibniz importance for modern mathematics can be understood through his work, he was especially interested in infinitesimal calculus. This is an area of calculus developed from geometry and algebra. It is divided into two parts. There is differential calculus, which is concerned with measuring rates of change of quantities. And there is integral calculus, which studies the accumulation of quantities. That is, Leibniz was looking at ways of measuring the speed and the distance travelled, for example. Today, calculations of this type are used not only in mathematics but in every branch of science and in many fields which apply a scientific methodology, such as economics and statistics.

Despite the disagreements between Leibniz and Newton, modern mathematicians recognise each of them as being vital to the development of modern mathematics. Newton was certainly the first to apply calculus to the problems of physics. In mathematics itself, it is to Leibniz that we look for our system of writing equations and for the *lansjuajje* we use to refer to the concepts. While both reached their understanding without the benefit of reading each other's work, it remains a fact that Leibniz was first to publish.

Read the text and answer the questions in your own words.

1. For what contribution to mathematics is Leibniz best remembered?
2. Who was Leibniz' main rival? About what did they disagree?
3. Which important geometrical terms did Leibniz invent?
4. What other areas of work also use Leibniz' calculus?
5. Who is considered more important for the development of modern mathematics?

Gottfried Leibniz

1. Считается, что Лейбниц является создателем математического анализа.
2. Он опубликовал свои работы по математическому анализу па три года ранее Ньютона.
3. Следует отметить, что Лейбниц был первым, кто использовал слова тангенс и хорда.
4. Лейбниц первым ввёл систему записи уравнений и современный математический язык.
5. Работы Лейбница в области анализа бесконечно малых представляют первостепенную важность.
6. Дифференциальное исчисление занимается измерением скорости изменения величин, тогда как интегральное исчисление изучает накопление величин.
7. Именно Готфрид Лейбниц внёс наибольший вклад в математический анализ и установил, что линейные уравнения могут быть преобразованы в матрицы.

Norbert Wiener

Complete the definitions below with words from the box.

cybernetics collaborative insight tend draw on elect via established imitate aspect

1. A feature or a side of something is a(n)
2. To ... means to copy.
3. The field of ... studies people and machines' practices and procedures to understand where they differ.
4. If work is ..., it is done by cooperating.
5. ... means by the use of.
6. If you have ... into something, you have special understanding.
7. To ... means to choose, perhaps for a position of responsibility.
8. If you ... something, you make use of a resource.
9. When you ... to do something, it is a habit you have.
10. If something is ..., it is made certain.

Norbert Wiener

Norbert Wiener, the famous applied mathematician, was born in 1894 in the USA and died in Stockholm, Sweden, in 1964. His father was a professor of Slavonic languages at Harvard. Norbert was a very intelligent child and his father was determined to make him a famous scholar. This is indeed what

he became, being awarded a PhD by Harvard at the age of 18. He also studied Philosophy, Logic and Mathematics at Cambridge and Gottingen.

His first important position was that of Instructor of Mathematics at MIT (Massachusetts Institute of Technology) in 1919, followed by that of Assistant Professor in 1929 and of Professor in 1931. Two years later, in 1933, he was elected to the National Academy of Sciences (USA), from which he resigned in 1941. In 1940 he started to work on a research project at MIT on anti-aircraft devices, a project which played an important part in his development of the science of cybernetics.

The idea of cybernetics came to Wiener when he began to consider the ways in which machines and human minds work. This led to the development of the idea of cybernetics, which is the study of the ways humans and machines process information, in order to understand their differences. It often refers to machines that imitate human behaviour. The term was coined from the Greek kubernetike which means the art of the steersman (the skill of a captain when controlling the ship). This idea made it possible to turn early computers into machines that imitate human ways of thinking, particularly in terms of control (via negative feedback) and communication (via the transmission of information).

Norbert Wiener was also deeply attracted to mathematical physics. This interest originated in the collaborative work that he did with Max Born in 1926 on quantum mechanics. But Wiener's interests were not limited to logic, mathematics, cybernetics or mathematical physics alone, as he was also familiar with every aspect of philosophy. In fact, he was awarded his doctorate for a study on mathematical logic that was based on his studies in philosophy. In addition to that, in a very different field, he wrote two short stories and a novel. Wiener also published an autobiography in two parts: *Ex-Prodigy: My Childhood and Youth* and *I Am a Mathematician*.

Norbert Wiener was an amazing mathematician, who was gifted with philosophical insight. In an age when scientists tended, and still tend, to specialise in their own very specific fields, this man was interested and involved in many different disciplines. Due to this, he was able to draw on many resources in his varied research, thus making him an incredibly successful applied scientist. Wiener was one of the most original and significant contemporary scientists and his reputation was securely established in the new sciences such as cybernetics, theory of information and biophysics.

Read the text and choose the correct answer.

1. Norbert Wiener's father
 - a. was awarded a PhD.
 - b. taught intelligent children.
 - c. was a language instructor.
2. Norbert Wiener began to think seriously about cybernetics
 - a. when he was at MIT.
 - b. when he was a science instructor.
 - c. after he resigned.
3. An example of cybernetics in action would be
 - a. a television
 - b. a computer
 - c. a ship
4. Wiener wrote a book about
 - a. himself
 - b. childhood
 - c. philosophy
5. According to the text, most scientists
 - a. know a lot about many different subjects,
 - b. are familiar with applied science,
 - c. deal with certain fields only.

Norbert Wiener

1. Норберт Винер был очень одарённым учеником и в 18 лет получил учёную степень доктора наук за диссертацию по проблемам математической логики.

2. В 1940-х годах Винер работал над устройствами противовоздушной обороны в Массачусетском технологическом институте (США), проектом, который сыграл важную роль в развитии Винером кибернетики.

3. Кибернетика, как идея, появилась в момент размышлений Винера о том, как работают машины и мозг человека.

4. Кибернетика занимается изучением процессов передачи информации живыми организмами и машинами.

5. Норберт Винер работал главным образом в областях логики, математики, кибернетики, математической физики и философии.

6. Благодаря тому, что Винер был специалистом во многих дисциплинах, он мог использоваться, в своих разнообразных научных исследованиях множество средств, что делало его поразительно успешным прикладным учёным.

7. Замечательным достижением XX столетия явилось создание машины, которая имитирует способ мышления человека.

№6

REPORTS AND PRESENTATIONS

Scientific report writing requires the use of certain techniques and conventions that are detailed, strict and not always easy to master. The main purpose of a scientific report is to communicate. A typical structure and style have evolved to convey essential information and ideas as concisely and effectively as possible. The main aim of the report is to state your opinion on the issue or to provide precise information about a practical investigation.

Audience. Assume that your intended reader has a background similar to yours before you started the project. That is, a general understanding of the topic but no specific knowledge of the details. The reader should be able to reproduce whatever you did by following your report.

Clarity of Writing. Good scientific reports share many of the qualities found in other kinds of writing. To write is to think, so a paper that lays out ideas in a logical order will facilitate the same kind of thinking. Make each sentence follow from the previous one, building an argument piece by piece. Group related sentences into paragraphs, and group paragraphs into sections. Create a flow from beginning to end.

Style. It is customary for reports to be written in the third person or the 'scientific passive', for example, instead of writing 'I saw', one writes 'it was observed'; rather than, 'I think that ...' one writes 'it could be stated that ...' and so on. Avoid jargon, slang, or colloquial terms. Define acronyms and any abbreviations not used as standard measurement units. Most of the report describes what you did, and thus it should be in the past tense (e.g., "values were averaged"), but use present or future tense as appropriate (e.g., "x is bigger than y" or "that effect will happen"). Employ the active rather than passive voice to avoid boring writing and contorted phrases (e.g., "the software calculated average values" is better than "average values were calculated by the software").

Typical Sections. There are four major sections to a scientific report, sometimes known as IMRAD – Introduction, Methods, Results, And Discussion. Respectively, these sections structure your report to say "here's the problem, here's how I studied it, here's what I found, and here's what it means." There are additional minor sections that precede or follow the major sections including the title, abstract, acknowledgements, references, and appendices. All sections are important, but at different stages to different readers. When flipping through a journal, a reader might read the title first, and if interested further then the abstract, then conclusions, and then if he or she is truly fascinated perhaps the entire paper. You have to convince the reader that what you have done is interesting and important by communicating appeal and content in all sections.

Title of the report. Convey the essential point of the paper. Be precise, concise, and use key words. Avoid padding with phrases like "A study of ..." or headlines like "Global warming will fry Earth!" It is usual to write the title as one phrase or sentence. A good title is brief and informative. Titles should not exceed 10 or 12 words, and they should reveal the content of the study. Many titles take one of these two forms: a simple nominal sentence (Asymmetric Information, Stock Returns and Monetary

Policy) or beginning with The effect of (for example, The Effects of Financial Restrictions and Technological Diversity on Innovation). Sometimes it is impossible to make word-by-word translation from Russian into English, for example, Об оценке работы фирмы should be translated as Assessing the Firm Performance or К проблеме хеджевых фондов is translated as Hedge Funds. Sometimes the title contains two parts, the first one is the topic, while the second is its specific details (International Financial Contagion: Evidence from the Argentine Crisis of 2001- 2002). If the report is of a very problematic issue its title may be in the form of a question (Was There a Credit Crunch in Turkey?)

Introduction. This section should contain a brief history of the research problem with appropriate references to the relevant literature and the purpose of the study. Introduce the problem, moving from the broader issues to your specific problem, finishing the section with the precise aims of the paper (key questions). Craft this section carefully, setting up your argument in logical order. Refer to relevant ideas/theories and related research by other authors. Answer the question "what is the problem and why is it important?" The introduction should also explain whether the study is an extension of a previous one, or whether a completely new hypothesis is to be tested. The final section of the introduction generally includes a list of all the hypotheses being tested in the study. The results of the current study are not to be referred to in the introduction.

You may use the following expressions:

| | | |
|------------|-------------|--|
| This paper | aims at | Настоящий доклад имеет своей целью... |
| | deals with, | В настоящем докладе рассматриваются... |
| | considers | |
| | describes | В настоящем докладе делается описание... |
| | examines | В настоящем докладе исследуется ... |
| | presents | В настоящем докладе представлен... |
| | reports on | В настоящем докладе сообщается о ... |

Examples of an Introduction

A. There has been a European Union foreign policy, confirmed in constitutional form in the Union Treaty, since 1993. The first decade, most commentators agree, has proved to be difficult: 'painful and problematic' according to one. As the twenty-first century progresses, replete with an array of new challenges, the need for a reassessment, and perhaps reinvigoration of Union 'foreign and security policy' is widely argued. The purpose of this article is to provide both a retrospective, of the evolution of the Union's foreign policy so far, and a prospective, of the challenges which it presently faces.

B. This paper examines companies incorporated under the Companies Act 1985. Its purpose is to consider the suitability of such companies for not-for-profit-organisations ('NFPOs').

Methods. Explain how you studied the problem, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed, study area, etc. Provide enough detail for the reader to reproduce what you did. Include flowcharts, maps or tables if they aid clarity or brevity. Answer the question "what steps did I follow?" but do not include results yet. Here you may use such expressions as:

| | |
|--|---|
| A method of ...is proposed | Предлагается метод... |
| Data on... are discussed | Обсуждаются данные по ... |
| Present data encompass a period of ... | Настоящие данные охватывают период в |
| The design of the experiments was to reveal... | Эксперименты были направлены на выявление |
| | ... |
| The effect of... on... is discussed | Обсуждается влияние ... на ... |
| The methods used for ... are discussed | Описываются методы, используемые для ... |

Results. Explain your actual findings, using subheadings to divide the section into logical parts, with the text addressing the study aims. Tables are an easy and neat way of summarizing the results. An alternative or additional way of presenting data is in the form of line graphs, bar-charts, pie-charts, etc.

Graphs, charts and illustrations are referred to as 'figures' (for example, Fig. 1) in the text of the report. All figures should be numbered in order of appearance in the text. For each table or graph, describe and interpret what you see (you do the thinking -- do not leave this to the reader). Expressions to describe results obtained may be:

| | |
|---|--|
| The most important results are as follows | Самые важные результаты имеют следующий вид... |
| The results indicate the dominant role of | Результаты указывают на доминирующую роль... |
| The results of ... are discussed | Обсуждаются результаты ... |
| The results of observations are supported by... | Результаты наблюдений дополняются |

Discussion. This is the most difficult section of a report to write and requires considerable thought and care. Essentially it is a consideration of the results obtained in the study, guided by any statistical tests used, indicating whether the hypotheses tested are considered true or are to be rejected.

This is best thought of in three steps: the main results must be very briefly summarized; the procedure must be critically assessed and weaknesses noted; and a final evaluation of the results made in terms of the design, leading to a final judgment concerning the hypotheses being tested. The discussion can only refer to results, which are presented in the results section. Any detailed results which only appear in the appendixes cannot be discussed.

Evaluation of the results should include reference to other research with indications as to whether or not the current findings are in agreement with other findings (that is, reference is made to the introduction). The main conclusions reached should be summarized at the end of the discussion. Suggestions for follow-up research can also be given.

Discuss the importance of what you found, in light of the overall study aims. Stand back from the details and synthesize what has (and has not) been learned about the problem, and what it all means. Say what you actually found, not what you hoped to find. Begin with specific comments and expand to more general issues. Recommend any improvements for further study. Answer the question "what is the significance of the research?"

Important Note: this section is often combined with either the Results section or the Conclusions section. Decide whether understanding and clarity are improved if you include some discussion as you cover the results, or if discussion material is better as part of the broader summing up.

Conclusions. Restate the study aims or key questions and summarize your findings using clear, concise statements. Keep this section brief and to the point.

Acknowledgments. This is an optional section. Thank people who directly contributed to the paper, by providing data, assisting with some part of the analysis, proofreading, typing, etc. It is not a dedication; so don't thank Mom and Dad for bringing you into the world, or your roommate for making your coffee.

References. Within the text, cite references by author and year unless instructed otherwise, for example "Comrie (1999) stated that ..." or "several studies have found that x is greater than y (Comrie 1999; Smith 1999)." For two authors, list both names, and for three or more use the abbreviation "et al." (note the period) following the first name, for example "Comrie and Smith (1999)" or "Comrie et al. (1999)." Attribute every idea that is not your own to avoid plagiarism.

2.3 Подготовка доклада

Подготовьте доклад по одной из предложенных тем. Темы представлены в КОМ для данной дисциплины по соответствующему профилю подготовки магистров.

Правила предоставления информации в докладе

| | |
|--------|------------------------------------|
| Размер | A4 |
| Шрифт | Текстовый редактор Microsoft Word, |

| | |
|-----------------|---|
| | шрифт Times New Roman 12 |
| Поля | слева – 2 см., сверху и справа – 1,5 см., снизу – 1 |
| Абзацный отступ | 1,25 см устанавливается автоматически |
| Стиль | Примеры выделяются курсивом |
| Интервал | межстрочный интервал – 1 |
| Объем | 2 -3 страницы (до 10 минут устного выступления) |
| Шапка доклада | <i>Иванова Мария Ивановна</i> Екатеринбург, Россия ФГБОУ ВПО УГГУ, АТПМ-19 НАЗВАНИЕ ДОКЛАДА |
| | Список использованной литературы |

Краткое содержание статьи должно быть представлено на 7-10 слайдах, выполненных в PowerPoint.

2.4 Подготовка к тесту

Тест направлен на проверку сформированности лексических и грамматических навыков и речевых умений в рамках изученных тем при формировании иноязычной профессионально-ориентированной коммуникативной компетенции. Для успешного написания теста необходимо повторение лексических единиц, представленных н стр. 51-64.

2.5 Аннотирование и реферирование текстов по специальности

Read the text “Laser lidar” and study the summary to this text.

Laser-based lidar (light detection and ranging) has also proven to be an important tool for oceanographers. While satellite pictures of the ocean surface provide insight into overall ocean health and hyperspectral imaging provides more insight, lidar is able to penetrate beneath the surface and obtain more specific data, even in murky coastal waters. In addition, lidar is not limited to cloudless skies or daylight hours. “One of the difficulties of passive satellite-based systems is that there is watersurface reflectance, water-column influence, water chemistry, and also the influence of the bottom”, said Chuck Bostater, director of the remote sensing lab at Florida Tech University (Melbourne, FL). “In shallow waters we want to know the quality of the water and remotely sense the water column without having the signal contaminated by the water column or the bottom”. A typical lidar system comprises a laser transmitter, receiver telescope, photodetectors, and range-resolving detection electronics. In coastal lidar studies, a 532-nm laser is typically used because it is well absorbed by the constituents in the water and so penetrates deeper in turbid or dirty water (400 to 490 nm penetrates deepest in clear ocean water). The laser transmits a short pulse of light in a specific direction. The light interacts with molecules in the air, and the molecules send a small fraction of the light back to telescope, where it is measured by the photodetectors.

Abstract (Summary). The text focuses on the use of laser-based lidar in oceanography. The ability of lidar to penetrate into the ocean surface to obtain specific data in murky coastal waters is specially mentioned. Particular attention is given to the advantage of laser-based lidars over passive satellite-based systems iN obtaining signals not being contaminated by the water column or the bottom. A typical lidar system is described with emphasis on the way it works. This information may be of interest to research teams engaged in studying shallow waters.

THE CENTRALITY OF MARKETING

1. Most management and marketing writers now distinguish between selling and marketing. The ‘selling concept’ assumes that resisting consumers have to be persuaded by vigorous hard-selling techniques to buy non-essential goods or services. Products are sold rather than bought. The ‘marketing concept’, on the contrary, assumes that the producer’s task is to find wants and fill them. In other words, you don’t sell what you make, you make what will be bought. As well as satisfying existing needs, marketers can also anticipate and create new ones. The markets for the Walkman, video recorders,

videogames consoles, CD players, personal computers, the internet, mobile phones, mountain bikes, snowboards and genetic engineering, to choose some recent examples, were largely created than identified.

2. Marketers are consequently looking for market opportunities- profitable possibilities of filling unsatisfied needs or creating new ones in areas in which the company is likely to enjoy a differential advantage due to its distinctive competencies (the things it does particularly well). Market opportunities are generally isolated by market segmentation. Once a target market has, been identified a company has to decide what goods or services to offer. This means that much of the work of marketing has been done before the final product or service comes into existence. It also means that the marketing concept has to be understood throughout the company, e.g. in the production department of a manufacturing company as much as in the marketing department itself. The company must also take account of the existence of competitors who always have to be identified, monitored and defeated in the search for loyal customers.

3. Rather than risk launching a product or service solely on the basis of intuition or guesswork, most companies undertake market research or marketing research. They collect and analyze information about the size of a potential market, about consumers' reaction to particular product or service features, and so on. Sales representatives, who also talk to customers, are another important source of information.

4. Once the basic offer, e.g. a product concept, has been established, the company has to think about the marketing mix, i.e. all the various elements of a marketing program their integration, and the amount of effort that a company can expend on them in order to influence the target market. The best-known classification of these elements is the 'Four Ps': product, place, promotion and price. Aspects to be considered in marketing products include quality, features (standard and optional), style, brand name, size, packaging, services and guarantee. Place in marketing mix includes such factors as distribution channels, location of point of sale, transport, inventory size, etc. Promotion groups together advertising, publicity, sales promotion, and personal selling, while price includes the basic list price, discounts, the length of the payment period, possible credit terms, and so on. It is the job of a product manager or a brand manager to look for ways to increase sales by changing the marketing mix.

5. It must be remembered that quite apart from consumer markets (in which people buy products for direct consumption) there exists an enormous producer or industrial or business market, consisting of all the individuals and organizations that acquire goods or services that are used in the production of other goods, or in the supply of services to others. Few consumers realize that the producer market is actually larger than the consumer market, since it contains all the raw materials, manufactured parts and components that go into consumer goods, plus capital equipment such as buildings and machines, supplies such as energy and pens and papers, and services ranging from cleaning to management consulting, all of which have to be marketed. There is consequently more industrial than consumer marketing. There is consequently more industrial than consumer marketing, even though ordinary consumers are seldom exposed to it.

First summary

Marketing means that you don't have to worry about selling your product, because you know it satisfies a need. Companies have to identify market opportunities by market segmentation: doing market research, finding a target market, and producing the right product. Once a product concept has been established, marketers regularly have to change the marketing mix-the product's features, its distribution, the way it is promoted, and its price- in order to increase sales. Industrial goods- components and equipment for producers of other goods- have to be marketed as well as consumer goods.

Second summary

The marketing concept has now completely replaced the old-fashioned selling concept. Companies have to identify and satisfy the needs of particular market segments. A product's features are often changed, as are in price, the places in which it is sold, and the way in which it is promoted. More important than the marketing of consumer goods is the marketing of industrial or producer goods.

Third summary

The marketing concept is that a company's choice of what goods and services to offer should be based on the goal of satisfying consumers' needs. Many companies limit themselves to attempting to satisfy the needs of particular market segments. Their choice of action is often the result of market

research. A product's features, the methods of distributing and promoting it, and its price, can all be changed during the course of its life, if necessary. Quite apart from the marketing of consumer products, with which everybody is familiar, there is a great deal of marketing of industrial goods.

Group work (expert group): Each group will read one of the texts about some systems of higher education and will make a summary of its specific features.

SYSTEMS OF HIGHER EDUCATION IN FRANCE AND GERMANY

Both France and Germany have systems of higher education that are basically administered by state agencies. Entrance requirements for students are also similar in both countries. In France an examination called the baccalauréat is given at the end of secondary education. Higher education in France is free and open to all students who have passed this examination. A passing mark admits students to a preparatory first year at a university, which finishes in another, more strict examination. Success in this examination allows students to attend universities for other three or four years until get the first university degree, called a licence in France.

Basic differences, however, distinguish these two countries' systems. French educational districts, called academies, are under the direction of a rector, who is appointed by the national government and is in charge of the university. The uniformity in curriculum in the country leaves each university with little to distinguish itself. That is why many students prefer to go to Paris, where there are better accommodations and more entertainment for students. Another difference is the existence in France of higher-educational institutions known as great school, which give advanced professional and technical training. Different great schools give a scrupulous training in all branches of applied science and technology. Their diplomas have higher value than the ordinary licence.

In Germany, a country made up of what were once strong principalities, the regional universities have autonomy in determining their curriculum under the direction of rectors. Students in Germany change universities according to their interests and the strengths of each university. In fact, it is a custom for students to attend two, three, or even four different universities in the course of their studies, and the professors at a particular university may teach in four or five others. This mobility means that schemes of study and examination are free and individual, what is not typical for France.

Each of these countries has influenced higher education in other nations. The French, either through colonial influence or through the work of missionaries, introduced many aspects of their system in North and West Africa, the Caribbean, and the Far East. In the 1870s Japan's growing university system was remodeled along French lines. France's great schools have been copied as models of technical schools. German influence has come in philosophical concepts regarding the role of universities. The Germans were the first to stress the importance of universities in the sphere of research. The doctoral degree, or Ph.D., invented in Germany, has gained popularity in systems around the world.

THE SYSTEM OF HIGHER EDUCATION IN GREAT BRITAIN

The autonomy of higher-educational institutions is important in Great Britain. Its universities enjoy almost complete autonomy from national or local government in their administration and the determination of their curricula. However the schools receive nearly all of their funding from the state. Entry requirements for British universities are rather difficult. A student must have a General Certificate of Education (corresponding to the French baccalauréat) by taking examinations in different subjects. If they have greater number of "advanced level" passes, in contrast to General Certificate of Secondary Education ("ordinary level") passes, then the student has better chances of entering the university of his choice. This selective admission to universities, and the close supervision of students by a tutorial system, makes it possible for most British students to complete a degree course in three years instead of the standard four years. Great Britain's academic programs are more highly specialized than the same programs in other parts of Europe. Great Britain's model of higher education has been copied to different degrees in Canada, Australia, India, South Africa, New Zealand, and other former British colonial territories in Africa, Southeast Asia, and the Pacific.

THE SYSTEM OF HIGHER EDUCATION IN THE UNITED STATES

The system of higher education in the United States differs from European in certain ways. In the United States, there is a national idea that students who have completed secondary school should have at least two years of university education. That is why there is a great number of “junior colleges” and “community colleges.” They give two years of undergraduate study. Traditional universities and colleges, where a majority of students complete four years of study for a degree. Universities that provide four-year study courses can be funded privately or can have state or city foundations that depend heavily on the government for financial support. Private universities and colleges depend on students payments. The state governments fund the nation’s highly developed system of universities, which give qualified higher education.

In the American system, the four-year, or “bachelor’s,” degree is ordinarily given to students after collecting of course “credits,” or hours of classroom study. The quality of work done in these courses is assessed by continuous record of marks and grades during a course. The completion of a certain number (and variety) of courses with passing grades leads to the “bachelor’s” degree. The first two years of a student’s studies are generally taken up with obligatory courses in a broad range of subjects, also some “elective” courses are selected by the student. In the third and fourth years of study, the student specializes in one or perhaps two subject fields. Postgraduate students can continue advanced studies or research in one of the many graduate schools, which are usually specialized institutions. At these schools students work to get a “master’s” degree (which involves one to two years of postgraduate study) or a doctoral degree (which involves two to four years of study and other requirements).

A distinctive feature of American education is the de-emphasis on lecture and examination. Students are evaluated by their performance in individual courses where discussion and written essays are important. The American model of higher learning was adopted wholesale by the Philippines and influenced the educational systems of Japan and Taiwan after World War II.

2.6 Подготовка к экзамену

Подготовка к экзамену включает в себя повторение всех изученных тем курса.

Билет на экзамен включает в себя тест и практико-ориентированное задание.

| <i>Наименование оценочного средства</i> | <i>Характеристика оценочного средства</i> | <i>Методика применения оценочного средства</i> | <i>Наполнение оценочного средства в КОС</i> | <i>Составляющая компетенции, подлежащая оцениванию</i> |
|---|--|--|---|--|
| Экзамен: | | | | |
| Тест | Система стандартизированных заданий, позволяющая автоматизировать процедуру измерения уровня знаний и умений обучающегося. | Тест состоит из 20 вопросов. | КОС - тестовые задания | Оценивание уровня знаний, умений, владений |
| Практико-ориентированное задание | Задание, в котором обучающемуся предлагают осмыслить реальную профессионально-ориентированную ситуацию | Количество заданий в билете – 1. Предлагаются задания по изученным темам в виде практических ситуаций. | КОС-Комплект заданий | Оценивание уровня знаний, умений и навыков |

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФГБОУ ВО «Уральский государственный горный университет»



**МЕТОДИЧЕСКИЕ УКАЗАНИЯ
ПО ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОЙ РАБОТЫ**

**Б1.В.02 КОММУНИКАЦИИ В ДЕЛОВОЙ
И АКАДЕМИЧЕСКОЙ СФЕРАХ**

Направление подготовки

Информатика и вычислительная техника

Профиль

Анализ больших данных и машинное обучение

квалификация выпускника: **магистр**

формы обучения: **очная, заочная**

Автор: Карякина М. В., канд. филол. наук

Одобрена на заседании кафедры

иностранных языков
и деловой коммуникации

Зав. кафедрой


(подпись)
Юсупова Л. Г.

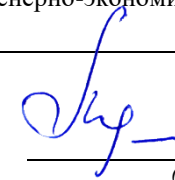
Протокол № 7 от 17.03.2021

(Дата)

Рассмотрена методической комиссией

Инженерно-экономического

Председатель


(подпись)
Мочалова Л. А.

Протокол № 7 от 20.03.2021

(Дата)

Екатеринбург
2021

Методические указания адресованы студентам, обучающимся по направлению подготовки «Электроэнергетика и электротехника», и призваны обеспечить эффективную самостоятельную работу по курсу «Коммуникации в деловой и академической сферах».

Суммарный объем часов на СРО очной формы обучения составляет 92 часа.

| № п/п | Виды самостоятельной работы | Единица измерения | Норма времени, час | Расчетная трудоемкость СРО по нормам, час. | Принятая трудоемкость СРО, час. |
|---|--|-------------------|--------------------|--|---------------------------------|
| Самостоятельная работа, обеспечивающая подготовку к аудиторным занятиям | | | | | 58 |
| 1 | Самостоятельное изучение тем курса | 1 тема | 1,0-8,0 | $8,0 \times 4 = 32$ | 32 |
| 2 | Ответы на вопросы для самопроверки (самоконтроля) | 1 тема | 0,3-0,5 | $0,5 \times 4 = 2$ | 2 |
| 3 | Подготовка к практическим занятиям | 1 занятие | 0,3-2,0 | $2,0 \times 8 = 16$ | 16 |
| 4 | Выполнение самостоятельного письменного домашнего задания (практико-ориентированного задания и подготовка доклада) | 1 тема | 0,3-2,0 | $2,0 \times 2 = 4$ | 4 |
| 5 | Подготовка к деловой игре | 1 занятие | 1,0-4,0 | $4,0 \times 1 = 4$ | 4 |
| Другие виды самостоятельной работы | | | | | 34 |
| 6 | Подготовка к зачету | 1 зачет | | | 34 |
| Итого: | | | | | 92 |

Суммарный объем часов на СРО заочной формы обучения составляет 100 часов.

| № п/п | Виды самостоятельной работы | Единица измерения | Норма времени, час | Расчетная трудоемкость СРО по нормам, час. | Принятая трудоемкость СРО, час. |
|---|--|-------------------|--------------------|--|---------------------------------|
| Самостоятельная работа, обеспечивающая подготовку к аудиторным занятиям | | | | | 50 |
| 1 | Самостоятельное изучение тем курса | 1 тема | 1,0-8,0 | $8,0 \times 4 = 32$ | 32 |
| 2 | Ответы на вопросы для самопроверки (самоконтроля) | 1 тема | 0,3-0,5 | $0,5 \times 4 = 2$ | 2 |
| 3 | Подготовка к практическим занятиям | 1 занятие | 0,3-2,0 | $2,0 \times 4 = 8$ | 8 |
| 4 | Выполнение самостоятельного письменного домашнего задания (практико-ориентированного задания и подготовка доклада) | 1 тема | 0,3-2,0 | $2,0 \times 2 = 4$ | 4 |
| 5 | Подготовка к деловой игре | 1 занятие | 1,0-4,0 | $4,0 \times 1 = 4$ | 4 |
| Другие виды самостоятельной работы | | | | | 50 |
| 6 | Подготовка к зачету | 1 зачет | | | 50 |
| Итого: | | | | | 100 |

Форма контроля самостоятельной работы студентов: проверка на практическом занятии, опрос, тест, доклад, деловая игра, практико-ориентированное задание, зачет.

ФОРМЫ И СОДЕРЖАНИЕ САМОСТОЯТЕЛЬНОЙ РАБОТЫ

Самостоятельное изучение тем курса заключается в работе с основной и дополнительной литературой по теме (чтение, конспектирование). Основная литература по курсу:

1. *Курганская М. Я.* Деловые коммуникации [Электронный ресурс]: курс лекций / М. Я. Курганская. — Электрон. текстовые данные. — М.: Московский гуманитарный университет, 2013. — 121 с. — 978-5-98079-935-9. — Режим доступа: <http://www.iprbookshop.ru/22455.html>.
2. *Основы русской научной речи* [Электронный ресурс]: учебное пособие по русскому языку/ Н.А. Буре [и др.]. Электрон. текстовые данные. Саратов: Ай Пи Эр Медиа, 2012. 285 с. Режим доступа: <http://www.iprbookshop.ru/4623.html>. ЭБС «IPRbooks».
3. *Меленкова Е. С.* Русский язык делового общения: учебное пособие. Екатеринбург: УГГУ, 2018. 80 с.
4. *Меленкова Е. С.* Стилистика русского языка: учебное пособие. Екатеринбург, 2013. 86 с.

Дополнительная литература по темам предложена в нижеследующей таблице.

| Тема | Литература |
|---|--|
| Коммуникация. Принципы эффективного речевого взаимодействия | <ul style="list-style-type: none"> - <i>Аннушкин В. И.</i> Риторика. Вводный курс: учебное пособие. М., 2008. - <i>Голуб И. Б.</i> Риторика: учитесь говорить правильно и красиво. М., 2012. - <i>Гойман О. Я., Надеина Т. М.</i> Речевая коммуникация: учебник / Под ред. Проф. О. Я. Гойман. – М.: ИНФРА-М, 2003. – 272 с. - <i>Клюев Е. В.</i> Речевая коммуникация: учебное пособие. М.: Рипол Классик, 2002. — 320 с. - <i>Колтунова М. В.</i> Язык и деловое общение: Нормы, риторика, этикет. М., 2000. - <i>Кибанов А. Я., Захаров Д. К., Коновалова В. Г.</i> Этика деловых отношений. М.: ИНФРА-М, 2012. 424 с. - <i>Леммерман Х.</i> Уроки риторики и дебатов. М., 2002. - <i>Михальская А. К.</i> Основы риторики. Мысль и слово. М. 1996. - <i>Непряхин Н.</i> Убеждай и побеждай: Секреты эффективной аргументации. М., 2010. - <i>Поварнин С. И.</i> Спор. О теории и практике спора. М., 2009. - <i>Поль Л. Сопер.</i> Основы искусства речи. Книга о науке убеждать. Ростов-на-Дону, 2005. - <i>Психология и этика делового общения:</i> учебник для вузов / под ред. В. Н. Лавриненко. М., 2005. - <i>Шипулин С.</i> Харизматичный оратор. М., 2010. |
| Деловая коммуникация | <ul style="list-style-type: none"> - <i>Введенская Л. А.</i> Деловая риторика: учебное пособие для вузов. Ростов-на-Дону: МарТ, 2001. 512 с. - <i>Деловые коммуникации</i> [Электронный ресурс]: учебное пособие / М.Г. Круталевич [и др.]. — Электрон. текстовые данные. — Оренбург: Оренбургский государственный университет, ЭБС АСВ, 2015. — 216 с. — 978-5-7410-1378-6. — Режим доступа: http://www.iprbookshop.ru/61357.html - <i>Кузнецова Е.В.</i> Деловые коммуникации [Электронный ресурс]: учебно-методическое пособие / Е.В. Кузнецова. — Электрон. текстовые данные. — Саратов: Вузовское образование, 2017. — 180 с. — 978-5-906172-24-2. — Режим доступа: http://www.iprbookshop.ru/61079.html. - <i>Культура устной и письменной речи делового человека:</i> Справочник. Практикум. / Н. С. Водина и др. М.: Флинта: Наука, 2012. 320 с. - <i>Немец Г. Н.</i> Бизнес-коммуникации. Практикум. Тесты [Электронный ресурс]: учебное пособие / Г. Н. Немец. — Электрон. текстовые данные. — Краснодар: Южный институт менеджмента, 2008. — 89 с. — 2227-8397. — Режим доступа: http://www.iprbookshop.ru/9774.html |
| Научная коммуникация | <ul style="list-style-type: none"> - <i>Аскаркина Н. А.</i> Технология подготовки научного текста: учебно-методическое пособие 3-е изд., стер. – М.: Флинта: Наука, 2017. – 112 с. - <i>Колесникова Н. И.</i> От конспекта к диссертации: учеб. Пособие по развитию навыков письменной речи / Н. И. Колесникова. М.: Флинта: Наука, 2016. – 288 с. |

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|--|--|
| | <p>- <i>Косарев Н. П., Хазин М. Л.</i> Подготовка кадров высшей квалификации в области геолого-минералогических и технических наук. Екатеринбург: Изд-во УГГУ, 2008. 481 с.</p> <p>- <i>Котюрова М. П.</i> Стилистика научной речи: учебное пособие для студентов учреждений высшего профессионального образования. М.: Академия, 2012. 240 с.</p> <p>- <i>Кузин Ф. А.</i> Магистерская диссертация. Методика написания, правила оформления и процедура защиты. Практическое пособие для студентов-магистрантов / Ф. А. Кузин. - М.: «Ось-89», 1997. – 304 с.</p> <p>- <i>Методические рекомендации в помощь автору вузовской книги</i> / Сост. Л. В. Устьянцева; Урал. гос. горный ун-т. Екатеринбург: Изд-во УГГУ, 2016. 51 с.</p> <p>- <i>Основы русской научной речи</i> [Электронный ресурс]: учебное пособие по русскому языку. Н.А. Буре [и др.] Электрон. текстовые данные. – Саратов: Ай Пи Эр Медиа, 2012. – 285 с.– Режим доступа: http://www.iprbookshop.ru/4623.html. – ЭБС «IPRbooks».</p> <p>- <i>Пособие по научному стилю речи.</i> Для вузов технического профиля / Под ред. проф. Проскураковой И. Г. 2-е изд., доп. и перераб. – М.: Флинта: Наука, 2004. – 320 с.</p> |
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Ответы на вопросы для самопроверки (самоконтроля) готовятся обучающимися самостоятельно по всем изучаемым темам.

Вопросы по теме 1 «Коммуникация. Принципы эффективного речевого взаимодействия»:

1. Что представляет собой речевая коммуникация?
2. Какие типы и виды, функции и цели общения существуют?
3. Как происходит процесс речевого взаимодействия?
4. Какие коммуникативные барьеры могут возникать в процессе общения?
5. Каковы основные принципы эффективной речевой коммуникации?
6. Каковы должны быть нравственные установки участников деловой коммуникации?
7. Какие невербальные средства существуют?
8. Какие из видов слушания являются продуктивными?
9. Как подготовить публичное выступление?
10. Каковы основные принципы речевого этикета?

Вопросы по теме 2 «Деловая коммуникация»:

1. В чем заключается специфика деловой коммуникации?
2. Какие виды делового общения различают?
3. Каковы черты официально-делового стиля речи и его лексические и грамматические особенности?
4. Какие подстили и жанры официально-делового стиля существуют?
5. Как составляются и редактируются документы?
6. Как осуществляется публичное выступление в деловой сфере?
7. Какие типы собеседников существуют?
8. Как осуществляются переговоры?
9. В чем заключаются особенности дистантного делового общения (беседа по телефону, электронная коммуникация)?
10. Как разрешать и предотвращать конфликты различных типов в деловом общении?

Вопросы по теме 3 «Научная коммуникация»:

1. В чем заключается специфика научной коммуникации?
2. Какие виды научной коммуникации различают?
3. Каковы черты научного стиля речи и его лексические и грамматические особенности?

4. Какие подстили и жанры научного стиля существуют?
5. Какие способы речевой компрессии используются во вторичных научных текстах?
6. Каковы особенности жанра диссертации?
7. Какие этапы имеет работа над научным текстом?
8. Каковы требования к оформлению научного текста?
9. В чем состоит отличие публичного выступления в научной сфере?
10. Как проводится дискуссия, какие речевые формулы используются в ней?

Подготовка к практическим занятиям заключается в повторении необходимого теоретического материала и выполнении вариативных индивидуальных или групповых заданий по изучаемым темам.

Выполнение самостоятельного письменного домашнего задания (практико-ориентированного задания) осуществляется по вариантам. Варианты заданий приведены в комплекте оценочных материалов (КОМ).

Подготовка к деловой игре состоит в ознакомлении студентов с концепцией игры, чтении дополнительной литературы по риторике, психологии и этике делового общения, а также в записи предполагаемого хода деловой беседы, тренировке произнесения речи. Концепции различных вариантов деловых игр описаны в КОМ. Вариант игры выбирается преподавателем в зависимости от уровня подготовленности и других особенностей группы.



С.А. Упоров

**МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ОРГАНИЗАЦИИ
САМОСТОЯТЕЛЬНОЙ РАБОТЫ И ЗАДАНИЯ ДЛЯ
ОБУЧАЮЩИХСЯ
Б1.В.03 УПРАВЛЕНИЕ ПРОЕКТАМИ И ПРОГРАММАМИ**

Программа подготовки магистров
09.04.01 Информатика и вычислительная техника

Направленность (профиль)
Анализ больших данных и машинное обучение

квалификация выпускника: магистр

формы обучения: **очная, очно-заочная, заочная,**

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Одобрена на заседании кафедры

Экономики и менеджмента

(название кафедры)

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Протокол № 7 от 17.03.2021

(Дата)

Рассмотрена методической комиссией
факультета

Инженерно-экономического

(название факультета)

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ВВЕДЕНИЕ

Самостоятельная работа в высшем учебном заведении – это часть учебного процесса, метод обучения, прием учебно-познавательной деятельности, комплексная целевая стандартизованная учебная деятельность с запланированными видом, типом, формами контроля.

Самостоятельная работа представляет собой плановую деятельность обучающихся по поручению и под методическим руководством преподавателя.

Целью самостоятельной работы студентов является закрепление тех знаний, которые они получили на аудиторных занятиях, а также способствование развитию у студентов творческих навыков, инициативы, умению организовать свое время.

Самостоятельная работа реализует следующие задачи:

- предполагает освоение курса дисциплины;
- помогает освоению навыков учебной и научной работы;
- способствует осознанию ответственности процесса познания;
- способствует углублению и пополнению знаний студентов, освоению ими навыков и умений;
- формирует интерес к познавательным действиям, освоению методов и приемов познавательного процесса,
- создает условия для творческой и научной деятельности обучающихся;
- способствует развитию у студентов таких личных качеств, как целеустремленность, заинтересованность, исследование нового.

Самостоятельная работа обучающегося выполняет следующие функции:

- развивающую (повышение культуры умственного труда, приобщение к творческим видам деятельности, обогащение интеллектуальных способностей студентов);
- информационно-обучающую (учебная деятельность студентов на аудиторных занятиях, неподкрепленная самостоятельной работой, становится мало результативной);
- ориентирующую и стимулирующую (процессу обучения придается ускорение и мотивация);
- воспитательную (формируются и развиваются профессиональные качества бакалавра и гражданина);
- исследовательскую (новый уровень профессионально-творческого мышления).

Организация самостоятельной работы студентов должна опираться на определенные требования, а, именно:

- сложность осваиваемых знаний должна соответствовать уровню развития студентов;
- стандартизация заданий в соответствии с логической системой курса дисциплины;

- объем задания должен соответствовать уровню студента;
- задания должны быть адаптированными к уровню студентов.

Содержание самостоятельной работы студентов представляет собой, с одной стороны, совокупность теоретических и практических учебных заданий, которые должен выполнить студент в процессе обучения, объект его деятельности; с другой стороны – это способ деятельности студента по выполнению соответствующего теоретического или практического учебного задания.

Свое внешнее выражение содержание самостоятельной работы студентов находит во всех организационных формах аудиторной и внеаудиторной деятельности, в ходе самостоятельного выполнения различных заданий.

Функциональное предназначение самостоятельной работы студентов в процессе практических занятий по овладению специальными знаниями заключается в самостоятельном прочтении, просмотре, прослушивании, наблюдении, конспектировании, осмыслении, запоминании и воспроизведении определенной информации. Цель и планирование самостоятельной работы студента определяет преподаватель. Вся информация осуществляется на основе ее воспроизведения.

Так как самостоятельная работа тесно связана с учебным процессом, ее необходимо рассматривать в двух аспектах:

1. аудиторная самостоятельная работа – практические занятия;
2. внеаудиторная самостоятельная работа – подготовка к практическим занятиям, подготовка к устному опросу, участию в дискуссиях, решению кейс-задач и др.

Основные формы организации самостоятельной работы студентов определяются следующими параметрами:

- содержание учебной дисциплины;
- уровень образования и степень подготовленности студентов;
- необходимость упорядочения нагрузки студентов при самостоятельной работе.

Таким образом, самостоятельная работа студентов является важнейшей составной частью процесса обучения.

Методические указания по организации самостоятельной работы и задания для обучающихся по дисциплине «Управление проектами и программами» обращают внимание студента на главное, существенное в изучаемой дисциплине, помогают выработать умение анализировать явления и факты, связывать теоретические положения с практикой, а также облегчают подготовку к сдаче экзамена.

Настоящие методические указания позволят студентам самостоятельно овладеть фундаментальными знаниями, профессиональными умениями и навыками деятельности по профилю подготовки, опытом творческой и исследовательской деятельности, и направлены на формирование компетенций, предусмотренных учебным планом поданной программой подготовки магистров.

Видами самостоятельной работы обучающихся по дисциплине «Управление проектами и программами» являются:

- самостоятельное изучение тем курса (в т.ч. рассмотрение основных категорий дисциплины, работа с литературой);
- подготовка к практическим и лабораторным занятиям (в т.ч. ответы на вопросы для самопроверки (самоконтроля));
- выполнение самостоятельного письменного домашнего задания (практико-ориентированного задания);
- подготовка к экзамену.

В методических указаниях представлены материалы для самостоятельной работы и рекомендации по организации отдельных её видов.

ВОПРОСЫ ДЛЯ САМОПРОВЕРКИ

Тема 1. Введение в управление проектами

Охарактеризуйте концепцию управления проектами.

Назовите этапы развития методов управления проектами.

Какова взаимосвязь управления проектами и управления инвестициями?

Какова взаимосвязь между управлением проектами и функциональным менеджментом?

Каковы задачи и этапы перехода к проектному управлению?

Приведите известную Вам классификацию типов проектов.

Тема 2. Система стандартов и сертификации в области управления проектами

Перечислите стандарты, применяемые к отдельным объектам управления проектами (проект, программа, портфель проектов).

Перечислите стандарты, определяющие требования к квалификации участников управления проектами (менеджеры проектов, участники команд управления проектами).

Перечислите стандарты, применяемые к системе управления проектами организации в целом и позволяющие оценить уровень зрелости организационной системы проектного менеджмента.

Как осуществляется международная сертификация по управлению проектами.

Тема 3. Жизненный цикл проекта и его фазы

Охарактеризуйте предынвестиционную фазу жизненного цикла проекта.

Охарактеризуйте инвестиционную и эксплуатационную фазы жизненного цикла проекта:

Охарактеризуйте эксплуатационную фазу жизненного цикла проекта.

Тема 4. Процессы и методы управления проектами

Что включает планирование проекта?

Опишите методы управления проектами.

Как осуществляется контроль и регулирование проекта?

Что подразумевает управление стоимостью проекта?

Опишите управление работами по проекту.

Что включает управление ресурсами проекта?

Как осуществляется управление командой проекта?

Тема 5. Специальные вопросы управления проектами

Опишите организационные структуры управления проектами.

Что подразумевает организация офиса проекта?

Как осуществляется оценка эффективности инвестиционных проектов?

Для чего и как нужно управлять рисками при реализации проекта?
Каковы особенности управления проектами при освоении минерально-сырьевой базы?

Тема 6. Информационное обеспечение проектного управления

Как осуществляется управление коммуникациями проекта?

Охарактеризуйте элементы информационной системы управления проектами.

Каковы требования к информационному обеспечению на разных уровнях управления?

ОСНОВНЫЕ КАТЕГОРИИ ДИСЦИПЛИНЫ

Тема 1. Введение в управление проектами

Управление проектами

Проект

Управление инвестициями

Тема 2. Система стандартов и сертификации в области управления проектами

Проект

Программа

Портфель проектов

Менеджер проекта

Организационная система проектного менеджмента

Тема 3. Жизненный цикл проекта и его фазы

Жизненный цикл проекта

Предынвестиционная фаза

Инвестиционная фаза

Эксплуатационная фаза

Проектная документация

Тема 4. Процессы и методы управления проектами

Планирование проекта

Цель проекта

Задача проекта

Диаграмма Ганта

Сетевой график

Управление стоимостью проекта

Бюджетирование проекта

Управление ресурсами проекта

Команда проекта

Тема 5. Специальные вопросы управления проектами

Организационная структура управления проектами

Офиса проекта

Маркетинг проекта

Проектное финансирование

Управление рисками

Конъюнктура рынков минерального сырья

Тема 6. Информационное обеспечение проектного управления

Управление коммуникациями проекта

Информационная система управления проектами

САМООРГАНИЗАЦИЯ РАБОТЫ С ЛИТЕРАТУРОЙ

Самостоятельное изучение тем курса осуществляется на основе списка рекомендуемой литературы к дисциплине. При работе с книгой необходимо научиться правильно ее читать, вести записи. Самостоятельная работа с учебными и научными изданиями профессиональной и общекультурной тематики – это важнейшее условие формирования научного способа познания.

Основные приемы работы с литературой можно свести к следующим:

- составить перечень книг, с которыми следует познакомиться;
- перечень должен быть систематизированным (что необходимо для семинаров, что для экзаменов, что пригодится для написания курсовых и выпускных квалификационных работ (ВКР), а что выходит за рамки официальной учебной деятельности, и расширяет общую культуру);
- обязательно выписывать все выходные данные по каждой книге (при написании курсовых и выпускных квалификационных работ это позволит экономить время);
- определить, какие книги (или какие главы книг) следует прочитать более внимательно, а какие – просто просмотреть;
- при составлении перечней литературы следует посоветоваться с преподавателями и руководителями ВКР, которые помогут сориентироваться, на что стоит обратить большее внимание, а на что вообще не стоит тратить время;
- все прочитанные монографии, учебники и научные статьи следует конспектировать, но это не означает, что надо конспектировать «все подряд»: можно выписывать кратко основные идеи автора и иногда приводить наиболее яркие и показательные цитаты (с указанием страниц);
- если книга – собственная, то допускается делать на полях книги краткие пометки или же в конце книги, на пустых страницах просто сделать свой «предметный указатель», где отмечаются наиболее интересные мысли и обязательно указываются страницы в тексте автора;
- следует выработать способность «воспринимать» сложные тексты; для этого лучший прием – научиться «читать медленно», когда понятно каждое прочитанное слово (а если слово незнакомое, то либо с помощью словаря, либо с помощью преподавателя обязательно его узнать). Таким образом, чтение текста является частью познавательной деятельности. Ее цель – извлечение из текста необходимой информации.

От того, насколько осознанна читающим собственная внутренняя установка при обращении к печатному слову (найти нужные сведения, усвоить информацию полностью или частично, критически проанализировать материал и т.п.) во многом зависит эффективность осуществляемого действия. Грамотная работа с книгой, особенно если речь идет о научной литературе, предполагает соблюдение ряда правил, для овладения которыми необходимо настойчиво учиться. Это серьезный, кропотливый труд. Прежде всего, при такой работе невозможен формальный,

поверхностный подход. Не механическое заучивание, не простое накопление цитат, выдержек, а сознательное усвоение прочитанного, осмысление его, стремление дойти до сути – вот главное правило. Другое правило – соблюдение при работе над книгой определенной последовательности. Вначале следует ознакомиться с оглавлением, содержанием предисловия или введения. Это дает общую ориентировку, представление о структуре и вопросах, которые рассматриваются в книге.

Следующий этап – чтение. Первый раз целесообразно прочитать книгу с начала до конца, чтобы получить о ней цельное представление. При повторном чтении происходит постепенное глубокое осмысление каждой главы, критического материала и позитивного изложения; выделение основных идей, системы аргументов, наиболее ярких примеров и т.д. Непременным правилом чтения должно быть выяснение незнакомых слов, терминов, выражений, неизвестных имен, названий. Студентам с этой целью рекомендуется заводить специальные тетради или блокноты. Важная роль в связи с этим принадлежит библиографической подготовке студентов. Она включает в себя умение активно, быстро пользоваться научным аппаратом книги, справочными изданиями, каталогами, умение вести поиск необходимой информации, обрабатывать и систематизировать ее.

Выделяют четыре основные установки в чтении текста:

- информационно-поисковая (задача – найти, выделить искомую информацию);
- усваивающая (усилия читателя направлены на то, чтобы как можно полнее осознать и запомнить, как сами сведения, излагаемые автором, так и всю логику его рассуждений);
- аналитико-критическая (читатель стремится критически осмыслить материал, проанализировав его, определив свое отношение к нему);
- творческая (создает у читателя готовность в том или ином виде – как отправной пункт для своих рассуждений, как образ для действия по аналогии и т.п. – использовать суждения автора, ход его мыслей, результат наблюдения, разработанную методику, дополнить их, подвергнуть новой проверке).

С наличием различных установок обращения к тексту связано существование и нескольких видов чтения:

- библиографическое – просматривание карточек каталога, рекомендательных списков, сводных списков журналов и статей за год и т.п.;
- просмотровое – используется для поиска материалов, содержащих нужную информацию, обычно к нему прибегают сразу после работы со списками литературы и каталогами, в результате такого просмотра читатель устанавливает, какие из источников будут использованы в дальнейшей работе;
- ознакомительное – подразумевает сплошное, достаточно подробное прочтение отобранных статей, глав, отдельных страниц; цель –

познакомиться с характером информации, узнать, какие вопросы вынесены автором на рассмотрение, провести сортировку материала;

- изучающее – предполагает доскональное освоение материала; в ходе такого чтения проявляется доверие читателя к автору, готовность принять изложенную информацию, реализуется установка на предельно полное понимание материала;

- аналитико-критическое и творческое чтение – два вида чтения близкие между собой тем, что участвуют в решении исследовательских задач.

Первый из них предполагает направленный критический анализ, как самой информации, так и способов ее получения и подачи автором; второе – поиск тех суждений, фактов, по которым, или, в связи с которыми, читатель считает нужным высказать собственные мысли.

Из всех рассмотренных видов чтения основным для студентов является изучающее – именно оно позволяет в работе с учебной и научной литературой накапливать знания в различных областях. Вот почему именно этот вид чтения в рамках образовательной деятельности должен быть освоен в первую очередь. Кроме того, при овладении данным видом чтения формируются основные приемы, повышающие эффективность работы с текстом. Научная методика работы с литературой предусматривает также ведение записи прочитанного. Это позволяет привести в систему знания, полученные при чтении, сосредоточить внимание на главных положениях, зафиксировать, закрепить их в памяти, а при необходимости вновь обратиться к ним.

Основные виды систематизированной записи прочитанного:

Аннотирование – предельно краткое связное описание просмотренной или прочитанной книги (статьи), ее содержания, источников, характера и назначения.

Планирование – краткая логическая организация текста, раскрывающая содержание и структуру изучаемого материала.

Тезирование – лаконичное воспроизведение основных утверждений автора без привлечения фактического материала.

Цитирование – дословное выписывание из текста выдержек, извлечений, наиболее существенно отражающих ту или иную мысль автора.

Конспектирование – краткое и последовательное изложение содержания прочитанного. Конспект – сложный способ изложения содержания книги или статьи в логической последовательности. Конспект аккумулирует в себе предыдущие виды записи, позволяет всесторонне охватить содержание книги, статьи. Поэтому умение составлять план, тезисы, делать выписки и другие записи определяет и технологию составления конспекта.

Как правильно составлять конспект? Внимательно прочитайте текст. Уточните в справочной литературе непонятные слова. При записи не забудьте вынести справочные данные на поля конспекта. Выделите главное,

составьте план, представляющий собой перечень заголовков, подзаголовков, вопросов, последовательно раскрываемых затем в конспекте. Это первый элемент конспекта. Вторым элементом конспекта являются тезисы. Тезис - это кратко сформулированное положение. Для лучшего усвоения и запоминания материала следует записывать тезисы своими словами. Тезисы, выдвигаемые в конспекте, нужно доказывать. Поэтому третий элемент конспекта - основные доводы, доказывающие истинность рассматриваемого тезиса. В конспекте могут быть положения и примеры. Законспектируйте материал, четко следуя пунктам плана. При конспектировании старайтесь выразить мысль своими словами. Записи следует вести четко, ясно. Грамотно записывайте цитаты. Цитируя, учитывайте лаконичность, значимость мысли. При оформлении конспекта необходимо стремиться к емкости каждого предложения. Мысли автора книги следует излагать кратко, заботясь о стиле и выразительности написанного. Число дополнительных элементов конспекта должно быть логически обоснованным, записи должны распределяться в определенной последовательности, отвечающей логической структуре произведения. Для уточнения и дополнения необходимо оставлять поля.

Конспектирование - наиболее сложный этап работы. Овладение навыками конспектирования требует от студента целеустремленности, повседневной самостоятельной работы. Конспект ускоряет повторение материала, экономит время при повторном, после определенного перерыва, обращении к уже знакомой работе. Учитывая индивидуальные особенности каждого студента, можно дать лишь некоторые, наиболее оправдавшие себя общие правила, с которыми преподаватель и обязан познакомить студентов:

1. Главное в конспекте не объем, а содержание. В нем должны быть отражены основные принципиальные положения источника, то новое, что внес его автор, основные методологические положения работы. Умение излагать мысли автора сжато, кратко и собственными словами приходит с опытом и знаниями. Но их накоплению помогает соблюдение одного важного правила – не торопиться записывать при первом же чтении, вносить в конспект лишь то, что стало ясным.

2. Форма ведения конспекта может быть самой разнообразной, она может изменяться, совершенствоваться. Но начинаться конспект всегда должен с указания полного наименования работы, фамилии автора, года и места издания; цитаты берутся в кавычки с обязательной ссылкой на страницу книги.

3. Конспект не должен быть «слепым», безликим, состоящим из сплошного текста. Особо важные места, яркие примеры выделяются цветным подчеркиванием, взятием в рамочку, оттенением, пометками на полях специальными знаками, чтобы можно было быстро найти нужное положение. Дополнительные материалы из других источников можно давать на полях, где записываются свои суждения, мысли, появившиеся уже после составления конспекта.

ПОДГОТОВКА К ПРАКТИКО-ОРИЕНТИРОВАННЫМ ЗАДАНИЯМ

Практико-ориентированные задания выступают средством формирования у студентов системы интегрированных умений и навыков, необходимых для освоения профессиональных компетенций. Это могут быть ситуации, требующие применения умений и навыков, специфичных для соответствующего профиля обучения (знания содержания предмета), ситуации, требующие организации деятельности, выбора её оптимальной структуры личностно-ориентированных ситуаций (нахождение нестандартного способа решения).

Кроме этого, они выступают средством формирования у студентов умений определять, разрабатывать и применять оптимальные методы решения профессиональных задач. Они строятся на основе ситуаций, возникающих на различных уровнях осуществления практики и формулируются в виде производственных поручений (заданий).

Под *практико-ориентированными заданиями* понимают задачи из окружающей действительности, связанные с формированием практических навыков, необходимых в повседневной жизни, в том числе с использованием элементов производственных процессов.

Цель практико-ориентированных заданий – приобретение умений и навыков практической деятельности по изучаемой дисциплине.

Задачи практико-ориентированных заданий:

- закрепление, углубление, расширение и детализация знаний студентов при решении конкретных задач;
- развитие познавательных способностей, самостоятельности мышления, творческой активности;
- овладение новыми методами и методиками изучения конкретной учебной дисциплины;
- обучение приемам решения практических задач;
- выработка способности логического осмысления полученных знаний для выполнения заданий;
- обеспечение рационального сочетания коллективной и индивидуальной форм обучения.

Важными отличительными особенностями практико-ориентированных задания от стандартных задач (предметных, межпредметных, прикладных) являются:

- значимость (познавательная, профессиональная, общекультурная, социальная) получаемого результата, что обеспечивает познавательную мотивацию обучающегося;
- условие задания сформулировано как сюжет, ситуация или проблема, для разрешения которой необходимо использовать знания из разных разделов основного предмета, из другого предмета или из жизни, на которые нет явного указания в тексте задания;

- информация и данные в задании могут быть представлены в различной форме (рисунок, таблица, схема, диаграмма, график и т.д.), что потребует распознавания объектов;

- указание (явное или неявное) области применения результата, полученного при решении задания.

Кроме выделенных четырех характеристик, практико-ориентированные задания имеют следующие:

1. по структуре эти задания – нестандартные, т.е. в структуре задания не все его компоненты полностью определены;

2. наличие избыточных, недостающих или противоречивых данных в условии задания, что приводит к объемной формулировке условия;

3. наличие нескольких способов решения (различная степень рациональности), причем данные способы могут быть неизвестны учащимся, и их потребуется сконструировать.

При выполнении практико-ориентированных заданий следует руководствоваться следующими общими рекомендациями:

- для выполнения практико-ориентированного задания необходимо внимательно прочитать задание, повторить лекционный материал по соответствующей теме, изучить рекомендуемую литературу, в т.ч. дополнительную;

- выполнение практико-ориентированного задания включает постановку задачи, выбор способа решения задания, разработку алгоритма практических действий, программы, рекомендаций, сценария и т. п.;

- если практико-ориентированное задание выдается по вариантам, то получить номер варианта исходных данных у преподавателя; если нет вариантов, то нужно подобрать исходные данные самостоятельно, используя различные источники информации;

- для выполнения практико-ориентированного задания может использоваться метод малых групп. Работа в малых группах предполагает решение определенных образовательных задач в рамках небольших групп с последующим обсуждением полученных результатов. Этот метод развивает навыки сотрудничества, достижения компромиссного решения, аналитические способности.

ПОДГОТОВКА К ПРОМЕЖУТОЧНОЙ АТТЕСТАЦИИ

При подготовке к экзамену по дисциплине «Управление проектами и программами» обучающемуся рекомендуется:

1. повторить пройденный материал и ответить на вопросы, используя конспект и материалы лекций. Если по каким-либо вопросам у студента недостаточно информации в лекционных материалах, то необходимо получить информацию из раздаточных материалов и/или учебников (литературы), рекомендованных для изучения дисциплины «Управление проектами и программами».

Целесообразно также дополнить конспект лекций наиболее существенными и важными тезисами для рассматриваемого вопроса;

2. при изучении основных и дополнительных источников информации в рамках выполнения заданий на экзамене особое внимание необходимо уделять схемам, рисункам, графикам и другим иллюстрациям, так как подобные графические материалы, как правило, в наглядной форме отражают главное содержание изучаемого вопроса;

3. при изучении основных и дополнительных источников информации в рамках выполнения заданий на экзамене (в случаях, когда отсутствует иллюстративный материал) особое внимание необходимо обращать на наличие в тексте словосочетаний вида «во-первых», «во-вторых» и т.д., а также дефисов и перечислений (цифровых или буквенных), так как эти признаки, как правило, позволяют структурировать ответ на предложенное задание.

Подобную текстовую структуризацию материала слушатель может трансформировать в рисунки, схемы и т. п. для более краткого, наглядного и удобного восприятия (иллюстрации целесообразно отразить в конспекте лекций – это позволит оперативно и быстро найти, в случае необходимости, соответствующую информацию);

4. следует также обращать внимание при изучении материала для подготовки к экзамену на словосочетания вида «таким образом», «подводя итог сказанному» и т.п., так как это признаки выражения главных мыслей и выводов по изучаемому вопросу (пункту, разделу). В отдельных случаях выводы по теме (разделу, главе) позволяют полностью построить (восстановить, воссоздать) ответ на поставленный вопрос (задание), так как содержат в себе основные мысли и тезисы для ответа.

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФГБОУ ВО «Уральский государственный горный университет»



**МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ОРГАНИЗАЦИИ
САМОСТОЯТЕЛЬНОЙ РАБОТЫ И ВЫПОЛНЕНИЮ
ЗАДАНИЙ ОБУЧАЮЩИХСЯ**

по дисциплине

**Б1.В.04 ДУХОВНО-ПРАВСТВЕННАЯ КУЛЬТУРА И
ПАТРИОТИЧЕСКОЕ ВОСПИТАНИЕ**

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Методические указания по освоению дисциплины

Освоение лекционного курса

Лекции по дисциплине дают основной теоретический материал, являющийся базой для восприятия практического материала. После прослушивания лекции необходимо обратиться к рекомендуемой литературе, прочитать соответствующие темы, уяснить основные термины, проблемные вопросы и подходы к их решению, а также рассмотреть дополнительный материал по теме.

Главное в период подготовки к лекционным занятиям – научиться методам самостоятельного умственного труда, сознательно развивать свои творческие способности и овладевать навыками творческой работы. Для этого необходимо строго соблюдать дисциплину учебы и поведения. Четкое планирование своего рабочего времени и отдыха является необходимым условием для успешной самостоятельной работы. В основу его нужно положить рабочие программы изучаемых в семестре дисциплин.

Каждому студенту следует составлять еженедельный и семестровый планы работы, а также план на каждый рабочий день. С вечера всегда надо распределять работу на завтрашний день. В конце каждого дня целесообразно подводить итог работы: тщательно проверить, все ли выполнено по намеченному плану, не было ли каких-либо отступлений, а если были, по какой причине это произошло. Нужно осуществлять самоконтроль, который является необходимым условием успешной учебы. Если что-то осталось невыполненным, необходимо изыскать время для завершения этой части работы, не уменьшая объема недельного плана.

Одним из важных элементов освоения лекционного курса является самостоятельная работа на лекции. Слушание и запись лекций – сложный вид вузовской аудиторной работы. Внимательное слушание и конспектирование лекций предполагает интенсивную умственную деятельность студента. Краткие записи лекций, их конспектирование помогает усвоить учебный материал. Конспект является полезным тогда, когда записано самое существенное, основное и сделано это самим студентом. Не надо стремиться записать дословно всю лекцию. Такое «конспектирование» приносит больше вреда, чем пользы. Запись лекций рекомендуется вести по возможности собственными формулировками. Желательно запись осуществлять на одной странице, а следующую оставлять для проработки учебного материала самостоятельно в домашних условиях. Конспект лекции лучше подразделять на пункты, параграфы, соблюдая красную строку. Этому в большой степени будут способствовать пункты плана лекции, предложенные преподавателями. Принципиальные места, определения, формулы и другие замечаниями «важно», «особо важно», «хорошо запомнить» и т.п. с помощью разноцветных маркеров или ручек. Лучше если они будут не приходилось просить их у однокурсников и тем самым не отвлекать их. Целесообразно разработать собственную «маркографию» (значения слов). Не лишним будет и изучение основ стенографии. Работа всегда необходимо использовать не только учебник, но и дополнительные материалы, рекомендованные лектором. Именно такая серьезная работа с лекционным материалом позволит глубоко овладеть знаниями.

Рассмотрена методической комиссией

Рассмотрена методической комиссией

Инженерно-экономическое

(название факультета)

Председатель

Рассмотрена методической комиссией

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Самостоятельное изучение

Самостоятельное изучение тем курса осуществляется по рекомендуемой литературе к дисциплине. При работе правильно ее читать, вести записи. Самостоятельная работа также включает самостоятельное теоретическое исследование

преподавателем на лекциях) – это важнейшее условие формирования научного способа познания. Основные приемы можно свести к следующим:

- составить перечень книг, с которыми следует познакомиться;
- перечень должен быть систематизированным (что необходимо для семинаров, что для экзаменов, что пригодится для написания курсовых и выпускных квалификационных работ, а что выходит за рамками официальной учебной деятельности, и расширяет общую культуру);
- обязательно выписывать все выходные данные по каждой книге (при написании курсовых и дипломных работ это позволит экономить время);
- определить, какие книги (или какие главы книг) следует прочитать более внимательно, а какие – просто просмотреть;
- при составлении перечней литературы следует посоветоваться с преподавателями и научными руководителями, которые помогут сориентироваться, на что стоит обратить большее внимание, а на что вообще не стоит тратить время;
- все прочитанные книги, учебники и статьи следует конспектировать, но это не означает, что надо конспектировать «все подряд»: можно выписывать кратко основные идеи автора и иногда приводить наиболее яркие и показательные цитаты (с указанием страниц);
- если книга – собственная, то допускается делать на полях книги краткие пометки или же в конце книги, на пустых страницах просто сделать свой «предметный указатель», где отмечаются наиболее интересные мысли и обязательно указываются страницы в тексте автора;
- следует выработать способность «воспринимать» сложные тексты; для этого лучший прием – научиться «читать медленно», когда понятно каждое прочитанное слово (а если слово незнакомое, то либо с помощью словаря, либо с помощью преподавателя обязательно его узнать); Таким образом, чтение научного текста является частью познавательной деятельности. Ее цель – извлечение из текста необходимой информации.

От того на сколько осознанна читающим собственная внутренняя установка при обращении к печатному слову (найти нужные сведения, усвоить информацию полностью или частично, критически проанализировать материал и т.п.) во многом зависит эффективность осуществляемого действия. Грамотная работа с книгой, особенно если речь идет о научной литературе, предполагает соблюдение ряда правил, для овладения которыми необходимо настойчиво учиться. Это серьезный, кропотливый труд. Прежде всего, при такой работе невозможен формальный, поверхностный подход. Не механическое заучивание, не простое накопление цитат, выдержек, а сознательное усвоение прочитанного, осмысление его, стремление дойти до сути – вот главное правило. Другое правило – соблюдение при работе над книгой определенной последовательности. Вначале следует ознакомиться с оглавлением, содержанием предисловия или введения. Это дает общую ориентировку, представление о структуре и вопросах, которые рассматриваются в книге.

Следующий этап – чтение. Первый раз целесообразно прочитать книгу с начала до конца, чтобы получить о ней цельное представление. При повторном чтении происходит постепенное глубокое осмысление каждой главы, критического материала и позитивного изложения; выделение основных идей, системы аргументов, наиболее ярких примеров и т.д. Непременным правилом чтения должно быть выяснение незнакомых слов, терминов, выражений, неизвестных имен, названий. Студенты с этой целью заводят специальные тетради или блокноты. Важная роль в связи с этим принадлежит библиографической подготовке студентов. Она включает в себя умение активно, быстро пользоваться научным аппаратом книги, справочными изданиями, каталогами, умение вести поиск необходимой информации, обрабатывать и систематизировать ее.

Выделяют четыре основные установки в чтении научного текста:

- информационно-поисковая (задача – найти, выделить искомую информацию);

- усваивающая (усилия читателя направлены на то, чтобы как можно полнее осознать и запомнить как сами сведения, излагаемые автором, так и всю логику его рассуждений);
- аналитико-критическая (читатель стремится критически осмыслить материал, проанализировав его, определив свое отношение к нему);
- творческая (создает у читателя готовность в том или ином виде – как отправной пункт для своих рассуждений, как образ для действия по аналогии и т.п. – использовать суждения автора, ход его мыслей, результат наблюдения, разработанную методику, дополнить их, подвергнуть новой проверке).

С наличием различных установок обращения к научному тексту связано существование и нескольких видов чтения:

- библиографическое – просматривание карточек каталога, рекомендательных списков, сводных списков журналов и статей за год и т.п.;
- просмотровое – используется для поиска материалов, содержащих нужную информацию, обычно к нему прибегают сразу после работы со списками литературы и каталогами, в результате такого просмотра читатель устанавливает, какие из источников будут использованы в дальнейшей работе;
- ознакомительное – подразумевает сплошное, достаточно подробное прочтение отобранных статей, глав, отдельных страниц, цель – познакомиться с характером информации, узнать, какие вопросы вынесены автором на рассмотрение, провести сортировку материала;
- изучающее – предполагает доскональное освоение материала; в ходе такого чтения проявляется доверие читателя к автору, готовность принять изложенную информацию, реализуется установка на предельно полное понимание материала;
- аналитико-критическое и творческое чтение – два вида чтения близкие между собой тем, что участвуют в решении исследовательских задач.

Первый из них предполагает направленный критический анализ, как самой информации, так и способов ее получения и подачи автором; второе – поиск тех суждений, фактов, по которым или в связи с которыми, читатель считает нужным высказать собственные мысли.

Из всех рассмотренных видов чтения основным для студентов является изучающее – именно оно позволяет в работе с учебной литературой накапливать знания в различных областях. Вот почему именно этот вид чтения в рамках учебной деятельности должен быть освоен в первую очередь. Кроме того, при овладении данным видом чтения формируются основные приемы, повышающие эффективность работы с научным текстом. Научная методика работы с литературой предусматривает также ведение записи прочитанного. Это позволяет привести в систему знания, полученные при чтении, сосредоточить внимание на главных положениях, зафиксировать, закрепить их в памяти, а при необходимости вновь обратиться к ним.

Основные виды систематизированной записи прочитанного:

- Аннотирование – предельно краткое связное описание просмотренной или прочитанной книги (статьи), ее содержания, источников, характера и назначения.
- Планирование – краткая логическая организация текста, раскрывающая содержание и структуру изучаемого материала.
- Тезирование – лаконичное воспроизведение основных утверждений автора без привлечения фактического материала.
- Цитирование – дословное выписывание из текста выдержек, извлечений, наиболее существенно отражающих ту или иную мысль автора.
- Конспектирование – краткое и последовательное изложение содержания прочитанного. Конспект – сложный способ изложения содержания книги или статьи в логической последовательности. Конспект аккумулирует в себе предыдущие виды записи, позволяет всесторонне охватить содержание книги, статьи. Поэтому умение составлять

план, тезисы, делать выписки и другие записи определяет и технологию составления конспекта.

Как правильно составлять конспект? Внимательно прочитайте текст. Уточните в справочной литературе непонятные слова. При записи не забудьте вынести справочные данные на поля конспекта. Выделите главное, составьте план, представляющий собой перечень заголовков, подзаголовков, вопросов, последовательно раскрываемых затем в конспекте. Это первый элемент конспекта. Вторым элементом конспекта являются тезисы. Тезис - это кратко сформулированное положение. Для лучшего усвоения и запоминания материала следует записывать тезисы своими словами. Тезисы, выдвигаемые в конспекте, нужно доказывать. Поэтому третий элемент конспекта - основные доводы, доказывающие истинность рассматриваемого тезиса. В конспекте могут быть положения и примеры. Законспектируйте материал, четко следуя пунктам плана. При конспектировании старайтесь выразить мысль своими словами. Записи следует вести четко, ясно. Грамотно записывайте цитаты. Цитируя, учитывайте лаконичность, значимость мысли. При оформлении конспекта необходимо стремиться к емкости каждого предложения. Мысли автора книги следует излагать кратко, заботясь о стиле и выразительности написанного. Число дополнительных элементов конспекта должно быть логически обоснованным, записи должны 15 распределяться в определенной последовательности, отвечающей логической структуре произведения. Для уточнения и дополнения необходимо оставлять поля.

Конспектирование - наиболее сложный этап работы. Овладение навыками конспектирования требует от студента целеустремленности, повседневной самостоятельной работы. Конспект ускоряет повторение материала, экономит время при повторном, после определенного перерыва, обращении к уже знакомой работе. Учитывая индивидуальные особенности каждого студента, можно дать лишь некоторые, наиболее оправдавшие себя общие правила, с которыми преподаватель и обязан познакомить студентов:

1. Главное в конспекте не объем, а содержание. В нем должны быть отражены основные принципиальные положения источника, то новое, что внес его автор, основные методологические положения работы. Умение излагать мысли автора сжато, кратко и собственными словами приходит с опытом и знаниями. Но их накоплению помогает соблюдение одного важного правила – не торопиться записывать при первом же чтении, вносить в конспект лишь то, что стало ясным.

2. Форма ведения конспекта может быть самой разнообразной, она может изменяться, совершенствоваться. Но начинаться конспект всегда должен с указания полного наименования работы, фамилии автора, года и места издания; цитаты берутся в кавычки с обязательной ссылкой на страницу книги.

3. Конспект не должен быть «слепым», безликим, состоящим из сплошного текста. Особо важные места, яркие примеры выделяются цветным подчеркиванием, взятием в рамочку, оттенением, пометками на полях специальными знаками, чтобы можно было быстро найти нужное положение. Дополнительные материалы из других источников можно давать на полях, где записываются свои суждения, мысли, появившиеся уже после составления конспекта.

Подготовка к тестированию

Тестирование - система стандартизированных заданий, позволяющая автоматизировать процедуру измерения уровня знаний и умений обучающегося.

Тестовая система предусматривает вопросы / задания, на которые слушатель должен дать один или несколько вариантов правильного ответа из предложенного списка ответов. При поиске ответа необходимо проявлять внимательность. Прежде всего, следует иметь в виду, что в предлагаемом задании всегда будет один правильный и один неправильный

ответ. Это оговаривается перед каждым тестовым вопросом. Всех правильных или всех неправильных ответов (если это специально не оговорено в формулировке вопроса) быть не может. Нередко в вопросе уже содержится смысловая подсказка, что правильным является только один ответ, поэтому при его нахождении продолжать дальнейшие поиски уже не требуется.

На отдельные тестовые задания не существует однозначных ответов, поскольку хорошее знание и понимание содержащегося в них материала позволяет найти такие ответы самостоятельно. Именно на это слушателям и следует ориентироваться, поскольку полностью запомнить всю получаемую информацию и в точности ее воспроизвести при ответе невозможно. Кроме того, вопросы в тестах могут быть обобщенными, не затрагивать каких-то деталей.

Тестовые задания сгруппированы по темам учебной дисциплины. Количество тестовых вопросов/заданий по каждой теме дисциплины определено так, чтобы быть достаточным для оценки знаний обучающегося по всему пройденному материалу.

При подготовке к тестированию студенту следует внимательно перечитать конспект лекций, основную и дополнительную литературу по той теме (разделу), по которому предстоит писать тест.

Для текущей аттестации по дисциплине «Духовно-нравственная культура и патриотическое воспитание» применяются тесты, которые выполняются по разделам № 1-4.

Предлагаются задания по изученным темам в виде открытых и закрытых вопросов (35 вопросов в каждом варианте).

Образец тестового задания

1. Древнейший человек на Земле появился около 3 млн. лет назад. Когда появились первые люди на Урале?

- а) 1млн. лет назад,
- б) 300 тыс. лет назад,
- в) около. 150 тыс. лет назад.

2. В каком регионе Урала находится укрепленное поселение бронзового века “Аркаим”:

- а) в Курганской
- б) в Челябинской,
- в) в Свердловской.

3. Уральский город, где расположена известная наклонная башня Демидовых:

- а) Кунгур
- б) Невьянск
- в) Екатеринбург
- г) Соликамск

4. В каком году была основана Екатеринбургская горнозаводская школа?

- а) 1723
- б) 1783
- в) 1847

5. Почему на гербе Уральского государственного горного университета изображена императорская корона?

- а) потому что он был основан императором Николаем II
- б) по личной просьбе представительницы царского дома Романовых О.Н. Куликовской-Романовой, посетившей Горный университет
- в) для красоты

6. Из приведенных волевых качеств определите те, которые необходимы для выполнения патриотического долга.

- а) Решительность, выдержка, настойчивость в преодолении препятствий и трудностей.
- б) Агрессивность, настороженность, терпимость к себе и сослуживцам.
- в) Терпимость по отношению к старшим, лояльность по отношению к окружающим

7. Печорин в произведении М.Ю. Лермонтова “Герой нашего времени” был ветераном этой войны:

- а) Русско – турецкой
- б) Кавказской
- в) Крымской
- г) Германской

Ключи:

- 1. б
- 2. б
- 3. б
- 4. а
- 5. а
- 6. а
- 7. б

Тест выполняется на отдельном листе с напечатанными тестовыми заданиями, выдаваемом преподавателем, на котором нужно обвести правильный вариант ответа. Тест подписывается сверху следующим образом: фамилия, инициалы, № группы, дата.

Оценка за тестирование определяется простым суммированием баллов за правильные ответы на вопросы.

В зависимости от типа вопроса ответ считается правильным, если:

- в тестовом задании закрытой формы с выбором ответа выбран правильный ответ;
- в тестовом задании открытой формы дан правильный ответ;
- в тестовом задании на установление правильной последовательности установлена правильная последовательность;

- в тестовом задании на установление соответствия, если сопоставление произведено верно для всех пар.

18-35 баллов (50-100%) – оценка «зачтено»

0-17 баллов (0-49%) - оценка «не зачтено»

Подготовка к групповой дискуссии

Групповая дискуссия — это одна из организационных форм познавательной деятельности обучающихся, позволяющая закрепить полученные ранее знания, восполнить недостающую информацию, сформировать умения решать проблемы, укрепить позиции, научить культуре ведения дискуссии. Тематика обсуждения выдается на первых занятиях. Подготовка осуществляется во внеаудиторное время. Регламент – 3-5 мин. на выступление. В оценивании результатов наравне с преподавателем принимают участие студенты группы.

Обсуждение проблемы (нравственной, политической, научной, профессиональной и др.) происходит коллективно, допускается корректная критика высказываний (мнений) своих сокурсников с обязательным приведением аргументов критики.

Участие каждого обучающегося в диалоге, обсуждении должно быть неформальным, но предметным.

Темы для групповых дискуссий по разделам

Тема для групповой дискуссии по разделу 1. История инженерного дела в России. Создание и развитие Уральского государственного горного университета.

Студентам заранее дается перечень великих уральцев XVIII – начала XX вв. (Демидовы, И.С. Мясников и Твердышевы, Г.В. де Генин, В.А. Глинка, М.Е. Грум-Гржимайло и др.), внесших существенный вклад в развитие металлургической и горной промышленности. Студенты разбиваются на несколько групп, каждой из которых дается один исторический персонаж. Задача студентов по литературным и интернет-источникам подробно познакомиться с биографией и трудами своего героя. В назначенный для дискуссии день они должны не только рассказать о нем и его трудах, но и, главным образом, указать на то, каким образом их жизнь и деятельность повлияла на культуру и жизненный уклад их современников, простых уральцев.

Тема для групповой дискуссии по разделу 2. «Основы российского патриотического самосознания»

Студенты должны заранее освежить в памяти произведения школьной программы: К.М. Симонова «Жди меня», М.Ю. Лермонтова «Бородино», Л.Н. Толстого «Война и мир», А.А. Фадеева «Молодая гвардия».

Вопросы, выносимые на обсуждение:

Какие специфические грани образа патриота представлены в произведениях К.М. Симонова «Жди меня», М.Ю. Лермонтова «Бородино», Л.Н. Толстого «Война и мир», А.А. Фадеева «Молодая гвардия», выделите общее и особенное.

Какие еще произведения, в которых главные герои проявляют патриотические качества, вы можете назвать. Соотнесите их с героями вышеупомянутых писателей.

Тема для групповой дискуссии по разделу 3. Религиозная культура в жизни человека и общества.

Описание изначальной установки:

Группа делится на 2 части: «верующие» и «светские». Каждая группа должна высказать аргументированные суждения по следующей теме:

«Может ли верующий человек прожить без храма/мечети/синагоги и другие культовые сооружения?»

Вопросы для обсуждения:

1. Зачем человеку нужен храм/мечеть/синагога и др. культовые сооружения?
2. Почему совесть называют голосом Божиим в человеке?
3. Что означает выражение «вечные ценности»?
4. Что мешает человеку прийти в храм/мечеть/синагогу и др. культовое сооружение?

Каждый из групп должна представить развернутые ответы на поставленные вопросы со ссылкой на религиозные источники и нормативно-правовые акты, аргументированно изложить свою позицию.

Тема для групповой дискуссии по разделу 4. «Основы духовной и социально-психологической безопасности»

Тема дискуссии: «Воспитание трезвенных убеждений»

Основой дискуссии как метода активного обучения и контроля полученных знаний является равноценное владение материалом дискуссии всеми студентами. Для этого при предварительной подготовке рекомендуется наиболее тщательно повторить темы раздела,

касающиеся формирования системы ценностей, манипуляций сознанием, методов ведения концентрированной войны, методике утверждения трезвости как базовой национальной ценности.

В начале дискуссии демонстрируется фильм Н. Михалкова «Окна Овертона» из серии Бесогон ТВ: https://www.youtube.com/watch?time_continue=8&v=BIiy4QfQIk

Затем перед студентами ставится проблемная задача: сформулировать ответ на вопрос «Возможно ли применение данной технологии формирования мировоззрения в благих целях — для воспитания трезвенных убеждений?»

Возможные варианты точек зрения:

1. Это манипулятивная технология, применение ее для воспитания трезвенных убеждений неэтично.
2. Это универсальная социально-педагогическая технология, применение ее во зло или во благо зависит от намерений автора. Использование ее в целях формирования трезвенных убеждений обосновано и может реализоваться в практической деятельности тех, кто овладел курсом «Основы утверждения трезвости»

Результатом дискуссии не могут быть однозначные выводы и формулировки. Действие ее всегда пролонгировано, что дает студентам возможность для дальнейшего обдумывания рассмотренных проблемных ситуаций, для поиска дополнительной информации по воспитанию трезвенных убеждений.

Незадолго до проведения групповой дискуссии преподаватель разделяет группу на несколько подгрупп, которая, согласно сценарию, будет представлять определенную точку зрения, информацию. При подготовке к групповой дискуссии студенту необходимо собрать материал по теме с помощью анализа научной литературы и источников.

Используя знание исторического, теологического и правового материала, исходя из изложенных изначальных концепций, каждая группа должна изложить свою точку зрения на обсуждаемый вопрос, подкрепив ее соответствующими аргументами.

Каждый из групп по очереди приводит аргументы в защиту своей позиции. Соответственно другая группа должна пытаться привести контраргументы, свидетельствующие о нецелесообразности, пагубности позиции предыдущей группы и стремится доказать, аргументированно изложить свою позицию.

Критерии оценивания: качество высказанных суждений, умение отстаивать свое мнение, культура речи, логичность.

Критерии оценки одной дискуссии:

Суждения зрелые, обоснованные, высказаны с использованием профессиональной терминологии, логично – 8-10 баллов.

Суждения не совсем зрелые или необоснованные, при ответе использована профессиональная терминология, суждение логично – 4 – 7 баллов.

Суждения незрелые, необоснованные, бытовая речь, нелогичный ответ – 2– 3 балла:

Суждения нет, бытовая речь, нелогичный ответ – 2– 3 балла.

Оценка «зачтено» выставляется обучающемуся, если он набрал 8-10 баллов

Оценка «зачтено» выставляется обучающемуся, если он набрал 4-7 баллов

Оценка «зачтено» выставляется обучающемуся, если он набрал 2-3 балла

Оценка «неудовлетворительно» выставляется обучающемуся, если он набрал 0-1 балл.

Максимальное количество баллов, которые можно набрать, работая на дискуссии – 40 баллов.

Методические указания по подготовке к промежуточной аттестации

Каждый учебный семестр заканчивается промежуточной аттестацией в виде зачетно-экзаменационной сессии. Подготовка к зачетно-экзаменационной сессии, сдача зачетов и экзаменов является также самостоятельной работой студента. Основное в подготовке к сессии – повторение всего учебного материала дисциплины, по которому необходимо сдавать зачет или экзамен. Только тот студент успевает, кто хорошо усвоил учебный материал. Если студент плохо работал в семестре, пропускал лекции, слушал их невнимательно, не конспектировал, не изучал рекомендованную литературу, то в процессе подготовки к сессии ему придется не повторять уже знакомое, а заново в короткий срок изучать весь учебный материал. Все это зачастую невозможно сделать из-за нехватки времени. Для такого студента подготовка к зачету или экзамену будет трудным, а иногда и непосильным делом, а конечный результат – возможное отчисление из учебного заведения.

Ознакомление обучающихся с процедурой и алгоритмом оценивания (в течение первой недели начала изучения дисциплины).

Сообщение результатов оценивания обучающимся.

Оформление необходимой документации.

Зачет - форма контроля промежуточной аттестации, в результате которого обучающийся получает оценку по шкале: «зачтено», «не зачтено».

Зачет проводится по расписанию.

Цель зачета – завершить курс изучения дисциплины, проверить сложившуюся у обучающегося систему знаний, понятий, отметить степень полученных знаний, определить сформированность компетенций.

Зачет подводит итог знаний, умений и навыков обучающихся по дисциплине, всей учебной работы по данному предмету.

К зачету по дисциплине «Духовно-нравственная культура и патриотическое воспитание» необходимо начинать готовиться с первой лекции, практического (семинарского) занятия, так как материал, набираемый памятью постепенно, неоднократно подвергавшийся обсуждению, образует качественные знания, формирует необходимые компетенции.

Зачет по дисциплине «Духовно-нравственная культура и патриотическое воспитание» проводится в письменной форме путем выполнения зачетного тестового задания.

При опоздании к началу зачета обучающийся на зачет не допускается. Использование средств связи, «шпаргалок», подсказок зачете является основанием для удаления обучающегося с зачета, а в зачетной ведомости проставляется оценка «не зачтено».

Для подготовки зачету (составления конспекта ответа) обучающийся должен иметь лист (несколько листов) формата А-4.

Лист (листы) формата А-4, на котором будет выполняться подготовка к ответу зачетного задания, должен быть подписан обучающимся в начале работы в правом верхнем углу. Здесь следует указать:

- Ф. И. О. обучающегося;
- группу, курс
- дату выполнения работы
- название дисциплины «Духовно-нравственная культура и патриотическое воспитание».

Страницы листов с ответами должны быть пронумерованы.

Промежуточная аттестация по итогам освоения дисциплины «Духовно-нравственная культура и патриотическое воспитание» проводится в форме теста. Выполнение теста предполагает выбор правильного варианта ответа на вопрос из числа предложенных.

На зачете преподаватель может задать обучающемуся дополнительные и уточняющие вопросы. Дополнительные вопросы задаются помимо вопросов теста и связаны, как правило, с плохим ответом. Уточняющие вопросы задаются в рамках теста и направлены на уточнение мысли студента.

Система оценивания по оценочным средствам промежуточного контроля

| Форма и описание контрольного мероприятия | Балловая стоимость контрольного мероприятия | Критерии начисления баллов |
|--|---|----------------------------|
| Тест - система стандартизированных заданий, позволяющая автоматизировать процедуру измерения уровня знаний и умений обучающегося | 0-35 баллов (35 заданий) | Правильность ответов |
| Итого | 35 баллов | |

Оценка за тестирование определяется простым суммированием баллов за правильные ответы на вопросы.

В зависимости от типа вопроса ответ считается правильным, если:

- в тестовом задании закрытой формы с выбором ответа выбран правильный ответ;
- в тестовом задании открытой формы дан правильный ответ;
- в тестовом задании на установление правильной последовательности установлена правильная последовательность;
- в тестовом задании на установление соответствия, если сопоставление произведено верно для всех пар.

Итоговая оценка по дисциплине складывается из суммы баллов текущего контроля и баллов по промежуточной аттестации.

55 - 110 балла (50-100%) - оценка «зачтено»

0 - 54 балла (0-49%) - оценка «не зачтено».

МИНОБРНАУКИ РОССИИ

ФГБОУ ВО «Уральский государственный горный университет»



УТВЕРЖДАЮ

Президент учебно-методическому комплексу

С.А. Упоров

14.10.2021

МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОЙ РАБОТЫ И ЗАДАНИЯ ДЛЯ ОБУЧАЮЩИХСЯ

Б1.О.10 УПРАВЛЕНИЕ БИЗНЕС-ПРОЦЕССАМИ

Направление подготовки

09.03.01 Информатика и вычислительная техника

Направленность (профиль)

Анализ больших данных и машинное обучение

квалификация выпускника: **магистр**

формы обучения: **очная, заочная**

Автор: Соколова О.Г., доцент, к.э.н.

Одобрена на заседании кафедры

Экономики и менеджмента

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Протокол № 1 от 10.09.2021

(Дата)

Рассмотрена методической комиссией

Инженерно-экономического факультета

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ВВЕДЕНИЕ

Самостоятельная работа в высшем учебном заведении – это часть учебного процесса, метод обучения, прием учебно-познавательной деятельности, комплексная целевая стандартизованная учебная деятельность с запланированными видом, типом, формами контроля.

Самостоятельная работа представляет собой плановую деятельность обучающихся по поручению и под методическим руководством преподавателя.

Целью самостоятельной работы студентов является закрепление тех знаний, которые они получили на аудиторных занятиях, а также способствование развитию у студентов творческих навыков, инициативы, умению организовать свое время.

Самостоятельная работа реализует следующие задачи:

- предполагает освоение курса дисциплины;
- помогает освоению навыков учебной и научной работы;
- способствует осознанию ответственности процесса познания;
- способствует углублению и пополнению знаний студентов, освоению ими навыков и умений;
- формирует интерес к познавательным действиям, освоению методов и приемов познавательного процесса,
- создает условия для творческой и научной деятельности обучающихся;
- способствует развитию у студентов таких личных качеств, как целеустремленность, заинтересованность, исследование нового.

Самостоятельная работа обучающегося выполняет следующие функции:

- развивающую (повышение культуры умственного труда, приобщение к творческим видам деятельности, обогащение интеллектуальных способностей студентов);
- информационно-обучающую (учебная деятельность студентов на аудиторных занятиях, неподкрепленная самостоятельной работой, становится мало результативной);
- ориентирующую и стимулирующую (процессу обучения придается ускорение и мотивация);
- воспитательную (формируются и развиваются профессиональные качества бакалавра и гражданина);
- исследовательскую (новый уровень профессионально-творческого мышления).

Организация самостоятельной работы студентов должна опираться на определенные требования, а, именно:

- сложность осваиваемых знаний должна соответствовать уровню развития студентов;
- стандартизация заданий в соответствии с логической системой курса дисциплины;
- объем задания должен соответствовать уровню студента;
- задания должны быть адаптированными к уровню студентов.

Содержание самостоятельной работы студентов представляет собой, с одной стороны, совокупность теоретических и практических учебных заданий, которые должен выполнить студент в процессе обучения, объект его деятельности; с другой стороны - это способ деятельности студента по выполнению соответствующего теоретического или практического учебного задания.

Свое внешнее выражение содержание самостоятельной работы студентов находит во всех организационных формах аудиторной и внеаудиторной деятельности, в ходе самостоятельного выполнения различных заданий.

Функциональное предназначение самостоятельной работы студентов в процессе лекций, практических занятий по овладению специальными знаниями заключается в самостоятельном прочтении, просмотре, прослушивании, наблюдении, конспектировании, осмыслении, запоминании и воспроизведении определенной информации. Цель и планирование самостоятельной работы студента определяет преподаватель. Вся информация осуществляется на основе ее воспроизведения.

Так как самостоятельная работа тесно связана с учебным процессом, ее необходимо рассматривать в двух аспектах:

1. аудиторная самостоятельная работа - лекционные, практические занятия;

2. внеаудиторная самостоятельная работа – дополнение лекционных материалов, подготовка к практическим занятиям, подготовка к решению кейс-задач, выполнение курсовых работ и др.

Основные формы организации самостоятельной работы студентов определяются следующими параметрами:

- содержание учебной дисциплины;
- уровень образования и степень подготовленности студентов;
- необходимость упорядочения нагрузки студентов при самостоятельной работе.

Таким образом, самостоятельная работа студентов является важнейшей составной частью процесса обучения.

Методические указания по организации самостоятельной работы и задания для обучающихся по дисциплине «*Управление бизнес-процессами предприятия*» обращают внимание студента на главное, существенное в изучаемой дисциплине, помогают выработать умение анализировать явления и факты, связывать теоретические положения с практикой, а также облегчают подготовку к выполнению *курсовой работы* и сдаче экзамена.

Настоящие методические указания позволят студентам самостоятельно овладеть фундаментальными знаниями, профессиональными умениями и навыками деятельности по профилю подготовки, опытом творческой и исследовательской деятельности, и направлены на формирование компетенций, предусмотренных учебным планом поданному профилю.

Видами самостоятельной работы обучающихся по дисциплине «*Управление бизнес-процессами предприятия*» являются:

- повторение материала лекций;
- самостоятельное изучение тем курса (в т.ч. рассмотрение основных категорий дисциплины, работа с литературой);
- подготовка к практическим и лабораторным занятиям (в т.ч. ответы на вопросы для самопроверки);
- подготовка курсовой работы;
- подготовка к экзамену.

В методических указаниях представлены материалы для самостоятельной работы и рекомендации по организации отдельных её видов.

ВОПРОСЫ ДЛЯ САМОПРОВЕРКИ

Тема 1. Современная система взглядов на управление организацией.

Охарактеризуйте систему управления организацией.

Опишите основные подходы к управлению организацией.

Тема 2. Бизнес-процесс как объект исследования

Проклассифицируйте бизнес-процессы.

Как следует исследовать бизнес-процессы организации?

Каким образом осуществляется управление бизнес-процессами?

Тема 3. Современные подходы к моделированию бизнес-процессов

Назовите цели и задачи моделирования бизнес-процессов.

Опишите способы описания бизнес-процессов.

Охарактеризуйте методологии моделирования бизнес-процессов.

Тема 4. Методология моделирования бизнес-процессов

Опишите методологию моделирования SADT, IDEF, ARIS, BPMN.

Как Вы знаете программные средства моделирования бизнес-процессов?

Тема 5. Оценка и основные подходы к оптимизации бизнес-процессов на предприятии

Как осуществляется оценка бизнес-процессов на предприятии ?

Опишите методы анализа и оптимизации бизнес-процессов на предприятии .

Каким образом управление бизнес-процессами может быть связано со сбалансированной системой показателей и ключевыми показателями эффективности?

ОСНОВНЫЕ КАТЕГОРИИ ДИСЦИПЛИНЫ

Тема 1. Современная система взглядов на управление организацией.

Система управления организацией
Подход к управлению организацией

Тема 2. Бизнес-процесс как объект исследования

Бизнес-процесс
Управление бизнес-процессами

Тема 3. Современные подходы к моделированию бизнес-процессов

Системный анализ
Моделирование бизнес-процессами

Тема 4. Методология моделирования бизнес-процессов

SADT
DEF
ARIS
BPMN

Тема 5. Оценка и основные подходы к оптимизации бизнес-процессов на предприятии

Оценка бизнес-процессов
Минерально-сырьевой комплекс
Оптимизация бизнес-процессов
Сбалансированная система показателей
Ключевые показатели эффективности

САМООРГАНИЗАЦИЯ РАБОТЫ С ЛИТЕРАТУРОЙ

Самостоятельное изучение тем курса осуществляется на основе списка рекомендуемой литературы к дисциплине. При работе с книгой необходимо научиться правильно ее читать, вести записи. Самостоятельная работа с учебными и научными изданиями профессиональной и общекультурной тематики – это важнейшее условие формирования научного способа познания.

Основные приемы работы с литературой можно свести к следующим:

- составить перечень книг, с которыми следует познакомиться;
- перечень должен быть систематизированным (что необходимо для семинаров, что для экзаменов, что пригодится для написания курсовых и выпускных квалификационных работ (ВКР), а что выходит за рамки официальной учебной деятельности, и расширяет общую культуру);
- обязательно выписывать все выходные данные по каждой книге (при написании курсовых и выпускных квалификационных работ это позволит экономить время);
- определить, какие книги (или какие главы книг) следует прочитать более внимательно, а какие – просто просмотреть;
- при составлении перечней литературы следует посоветоваться с преподавателями и руководителями ВКР, которые помогут сориентироваться, на что стоит обратить большее внимание, а на что вообще не стоит тратить время;
- все прочитанные монографии, учебники и научные статьи следует конспектировать, но это не означает, что надо конспектировать «все подряд»: можно выписывать кратко основные идеи автора и иногда приводить наиболее яркие и показательные цитаты (с указанием страниц);
- если книга – собственная, то допускается делать на полях книги краткие пометки или же в конце книги, на пустых страницах просто сделать свой «предметный указатель», где отмечаются наиболее интересные мысли и обязательно указываются страницы в тексте автора;
- следует выработать способность «воспринимать» сложные тексты; для этого лучший прием – научиться «читать медленно», когда понятно каждое прочитанное слово (а если слово незнакомое, то либо с помощью словаря, либо с помощью преподавателя обязательно его узнать). Таким образом, чтение текста является частью познавательной деятельности. Ее цель – извлечение из текста необходимой информации.

От того, насколько осознанна читающим собственная внутренняя установка при обращении к печатному слову (найти нужные сведения, усвоить информацию полностью или частично, критически проанализировать материал и т.п.) во многом зависит эффективность осуществляемого действия. Грамотная работа с книгой, особенно если речь идет о научной литературе, предполагает соблюдение ряда правил, для овладения которыми необходимо настойчиво учиться. Это серьезный, кропотливый труд. Прежде всего, при такой работе невозможен формальный, поверхностный подход. Не механическое заучивание, не простое накопление цитат, выдержек, а

сознательное усвоение прочитанного, осмысление его, стремление дойти до сути – вот главное правило. Другое правило – соблюдение при работе над книгой определенной последовательности. Вначале следует ознакомиться с оглавлением, содержанием предисловия или введения. Это дает общую ориентировку, представление о структуре и вопросах, которые рассматриваются в книге.

Следующий этап – чтение. Первый раз целесообразно прочитать книгу с начала до конца, чтобы получить о ней цельное представление. При повторном чтении происходит постепенное глубокое осмысление каждой главы, критического материала и позитивного изложения; выделение основных идей, системы аргументов, наиболее ярких примеров и т.д. Непременным правилом чтения должно быть выяснение незнакомых слов, терминов, выражений, неизвестных имен, названий. Студентам с этой целью рекомендуется заводить специальные тетради или блокноты. Важная роль в связи с этим принадлежит библиографической подготовке студентов. Она включает в себя умение активно, быстро пользоваться научным аппаратом книги, справочными изданиями, каталогами, умение вести поиск необходимой информации, обрабатывать и систематизировать ее.

Выделяют четыре основные установки в чтении текста:

- информационно-поисковая (задача – найти, выделить искомую информацию);
- усваивающая (усилия читателя направлены на то, чтобы как можно полнее осознать и запомнить, как сами сведения, излагаемые автором, так и всю логику его рассуждений);
- аналитико-критическая (читатель стремится критически осмыслить материал, проанализировав его, определив свое отношение к нему);
- творческая (создает у читателя готовность в том или ином виде – как отправной пункт для своих рассуждений, как образ для действия по аналогии и т.п. – использовать суждения автора, ход его мыслей, результат наблюдения, разработанную методику, дополнить их, подвергнуть новой проверке).

С наличием различных установок обращения к тексту связано существование и нескольких видов чтения:

- библиографическое – просматривание карточек каталога, рекомендательных списков, сводных списков журналов и статей за год и т.п.;
- просмотрное – используется для поиска материалов, содержащих нужную информацию, обычно к нему прибегают сразу после работы со списками литературы и каталогами, в результате такого просмотра читатель устанавливает, какие из источников будут использованы в дальнейшей работе;
- ознакомительное – подразумевает сплошное, достаточно подробное прочтение отобранных статей, глав, отдельных страниц; цель – познакомиться с характером информации, узнать, какие вопросы вынесены автором на рассмотрение, провести сортировку материала;
- изучающее – предполагает доскональное освоение материала; в ходе такого чтения проявляется доверие читателя к автору, готовность принять

изложенную информацию, реализуется установка на предельно полное понимание материала;

- аналитико-критическое и творческое чтение – два вида чтения близкие между собой тем, что участвуют в решении исследовательских задач.

Первый из них предполагает направленный критический анализ, как самой информации, так и способов ее получения и подачи автором; второе – поиск тех суждений, фактов, по которым, или, в связи с которыми, читатель считает нужным высказать собственные мысли.

Из всех рассмотренных видов чтения основным для студентов является изучающее – именно оно позволяет в работе с учебной и научной литературой накапливать знания в различных областях. Вот почему именно этот вид чтения в рамках образовательной деятельности должен быть освоен в первую очередь. Кроме того, при овладении данным видом чтения формируются основные приемы, повышающие эффективность работы с текстом. Научная методика работы с литературой предусматривает также ведение записи прочитанного. Это позволяет привести в систему знания, полученные при чтении, сосредоточить внимание на главных положениях, зафиксировать, закрепить их в памяти, а при необходимости вновь обратиться к ним.

Основные виды систематизированной записи прочитанного:

Аннотирование – предельно краткое связное описание просмотренной или прочитанной книги (статьи), ее содержания, источников, характера и назначения.

Планирование – краткая логическая организация текста, раскрывающая содержание и структуру изучаемого материала.

Тезирование – лаконичное воспроизведение основных утверждений автора без привлечения фактического материала.

Цитирование – дословное выписывание из текста выдержек, извлечений, наиболее существенно отражающих ту или иную мысль автора.

Конспектирование – краткое и последовательное изложение содержания прочитанного. Конспект – сложный способ изложения содержания книги или статьи в логической последовательности. Конспект аккумулирует в себе предыдущие виды записи, позволяет всесторонне охватить содержание книги, статьи. Поэтому умение составлять план, тезисы, делать выписки и другие записи определяет и технологию составления конспекта.

Как правильно составлять конспект? Внимательно прочитайте текст. Уточните в справочной литературе непонятные слова. При записи не забудьте вынести справочные данные на поля конспекта. Выделите главное, составьте план, представляющий собой перечень заголовков, подзаголовков, вопросов, последовательно раскрываемых затем в конспекте. Это первый элемент конспекта. Вторым элементом конспекта являются тезисы. Тезис - это кратко сформулированное положение. Для лучшего усвоения и запоминания материала следует записывать тезисы своими словами. Тезисы, выдвигаемые в конспекте, нужно доказывать. Поэтому третий элемент конспекта - основные доводы, доказывающие истинность рассматриваемого тезиса. В конспекте

могут быть положения и примеры. Законспектируйте материал, четко следуя пунктам плана. При конспектировании старайтесь выразить мысль своими словами. Записи следует вести четко, ясно. Грамотно записывайте цитаты. Цитируя, учитывайте лаконичность, значимость мысли. При оформлении конспекта необходимо стремиться к емкости каждого предложения. Мысли автора книги следует излагать кратко, заботясь о стиле и выразительности написанного. Число дополнительных элементов конспекта должно быть логически обоснованным, записи должны распределяться в определенной последовательности, отвечающей логической структуре произведения. Для уточнения и дополнения необходимо оставлять поля.

Конспектирование – наиболее сложный этап работы. Овладение навыками конспектирования требует от студента целеустремленности, повседневной самостоятельной работы. Конспект ускоряет повторение материала, экономит время при повторном, после определенного перерыва, обращении к уже знакомой работе. Учитывая индивидуальные особенности каждого студента, можно дать лишь некоторые, наиболее оправдавшие себя общие правила, с которыми преподаватель и обязан познакомить студентов:

1. Главное в конспекте не объем, а содержание. В нем должны быть отражены основные принципиальные положения источника, то новое, что внес его автор, основные методологические положения работы. Умение излагать мысли автора сжато, кратко и собственными словами приходит с опытом и знаниями. Но их накоплению помогает соблюдение одного важного правила – не торопиться записывать при первом же чтении, вносить в конспект лишь то, что стало ясным.

2. Форма ведения конспекта может быть самой разнообразной, она может изменяться, совершенствоваться. Но начинаться конспект всегда должен с указания полного наименования работы, фамилии автора, года и места издания; цитаты берутся в кавычки с обязательной ссылкой на страницу книги.

3. Конспект не должен быть «слепым», безликим, состоящим из сплошного текста. Особо важные места, яркие примеры выделяются цветным подчеркиванием, взятием в рамочку, оттенением, пометками на полях специальными знаками, чтобы можно было быстро найти нужное положение. Дополнительные материалы из других источников можно давать на полях, где записываются свои суждения, мысли, появившиеся уже после составления конспекта.

ПОДГОТОВКА К ПРОМЕЖУТОЧНОЙ АТТЕСТАЦИИ

При подготовке к экзамену по дисциплине «Управление бизнес-процессами предприятия» обучающемуся рекомендуется:

1. повторить пройденный материал и ответить на вопросы, используя конспект и материалы лекций. Если по каким-либо вопросам у студента недостаточно информации в лекционных материалах, то необходимо получить информацию из раздаточных материалов и/или учебников (литературы), рекомендованных для изучения дисциплины «Управление бизнес-процессами предприятия».

Целесообразно также дополнить конспект лекций наиболее существенными и важными тезисами для рассматриваемого вопроса;

2. при изучении основных и дополнительных источников информации в рамках выполнения заданий на экзамене особое внимание необходимо уделять схемам, рисункам, графикам и другим иллюстрациям, так как подобные графические материалы, как правило, в наглядной форме отражают главное содержание изучаемого вопроса;

3. при изучении основных и дополнительных источников информации в рамках выполнения заданий на экзамене (в случаях, когда отсутствует иллюстративный материал) особое внимание необходимо обращать на наличие в тексте словосочетаний вида «во-первых», «во-вторых» и т.д., а также дефисов и перечислений (цифровых или буквенных), так как эти признаки, как правило, позволяют структурировать ответ на предложенное задание.

Подобную текстовую структуризацию материала слушатель может трансформировать в рисунки, схемы и т. п. для более краткого, наглядного и удобного восприятия (иллюстрации целесообразно отразить в конспекте лекций – это позволит оперативно и быстро найти, в случае необходимости, соответствующую информацию);

4. следует также обращать внимание при изучении материала для подготовки к экзамену на словосочетания вида «таким образом», «подводя итог сказанному» и т.п., так как это признаки выражения главных мыслей и выводов по изучаемому вопросу (пункту, разделу). В отдельных случаях выводы по теме (разделу, главе) позволяют полностью построить (восстановить, воссоздать) ответ на поставленный вопрос (задание), так как содержат в себе основные мысли и тезисы для ответа.

МИНОБРНАУКИ РОССИИ

ФГБОУ ВО «Уральский государственный горный университет»



УТВЕРЖДАЮ

Проректор по учебно-методическому
комитету

С.А. Упоров

14.10.2021

МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ВЫПОЛНЕНИЮ КУРСОВОЙ РАБОТЫ

Б1.О.10 УПРАВЛЕНИЕ БИЗНЕС-ПРОЦЕССАМИ

Направление подготовки

09.03.01 Информатика и вычислительная техника

Направленность (профиль)

Анализ больших данных и машинное обучение

квалификация выпускника: **магистр**

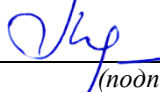
Автор: Соколова О.Г., доцент, к.э.н.

Одобрена на заседании кафедры

Экономики и менеджмента

(название кафедры)

Зав. кафедрой


(подпись)

Мочалова Л.А.

(Фамилия И.О.)

Протокол № 1 от 10.09.2021

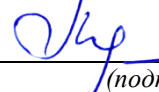
(Дата)

Рассмотрена методической комиссией

Инженерно-экономического факультета

(название факультета)

Председатель


(подпись)

Мочалова Л.А.

(Фамилия И.О.)

Протокол № 1 от 29.09.2021

(Дата)

Екатеринбург
2021

ВВЕДЕНИЕ

Данные методические рекомендации необходимы для студентов магистров по направлению подготовки 38.04.02 – «Менеджмент» при организации самостоятельной работы по дисциплине «Управление бизнес-процессами предприятия» в рамках подготовки и защиты курсовой работы.

В методических рекомендациях содержатся особенности организации подготовки курсовой работы, требования к её оформлению, а также порядок защиты и критерии оценки.

1. ОРГАНИЗАЦИЯ ПОДГОТОВКИ КУРСОВОЙ РАБОТЫ

1.1. Цели и задачи курсовой работы

Подготовка курсовой работы по дисциплине «Управление бизнес-процессами предприятия» студентами направления подготовки 38.04.02 – «Менеджмент» является важным этапом образовательного процесса, в ходе которого закладываются компетенции, позволяющие студенту использовать количественные и качественные методы для проведения прикладных исследований и управления бизнес-процессами, готовить аналитические материалы по результатам их применения. Курсовая работа по дисциплине «Управление бизнес-процессами предприятия» должна быть выполнена в форме самостоятельно проведенного научного исследования и демонстрировать способность студента грамотно пользоваться литературой, умение обобщать и анализировать собранную информацию, критически оценивать существующие идеи, теории и концепции, излагать свои мысли, грамотно структурировать материал.

Задачами выполнения курсовой работы по дисциплине «Управление бизнес-процессами предприятия» являются:

- расширение и закрепление теоретических знаний, полученных студентами в процессе лекционных и практических занятий о концепциях проектирования бизнес-процессов;
- формирование навыков научно-исследовательской работы;
- овладение навыками работы со специальной экономической литературой (монографии, брошюры, журналы, газеты и др.);
- формирование умения собирать и анализировать материал по конкретной макроэкономической проблеме.
- углубленное изучение ключевых понятий и цели использования процессного подхода при управлении предприятиями;

- овладение навыками самостоятельной творческой работы по совершенствованию бизнес-процессов, постановки целей и формулирования задач, связанных с реализацией профессиональных функций менеджера.

1.2. Выбор темы и руководство курсовой работой

Примерная тематика курсовых работ по дисциплине «Управление бизнес-процессами предприятия », разработанных преподавателем дисциплины, включает следующие темы:

1. Процессное управление компанией
2. Обоснование показателей функционирования бизнес-процессов
3. Отечественный и зарубежный опыт проведения реинжиниринга бизнес-процессов
4. Оценка эффективности функционирования бизнес-процессов
5. Оптимизация параметров бизнес-процесса «Добыча полезных ископаемых».
6. Объектно-ориентированное моделирование бизнес-процессов.
7. Разработка проекта сети бизнес-процессов в организации.
8. Реинжиниринг бизнес-процессов компании. Причины возникновения реинжиниринга бизнес-процессов.
9. Реинжиниринг бизнес-процессов и его воздействие на предприятие.
10. Реинжиниринг бизнеса на основе глобальных сетевых технологий.
11. Функционально-структурный подход в реинжиниринге бизнес-процессов
12. Управление качеством и процессный подход
13. Использование информационных технологий в процессе реинжиниринга бизнес-процессов
14. Управление производительностью процессов
15. Обоснование приоритетов управления бизнес-процессов с использованием аутсорсинга, аутстафинга, инсорсинга.
16. Моделирование бизнеса и CASE-технологии.
17. Информационные системы управления предприятием.
18. Роль информационных и интеллектуальных технологий в реинжиниринге бизнес-процессов.

Студент имеет право предложить собственную тему, обосновав целесообразность ее разработки. Преподаватель может принять либо отклонить тему, предложенную студентом, или рекомендовать ее изменение.

При выборе темы студенту рекомендуется учитывать собственные научные интересы, тематику подготовленных ранее рефератов и докладов, актуальность темы и ее практическую значимость, наличие источников литературы. Уточнение и изменение темы курсовой работы производится по согласованию с руководителем.

Преподаватель консультирует студента в ходе выполнения работы, контролирует ход ее подготовки, но не предлагает готовых решений и выводов.

1.3. План и график работы над курсовой работой

Подготовка курсовой работы начинается с составления совместно с преподавателем плана по выбранной теме. План курсовой работы обязательно должен носить развернутый характер.

Курсовая работа должна включать следующие разделы:

- содержание;
- введение;
- основная часть (три главы, разбитые на параграфы);
- заключение;
- приложения (при необходимости);
- библиографический список.

Курсовая работа должна быть выполнена в сроки, установленные руководителем.

2. РЕКОМЕНДАЦИИ ПО ПОДГОТОВКЕ ОСНОВНЫХ РАЗДЕЛОВ КУРСОВОЙ РАБОТЫ

2.1. Введение

Объем введения, как правило, не превышает 2 страниц. Во введении необходимо:

- обосновать актуальность выбранной темы;
- кратко охарактеризовать степень разработанности проблемы отечественными и зарубежными исследователями;
- сформулировать цель работы;
- определить задачи работы (т. е. обозначить основные рассматриваемые в ней вопросы);
- охарактеризовать источники получения информации и статистических данных.

Именно на основе введения формируется первое впечатление о курсовой работе, поэтому необходимо особо тщательно подойти к используемым формулировкам, особенно к определению цели и задач работы.

Во введение не включают схемы, таблицы, описания и т. п.

2.2. Основная часть

Основная часть курсовой работы, как правило, включает три главы: теоретическая, аналитическая и практическая.

Теоретическая глава призвана отразить кругозор автора в выбранной для научного исследования области; в нем должна быть четко сформулирована рассматриваемая проблема, раскрыты сущность, роль и функции исследуемого явления или процесса, особенности его изучения отечественными и зарубежными специалистами.

Обязательным элементом подготовки данной главы являются обзор и критический анализ монографической и периодической литературы. Кроме того, если этого требует тема работы, автор должен показать знание основных законодательных и других нормативно-правовых актов, регулирующих изучаемую сферу.

Аналитическая глава строится на основе качественного, количественного и графического анализа управленческой и экономической информации, характеризующей изучаемую сферу деятельности на уровне. Следует оценивать реальный уровень развития предприятия: культуру управления, реального документирования деятельности, состояния взаимодействия между подразделениями, корпоративной культуры и т.д.

При анализе практической информации обязательно должны использоваться основные методы стратегического анализа, например: SWOT-анализ, PEST-анализ, оценка конкурентоспособности на основе балльных оценок, построение стратегической карты, портфельный анализ, системный анализ, диагностика состояния предприятия и др. Проведенный качественный, количественный и графический анализ обязательно завершается качественными выводами автора, выявлением тенденций в функционировании и развитии изучаемых процессов, сравнением динамики и обоснованием взаимосвязи между качественными и количественными показателями.

Практическая глава предполагает обобщение существующих в науке взглядов и собственных рассуждений магистранта по поводу решения проблем, выявленных по отношению к исследуемому явлению или процессу в период аналитических исследований. Данная глава должна заканчиваться оформлением неких рекомендаций методического (научного) характера.

Так, например, при выборе темы курсовой работы «*Процессное управление компанией*» общее содержание работы можно охарактеризовать следующим образом:

В первой главе необходимо раскрыть теоретические аспекты процессного управления. Важно раскрыть существующие подходы к управлению организацией, их особенности, преимущества и недостатки, дать сравнительный анализ.

Во второй главе работы на основе анализа деятельности организации следует оценить структуру процессов организации, выделить основные и вспомогательные процессы, проанализировать применяемые подходы к управлению, оценить их эффективность, выявить проблемы в управлении предприятием.

В третьей главе работы следует обосновать собственные предложения по совершенствованию процесса управления на предприятии, дать рекомендации по комплексному использованию инструментов совершенствования бизнес-процессов рассматриваемой организации.

Комплексный подход к разработке системы управления компаний, ориентированной на процессы должен включать в себя следующие шаги:

- 1) определение сети процессов, включающей всю деятельность предприятия;
- 2) для каждого процесса назначение владельца процесса;
- 3) создание документации, регламентирующей процессы (при этом степень детализации процессов и соответствующих документов определяется принципом управленческой целесообразности);

4) определение стратегических целей компании, показателей и критериев их достижения; на основе этих показателей верхнего уровня определение показателей процессов;

5) каждый процесс должен управляться на основе требований процессного подхода (т.е. должна быть внедрена система управления процессами на основе цикла PDCA). Цикл управления Деминга-Шухарта Р-Д-С-А (Plan-Do-Check-Act): планирование – выполнение - проверка – управление (исправление). Р-Д-С-А – алгоритм действий руководителя по управлению процессом и достижению его целей.

6) процесс управления предприятием детально разрабатывается, документируется и обязательно включает в себя функции по стратегическому планированию и управлению на основе системы показателей и проч.

В целом при написании основной части работы необходимо соблюдать следующие требования:

- каждую главу должно завершать краткое резюме, обобщающее изложенный материал и служащее логическим переходом к следующей главе;
- недопустимо использование устаревших статистических данных и нормативных материалов;
- разделение основной части на теоретический, аналитический и практический разделы не всегда соответствует разбиению на главы, однако с содержательной точки зрения все они обязательно должны быть представлены.

2.3. Заключение

Заключение кратко обобщает содержание выполненной работы. При его написании целесообразно:

- упомянуть цель, которая ставилась в начале работы;
- сжато описать основные этапы работы и результаты, полученные в ходе ее выполнения.

Заключение не должно содержать новой информации, положений, выводов и т. д., которые до этого не рассматривались в работе. Рекомендуемый объем заключения – 2 страницы.

2.4. Список использованной литературы

Список использованной литературы должен отражать реально использованные для написания курсовой работы литературные источники, перио-

дические издания и электронные источники информации. Список составляется согласно правилам библиографического описания.

3. ТРЕБОВАНИЯ К ОФОРМЛЕНИЮ КУРСОВОЙ РАБОТЫ

3.1. Общие требования к оформлению курсовой работы

Курсовая работа по дисциплине «Управление бизнес-процессами предприятия» магистратуры направления подготовки 38.04.02 – «Менеджмент», как правило, требуют изучения и анализа значительного объема статистического материала, формул, графиков и т. п. В силу этого особое значение приобретает правильное оформление результатов проделанной работы.

Текст курсовой работы должен быть подготовлен в печатном виде, без стилистических и грамматических ошибок. Исправления и поправки не допускаются. Текст работы оформляется на листах формата А4, на одной стороне листа, должен иметь книжную ориентацию, поля страницы: левое – 25 мм, верхнее – 20 мм, правое – 15 мм и нижнее – 20 мм. Абзац (красная строка) – 1,25 см. При компьютерном наборе шрифт должен быть таким: тип шрифта Times New Roman, кегль 14, междустрочный интервал 1,5. Выравнивание текста на листах должно производиться по ширине строк.

Каждая структурная часть курсовой работы (введение, разделы основной части, заключение и т. д.) начинается с новой страницы.

Заголовки разделов, введение, заключение, библиография набираются прописным полужирным шрифтом. Не допускаются подчеркивание заголовка и переносы в словах заголовков. После заголовка, располагаемого посередине строки, точка не ставится.

Расстояние между заголовком и следующим за ней текстом, а также между главой и параграфом составляет 2 интервала.

Рекомендуемый объем курсовой работы (без учета приложений) – не менее 40. Титульный лист курсовой работы оформляется студентом по образцу, данному в приложении.

Текст курсовой работы должен быть разбит на разделы: главы, параграфы и т. д. Очередной раздел нужно начинать с нового листа.

Все страницы курсовой работы должны быть пронумерованы. Номер страницы ставится снизу страницы, по центру. Первой страницей является титульный лист, но на ней номер страницы не ставится.

3.2. Таблицы

Таблицы по содержанию делятся на аналитические и неаналитические. Аналитические таблицы являются результатом обработки и анализа цифровых показателей. Как правило, после таких таблиц делается обобщение, ко-

торое вводится в текст словами: «таблица позволяет сделать вывод о том, что...», «таблица позволяет заключить, что...» и т. п.

В неаналитических таблицах обычно помещаются необработанные статистические данные, необходимые лишь для информации и констатации фактов.

Таблицы размещают после первого упоминания о них в тексте таким образом, чтобы их можно было читать без поворота работы или с поворотом по часовой стрелке.

Каждая таблица должна иметь нумерационный и тематический заголовок. Тематический заголовок располагается по центру таблицы, после нумерационного, размещённого в правой стороне листа и включающего надпись «Таблица» с указанием арабскими цифрами номера таблицы. Нумерация таблиц сквозная в пределах каждой главы. Номер таблицы состоит из двух цифр: первая указывает на номер главы, вторая – на номер таблицы в главе по порядку (например: «Таблица 2.2» – это значит, что представленная таблица вторая во второй главе).

Цифры в графах таблиц должны проставляться так, чтобы разряды чисел во всей графе были расположены один под другим. В одной графе количество десятичных знаков должно быть одинаковым. Если данные отсутствуют, то в графах ставят знак тире. Округление числовых значений величин до первого, второго и т. д. десятичного знака для различных значений одного и того же наименования показателя должно быть одинаковым.

Таблицу с большим количеством строк допускается переносить на другую страницу, при этом заголовок таблицы помещают только над ее первой частью, а над переносимой частью пишут «Продолжение таблицы» или «Окончание таблицы». Если в работе несколько таблиц, то после слов «Продолжение» или «Окончание» указывают номер таблицы, а само слово «таблица» пишут сокращенно, например: «Продолжение табл. 1.1», «Окончание табл. 1.1».

На все таблицы в тексте курсовой работы должны быть даны ссылки с указанием их порядкового номера, например: «...в табл. 2.2».

3.3. Формулы

Формулы – это комбинации математических знаков, выражающие какие-либо предложения.

Формулы, приводимые в курсовой работе, должны быть наглядными, а обозначения, применяемые в них, соответствовать стандартам.

Пояснения значений символов и числовых коэффициентов следует приводить непосредственно под формулой, в той последовательности, в ка-

кой они даны в формуле. Значение каждого символа и числового коэффициента дается с новой строки. Первую строку объяснения начинают со слова «где» без двоеточия после него.

Формулы оформляются через редактор формул «Microsoft Equation». Представление формул в формате «рисунок» не допускается. В формулах допускается использование исключительно латинских и греческих букв, арабских цифр, математических знаков действий.

Формулы нумеруют арабскими цифрами в пределах всей курсовой работы (реферата) или главы. Номер указывают с правой стороны листа на уровне формулы в круглых скобках.

В тексте ссылки на формулы приводятся с указанием их порядковых номеров, например: «...в формуле (2.2)» (второй формуле второй главы).

3.4. Иллюстрации

Иллюстрации позволяют наглядно представить явление или предмет такими, какими мы их зрительно воспринимаем, но без лишних деталей и подробностей.

Основными видами иллюстраций являются схемы, диаграммы и графики.

Схема – это изображение, передающее обычно с помощью условных обозначений и без соблюдения масштаба основную идею какого-либо устройства, предмета, сооружения или процесса и показывающее взаимосвязь их главных элементов.

Диаграмма – один из способов изображения зависимости между величинами. Наибольшее распространение получили линейные, столбиковые и секторные диаграммы.

Для построения линейных диаграмм используется координатное поле. По горизонтальной оси в изображенном масштабе откладывается время или факториальные признаки, на вертикальной – показатели на определенный момент (период) времени или размеры результативного независимого признака. Вершины ординат соединяются отрезками – в результате получается ломаная линия.

На столбиковых диаграммах данные изображаются в виде прямоугольников (столбиков) одинаковой ширины, расположенных вертикально или горизонтально. Длина (высота) прямоугольников пропорциональна изображенным ими величинам.

Секторная диаграмма представляет собой круг, разделенный на секторы, величины которых пропорциональны величинам частей изображаемого явления.

График – это результат обработки числовых данных. Он представляет собой условные изображения величин и их соотношений через геометрические фигуры, точки и линии.

Количество иллюстраций в работе должно быть достаточным для пояснения излагаемого текста.

Иллюстрации обозначаются словом «Рис.» и располагаются после первой ссылки на них в тексте так, чтобы их было удобно рассматривать без поворота работы или с поворотом по часовой стрелке. Иллюстрации должны иметь номер и наименование, расположенные по центру, под ней. Иллюстрации нумеруются в пределах главы арабскими цифрами, например: «Рис. 1.1» (первый рисунок первой главы). Ссылки на иллюстрации в тексте курсовой работы приводятся с указанием их порядкового номера, например: «...на рис. 1.1».

При необходимости иллюстрации снабжаются поясняющими данными (подрисовочный текст).

3.5. Приложения

Приложение – это часть основного текста, которая имеет дополнительное (обычно справочное) значение, но, тем не менее, необходима для более полного освещения темы. По форме они могут представлять собой текст, таблицы, графики, карты. В приложении помещают вспомогательные материалы по рассматриваемой теме: инструкции, методики, положения, результаты промежуточных расчетов, типовые проекты, имеющие значительный объем, затрудняющий чтение и целостное восприятие текста. В этом случае в тексте приводятся основные выводы (результаты) и делается ссылка на приложение, содержащее соответствующую информацию. Каждое приложение должно начинаться с новой страницы. В правом верхнем углу листа пишут слово «Приложение» и указывают номер приложения. Если в курсовой работе больше одного приложения, их нумеруют последовательно арабскими цифрами, например: «Приложение 1», «Приложение 2» и т. д.

Каждое приложение должно иметь заголовок, который помещают ниже слова «Приложение» над текстом приложения, по центру.

При ссылке на приложение в тексте курсовой работы пишут сокращенно строчными буквами «прил.» и указывают номер приложения, например: «...в прил. 1».

Приложения оформляются как продолжение текстовой части курсовой работы со сквозной нумерацией листов. Число страниц в приложении не лимитируется и не включается в общий объем страниц курсовой работы.

3.6. Библиографический список

Библиографический список должен содержать перечень и описание только тех источников, которые были использованы при написании курсовой работы.

В библиографическом списке должны быть представлены монографические издания отечественных и зарубежных авторов, материалы профессиональной периодической печати (экономических журналов, газет и еженедельников), законодательные и др. нормативно-правовые акты. При составлении списка необходимо обратить внимание на достижение оптимального соотношения между монографическими изданиями, характеризующими глубину теоретической подготовки автора, и периодикой, демонстрирующей владение современными экономическими данными.

Наиболее распространенным способом расположения наименований литературных источников является алфавитный. Работы одного автора перечисляются в алфавитном порядке их названий. Исследования на иностранных языках помещаются в порядке латинского алфавита после исследований на русском языке.

Ниже приводятся примеры библиографических описаний использованных источников.

Статья одного, двух или трех авторов из журнала

Блинов А.О., Угрюмова Н.В. Возможности использования реинжиниринга как инструмента управления предприятиями с позиции процессного подхода // Вестник УГУЭС. Наука. Образование. Экономка. Серия: Экономика. 2010. № 1 (7). 2014. С. 224–232.

Статья из журнала, написанная более чем тремя авторами

Применение методики построения моделей бизнес-процессов с использованием BPMN при регулярном, проектном и ситуационном управлении в нефтяной отрасли / Г.А. Куликов, Р.Р. Шамсутдинов, С.Р. Алимбекова [и др.] // Вестник Уфимского государственного авиационного технического университета. 2010. Т.14, № 1(36). С. 136–147

Книга, написанная одним, двумя или тремя авторами

Рыбаков М. Бизнес-процессы: как их описать, отладить и внедрить. Практикум. – М.: Альпина Паблишер, 2016. – 392 с.

Книга, написанная более чем тремя авторами

Свод знаний по управлению бизнес-процессами: BPM СВОК 3.0 / Под ред. А.А. Белайчука, В.Г. Елиферова; Пер. с англ. – М.: Альпина Паблишер, 2016. – 480 с.

Сборники

Актуальные проблемы экономики и управления: сборник статей Шестой всероссийской научно-практической конференции с международным участием (г. Екатеринбург, 15 – 16 октября 2018 года) / отв. ред. проф. М. Н. Игнатьева и доц. Л. А. Мочалова; Урал. гос. горный ун-т. – Екатеринбург. Изд-во УГГУ, 2018. – 234 с.

Статья из сборника

Соколова О. Б., Мочалова Л. А., Киселев Н. А. Обоснование необходимости логистического подхода к управлению на предприятиях минерально-сырьевого сектора экономики. // Актуальные проблемы экономики и управления: сб. научных статей. Екатеринбург: УГГУ, 2018. С. 59–65.

3.7. Библиографические ссылки

Библиографические ссылки требуется приводить при цитировании, заимствовании материалов из других источников, упоминании или анализе работ того или иного автора, а также при необходимости адресовать читателя к трудам, в которых рассматривался данный вопрос.

Ссылки должны быть затекстовыми, с указанием номера соответствующего источника (на который автор ссылается в работе) в соответствии с библиографическим списком и соответствующей страницы.

Пример оформления затекстовой ссылки

Ссылка в тексте: «При оценке стоимости земли необходимо учесть все возможности ее производственного использования» [17, С. 191].

В списке использованных источников:

17. *Борисов Е. Ф. Основы экономики.* М.: Юристъ, 2008. 308 с.

4. ОРГАНИЗАЦИЯ ЗАЩИТЫ КУРСОВОЙ РАБОТЫ

4.1. Подготовка к защите и порядок защиты курсовой работы

Необходимо заранее подготовить тезисы выступления (план-конспект).

Порядок защиты курсовой работы.

1. Краткое сообщение, характеризующее цель и задачи работы, ее актуальность, полученные результаты, вывод и предложения.
2. Ответы студента на вопросы преподавателя.
3. Отзыв руководителя-консультанта о ходе выполнения работы.

Советы студенту:

•Готовясь к защите курсовой работы, вы должны вспомнить материал максимально подробно, и это должно найти отражение в схеме вашего ответа. Но тут же необходимо выделить главное, что наиболее важно для понимания материала в целом, иначе вы сможете проговорить все 15-20 минут и не раскрыть существа вопроса. Особенно строго следует отбирать примеры и иллюстрации.

•Вступление должно быть очень кратким – 1-2 фразы (если вы хотите подчеркнуть при этом важность и сложность данного вопроса, то не говорите, что он сложен и важен, а покажите его сложность и важность).

•Целесообразнее вначале показать свою схему раскрытия вопроса, а уж потом ее детализировать.

•Рассказывать будет легче, если вы представите себе, что объясняете материал очень способному и хорошо подготовленному человеку, который не знает именно этого раздела, и что при этом вам обязательно нужно доказать важность данного раздела и заинтересовать в его освоении.

•Строго следите за точностью своих выражений и правильностью употребления терминов.

•Не пытайтесь рассказать побольше за счет ускорения темпа, но и не мямлите.

•Не демонстрируйте излишнего волнения и не напрашивайтесь на сочувствие.

•Будьте особенно внимательны ко всем вопросам преподавателя, к малейшим его замечаниям. И уж ни в коем случае его не перебивайте!

•Не бойтесь дополнительных вопросов – чаще всего преподаватель использует их как один из способов помочь вам или сэкономить время. Если вас прервали, а при оценке ставят в вину пропуск важной части материала, не

возмущайтесь, а покажите план своего ответа, где эта часть стоит несколько позже того, на чем вы были прерваны.

- Прежде чем отвечать на дополнительный вопрос, необходимо сначала правильно его понять. Для этого нужно хотя бы немного подумать, иногда переспросить, уточнить: правильно ли вы поняли поставленный вопрос. И при ответе следует соблюдать тот же принцип экономности мышления, а не высказывать без разбора все, что вы можете сказать.

- Будьте доброжелательны и тактичны, даже если к ответу вы не готовы (это вина не преподавателя, а ваша).

4.2. Критерии оценки курсовой работы

Подготовленная и оформленная в соответствии с требованиями курсовая работа оценивается преподавателем по следующим критериям:

- достижение поставленной цели и задач исследования (новизна и актуальность поставленных в работе проблем, правильность формулирования цели, определения задач исследования, правильность выбора методов решения задач и реализации цели; соответствие выводов решаемым задачам, поставленной цели);

- знания и умения на уровне требований стандарта данной дисциплины: знание фактического материала, усвоение общих понятий и идей;

- уровень эрудированности автора по изученной теме (знание автором состояния изучаемой проблематики, новизна материала и рассмотренной проблемы, цитирование источников, степень использования в работе результатов исследований);

- культура письменного изложения материала (логичность подачи материала, грамотность автора);

- культура оформления материалов работы (соответствие работы всем стандартным требованиям);

- степень обоснованности аргументов и обобщений (полнота, глубина, всестороннее раскрытие темы, корректность аргументации и системы доказательств, характер и достоверность примеров, иллюстративного материала, наличие знаний интегрированного характера, способность к обобщению, спорность или однозначность выводов);

- использование литературных источников (достаточное количество, наличие в списке учебников и научных публикаций по теме, современность источников);

- умение ориентироваться в материале и отвечать на вопросы по работе;

- умение подготовить презентацию к работе (содержательность, логичность и правильное оформление презентации).

Объективность оценки работы преподавателем заключается в определении ее положительных и отрицательных сторон, по совокупности которых он окончательно оценивает представленную работу. При положительном заключении работа допускается к защите, о чем делается запись на титульном листе работы. При отрицательной оценке работа возвращается на доработку с последующим представлением на повторную проверку с приложением замечаний, сделанных преподавателем.

Внимание

1. Не допускается сдача скачанных из сети Internet курсовых работ, поскольку, во-первых, это будет рассматриваться как попытка обмана преподавателя, во-вторых, это приводит к формализации получения знаний, в-третьих, в мировой практике ведется борьба с плагиатом при сдаче работ вплоть до отчисления студентов от обучения. В подобном случае курсовая работа не принимается к защите и вместо него выдается новая тема.

2. Студент, не подготовивший и не защитивший курсовую работу, не может быть допущен к экзамену по дисциплине «Управление бизнес-процессами предприятия».

Образец оформления титульного листа курсовой работы

МИНОБРНАУКИ РОССИИ
Федеральное государственное бюджетное образовательное учреждение
высшего образования
«Уральский государственный горный университет»

Управление магистратуры и подготовки
кадров высшей квалификации

Кафедра экономики и менеджмента

КУРСОВАЯ РАБОТА

по дисциплине
«Управление бизнес-процессами предприятия
»

на тему:

ПРОЦЕССНОЕ УПРАВЛЕНИЕ КОМПАНИЕЙ

Руководитель:
доцент, к.э.н. Соколова О.Г.
Студент: гр. УМК.м-20
Иванов Е. Ю.

Екатеринбург – 2021

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ
ФЕДЕРАЦИИ

ФГБОУ ВО «Уральский государственный горный университет»



УТВЕРЖДАЮ

Проректор по учебно-методическому
комплексу

С.А.Упоров

14.10.2021

**МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО САМОСТОЯТЕЛЬНОЙ
РАБОТЕ РАБОТЫ И ЗАДАНИЯ ДЛЯ ОБУЧАЮЩИХСЯ**

Б1.О.ДВ.01.02 КОМУНИКАТИВНАЯ КУЛЬТУРА ЛИЧНОСТИ

Направление подготовки:

09.04.01 «Информатика и вычислительная техника»

Направленность (профиль):

«Анализ больших данных и машинное обучение

»

квалификация выпускника: **магистр**

Автор: Гладкова И. В., доцент, к. ф. н.

Одобрена на заседании кафедры

Философии и культурологии

(название кафедры)

Зав. кафедрой

(подпись)

Беляев В.П.

(Фамилия И.О.)

Протокол № 1 от 26.09.2021

(Дата)

Рассмотрена методической комиссией

Инженерно-экономического факультета

(название факультета)

Председатель

(подпись)

Мочалова Л.А.

(Фамилия И.О.)

Протокол № 1 от 29.09.2021

(Дата)

Екатеринбург
2021

Введение

Инициативная самостоятельная работа магистранта есть неотъемлемая составная часть учебы в вузе. В современном формате высшего образования значительно возрастает роль самостоятельной работы. Правильно спланированная и организованная самостоятельная работа обеспечивает достижение высоких результатов в учебе.

Самостоятельная работа магистранта (СРМ) - это планируемая учебная, учебно-исследовательская, научно-исследовательская работа магистрантов, выполняемая во внеаудиторное (аудиторное) время по заданию и при методическом руководстве преподавателя, но без его непосредственного участия, при сохранении ведущей роли магистрантов.

Целью СРС является овладение фундаментальными знаниями, профессиональными умениями и навыками по профилю будущей специальности, опытом творческой, исследовательской деятельности, развитие самостоятельности. Ответственности и организованности, творческого подхода к решению проблем учебного и профессионального уровней. Самостоятельная работа – важнейшая составная часть учебного процесса, обязательная для каждого магистранта, объем которой определяется учебным планом. Методологическую основу самостоятельной работы составляет деятельностный подход, при котором цели обучения ориентированы на формирование умений решать типовые и нетиповые задачи, т. е. на реальные ситуации, в которых магистрантам надо проявить знание конкретной дисциплины. Предметно и содержательно СРС определяется государственным образовательным стандартом, действующими учебными планами и образовательными программами различных форм обучения, рабочими программами учебных дисциплин, средствами обеспечения самостоятельной работы: учебниками, учебными пособиями и методическими руководствами, учебно-программными комплексами и т.д.

Самостоятельная работа магистрантов может рассматриваться как организационная форма обучения - система педагогических условий, обеспечивающих управление учебной деятельностью магистрантов по освоению знаний и умений в области учебной и научной деятельности без посторонней помощи.

Самостоятельная работа проводится с целью:

- систематизации и закрепления полученных теоретических знаний и практических умений;
- углубления и расширения теоретических знаний;
- формирования умений использовать нормативную, правовую, справочную документацию и специальную литературу;
- развития познавательных способностей, творческой инициативы, самостоятельности, ответственности и организованности;
- формирования самостоятельности мышления, способностей к саморазвитию, самосовершенствованию и самореализации;
- формирования практических (общеучебных и профессиональных) умений и навыков;
- развития исследовательских умений;
- получения навыков эффективной самостоятельной профессиональной (практической и научно-теоретической) деятельности.

Самостоятельная работа - это особым образом организованная деятельность, включающая в свою структуру такие компоненты, как:

- уяснение цели и поставленной учебной задачи;
- четкое и системное планирование самостоятельной работы;
- поиск необходимой учебной и научной информации;
- освоение информации и ее логическая переработка;

- использование методов исследовательской, научно-исследовательской работы для решения поставленных задач;
- выработка собственной позиции по поводу полученной задачи;
- представление, обоснование и защита полученного решения;
- проведение самоанализа и самоконтроля.

В учебном процессе выделяют два вида самостоятельной работы: аудиторная и внеаудиторная.

Аудиторная самостоятельная работа по дисциплине выполняется на учебных занятиях под непосредственным руководством преподавателя и по его заданию: текущие консультации, коллоквиум, прием и разбор домашних заданий и другие.

Внеаудиторная самостоятельная работа - планируемая учебная, учебно-исследовательская, научно-исследовательская работа, выполняемая во внеаудиторное время по заданию и при методическом руководстве преподавателя, но без его непосредственного участия: подготовка презентаций, составление глоссария, подготовка к практическим занятиям, подготовка рецензий, аннотаций на статью, подготовка к дискуссиям, круглым столам.

Самостоятельная работа может включать следующие формы работ:

- изучение лекционного материала;
- работа с источниками литературы: поиск, подбор и обзор литературы и электронных источников информации по заданной проблеме курса;
- выполнение домашних заданий, выдаваемых на занятиях: тестов, докладов и других форм текущего контроля;
- изучение материала, вынесенного на самостоятельное изучение; подготовка к практическим занятиям;
- подготовка к контрольной работе или коллоквиуму;
- подготовка к зачету;
- анализ научной публикации по определенной преподавателем теме, ее реферирование;
- исследовательская работа и участие в научных конференциях, семинарах и олимпиадах.

Особенностью организации самостоятельной работы магистрантов является необходимость не только подготовиться к сдаче зачета, но и собрать, обобщить, систематизировать, проанализировать информацию по темам дисциплины.

Технология организации самостоятельной работы включает использование информационных и материально-технических ресурсов образовательного учреждения. Для более эффективного выполнения самостоятельной работы по дисциплине преподаватель рекомендует магистрантам источники и учебно-методические пособия для работы, характеризует наиболее рациональную методику самостоятельной работы.

Самостоятельная работа может осуществляться индивидуально или группами, online и на занятиях в зависимости от цели, объема, конкретной тематики самостоятельной работы, уровня сложности, уровня умений студентов.

В качестве форм и методов контроля внеаудиторной самостоятельной работы магистрантов могут быть использованы: обмен информационными файлами, тестирование, доклад, самоотчеты, защита творческих работ и электронных презентаций и др.

1. Методические рекомендации по работе с текстом лекций

На лекционных занятиях необходимо конспектировать учебный материал. Обращать внимание на формулировки, определения, раскрывающие содержание тех или иных понятий, научные выводы и практические рекомендации, положительный опыт в ораторском мастерстве. Внимательное слушание и конспектирование лекций помогает усвоить учебный материал.

Желательно оставлять в рабочих конспектах поля, на которых делать пометки, дополняющие материал прослушанной лекции, а также подчеркивающие особую важность тех или иных теоретических положений, фиксировать вопросы, вызывающие личный интерес, варианты ответов на них, сомнения, проблемы, спорные положения. Рекомендуется вести записи на одной стороне листа, оставляя вторую сторону для размышлений, разборов, вопросов, ответов на них, для фиксирования деталей темы или связанных с ней фактов, которые припоминаются самим студентом в ходе слушания.

Слушание лекций - сложный вид интеллектуальной деятельности, успех которой обусловлен *умением слушать*, и стремлением воспринимать материал, нужно записывая в тетрадь. Запись лекции помогает сосредоточить внимание на главном, в ходе самой лекции продумать и осмыслить услышанное, осознать план и логику изложения материала преподавателем.

Такая работа нередко вызывает трудности: некоторые стремятся записывать все дословно, другие пишут отрывочно, хаотично. Чтобы избежать этих ошибок, целесообразно придерживаться ряда правил.

1. После записи ориентирующих и направляющих внимание данных (тема, цель, план лекции, рекомендованная литература) важно попытаться проследить, как они раскрываются в содержании, подкрепляются формулировками, доказательствами, а затем и выводами.

2. Записывать следует основные положения и доказывающие их аргументы, наиболее яркие примеры и факты, поставленные преподавателем вопросы для самостоятельной проработки.

3. Стремиться к четкости записи, ее последовательности, выделяя темы, подтемы, вопросы и подвопросы, используя цифровую и буквенную нумерацию (римские и арабские цифры, большие и малые буквы), красные строки, выделение абзацев, подчеркивание главного и т.д.

Форма записи материала может быть различной - в зависимости от специфики изучаемого предмета. Это может быть стиль учебной программы (назывные предложения), уместны и свои краткие пояснения к записям.

Не следует подробно записывать на лекции «все подряд», но следует обязательно фиксировать то, что преподаватели диктуют – это базовый конспект, содержащий основные положения лекции: определения, выводы, параметры, критерии, аксиомы, постулаты, парадигмы, концепции, ситуации, а также мысли-маяки (ими часто являются афоризмы, цитаты, остроумные изречения). Запись лекции лучше вести в сжатой форме, короткими и четкими фразами. Каждому полезно выработать свою систему сокращений, в которой он мог бы разобраться легко и безошибочно.

Даже отлично записанная лекция предполагает дальнейшую самостоятельную работу над ней (осмысление ее содержания, логической структуры, выводов). С целью доработки конспекта лекции необходимо в первую очередь прочитать записи, восстановить текст в памяти, а также исправить опiski, расшифровать не принятые ранее сокращения, заполнить пропущенные места, понять текст, вникнуть в его смысл. Далее, прочитать материал по рекомендуемой литературе, разрешая в ходе чтения возникшие ранее затруднения, вопросы, а также дополняя и исправляя свои записи. В ходе доработки конспекта углубляются, расширяются и закрепляются знания, а также дополняется, исправляется и совершенствуется конспект. Доработанный конспект и

рекомендуемая литература используется при подготовке к практическому занятию. Знание лекционного материала при подготовке к практическому занятию обязательно.

Особенно важно в процессе самостоятельной работы над лекцией выделить новый понятийный аппарат, уяснить суть новых понятий, при необходимости обратиться к словарям и другим источникам, заодно устранив неточности в записях. Главное - вести конспект аккуратно и регулярно, только в этом случае он сможет стать подспорьем в изучении дисциплины.

Работа над лекцией стимулирует самостоятельный поиск ответов на самые различные вопросы: над какими понятиями следует поработать, какие обобщения сделать, какой дополнительный материал привлечь.

Важным средством, направляющим самообразование, является выполнение различных заданий по тексту лекции, например, составление ее развернутого плана или тезисов; ответы на вопросы проблемного характера, (скажем, об основных тенденциях развития той или иной проблемы); составление проверочных тестов по проблеме, написание по ней реферата, составление графических схем.

По своим задачам лекции могут быть разных жанров: *установочная лекция* вводит в изучение курса, предмета, проблем (что и как изучать), а *обобщающая лекция* позволяет подвести итог (зачем изучать), выделить главное, усвоить законы развития знания, преемственности, новаторства, чтобы применить обобщенный позитивный опыт к решению современных практических задач. Обобщающая лекция ориентирует в истории и современном состоянии научной проблемы.

В процессе освоения материалов обобщающих лекций магистранты могут выполнять задания разного уровня. Например: задания *репродуктивного* уровня (составить развернутый план обобщающей лекции, составить тезисы по материалам лекции); задания *продуктивного* уровня (ответить на вопросы проблемного характера, составить опорный конспект по схеме, выявить основные тенденции развития проблемы); задания *творческого* уровня (составить проверочные тесты по теме, защитить реферат и графические темы по данной проблеме). Обращение к ранее изученному материалу не только помогает восстановить в памяти известные положения, выводы, но и приводит разрозненные знания в систему, углубляет и расширяет их. Каждый возврат к старому материалу позволяет найти в нем что-то новое, переосмыслить его с иных позиций, определить для него наиболее подходящее место в уже имеющейся системе знаний.

2. Методические рекомендации по подготовке доклада (презентации)

Доклад – публичное сообщение по заданной теме, представляющее собой развернутое изложение на определенную тему, вид самостоятельной работы, который используется в учебных и внеаудиторных занятиях и способствует формированию навыков исследовательской работы, освоению методов научного познания, приобретению навыков публичного выступления, расширяет познавательные интересы, приучает критически мыслить.

При подготовке доклада используется дополнительная литература, систематизируется материал. Работа над докладом не только позволяет приобрести новые знания, но и способствует формированию важных научно-исследовательских навыков самостоятельной работы с научной литературой, что повышает познавательный интерес к научному познанию.

Приветствуется использование мультимедийных технологий, подготовка докладов-презентаций.

Доклад должен соответствовать следующим требованиям:

- тема доклада должна быть согласована с преподавателем и соответствовать теме занятия;
- иллюстрации (слайды в презентации) должны быть достаточными, но не чрезмерными;
- материалы, которыми пользуется студент при подготовке доклада-презентации, должны соответствовать научно-методическим требованиям ВУЗа и быть указаны в докладе;
- необходимо соблюдать регламент: 7-10 минут выступления.

Преподаватель может дать тему сразу нескольким магистрантам одной группы, по принципу: докладчик и оппонент. Можно подготовить два выступления с противоположными точками зрения и устроить дискуссию по проблемной теме. Докладчики и содокладчики во многом определяют содержание, стиль, активность данного занятия, для этого необходимо:

- знать и хорошо ориентироваться в теме всей презентации (семинара);
- уметь дискутировать и быстро отвечать на вопросы;
- четко выполнять установленный регламент: докладчик - 7-10 мин.; содокладчик - 5 мин.; дискуссия - 10 мин;
- иметь представление о композиционной структуре доклада.

После выступления докладчик и содокладчик, должны ответить на вопросы слушателей.

В подготовке доклада выделяют следующие этапы:

1. Определение цели доклада: информировать, объяснить, обсудить что-то (проблему, решение, ситуацию и т. п.)
2. Подбор литературы, иллюстративных примеров.
3. Составление плана доклада, систематизация материала, композиционное оформление доклада в виде печатного /рукописного текста и электронной презентации.

Общая структура доклада

Построение доклада включает три части: вступление, основную часть и заключение.

Вступление.

Вступление должно содержать:

- название презентации (доклада);
- сообщение основной идеи;
- обоснование актуальности обсуждаемого вопроса;
- современную оценку предмета изложения;
- краткое перечисление рассматриваемых вопросов;

- живую интересную форму изложения;
- акцентирование оригинальности подхода.

Основная часть.

Основная часть состоит из нескольких разделов, постепенно раскрывающих тему. Возможно использование иллюстрации (графики, диаграммы, фотографии, карты, рисунки) Если необходимо, для обоснования темы используется ссылка на источники с доказательствами, взятыми из литературы (цитирование авторов, указание цифр, фактов, определений). Изложение материала должно быть связным, последовательным, доказательным.

Задача основной части - представить достаточно данных для того, чтобы слушатели и заинтересовались темой и захотели ознакомиться с материалами. При этом логическая структура теоретического блока не должны даваться без наглядных пособий, аудио-визуальных и визуальных материалов.

Заключение.

Заключение - это ясное четкое обобщение, в котором подводятся итоги, формулируются главные выводы, подчеркивается значение рассмотренной проблемы, предлагаются самые важные практические рекомендации. Требования к оформлению доклада. Объем машинописного текста доклада должен быть рассчитан на произнесение доклада в течение 7 -10 минут (3-5 машинописных листа текста с докладом).

Доклад оценивается по следующим критериям:

| <i>Критерии оценки доклада, сообщения</i> | <i>Количество баллов</i> |
|---|--------------------------|
| Содержательность, информационная насыщенность доклада | 1 |
| Наличие аргументов | 1 |
| Наличие выводов | 1 |
| Наличие презентации доклада | 1 |
| Владение профессиональной лексикой | 1 |
| Итого: | 5 |

Электронные презентации выполняются в программе MS PowerPoint в виде слайдов в следующем порядке: • титульный лист с заголовком темы и автором исполнения презентации; • план презентации (5-6 пунктов - это максимум); • основная часть (не более 10 слайдов); • заключение (вывод). Общие требования к стилевому оформлению презентации: • дизайн должен быть простым и лаконичным; • основная цель - читаемость, а не субъективная красота; цветовая гамма должна состоять не более чем из двух-трех цветов; • всегда должно быть два типа слайдов: для титульных и для основного текста; • размер шрифта должен быть: 24–54 пункта (заголовок), 18–36 пунктов (обычный текст); • текст должен быть свернут до ключевых слов и фраз. Полные развернутые предложения на слайдах таких презентаций используются только при цитировании; каждый слайд должен иметь заголовок; • все слайды должны быть выдержаны в одном стиле; • на каждом слайде должно быть не более трех иллюстраций; • слайды должны быть пронумерованы с указанием общего количества слайдов

3. Методические рекомендации по подготовке к дискуссии

Современная практика предлагает широкий круг типов семинарских занятий. Среди них особое место занимает *семинар-дискуссия*, где в диалоге хорошо усваивается новая информация, видны убеждения студента, обсуждаются противоречия (явные и скрытые) и недостатки. Для обсуждения берутся конкретные актуальные вопросы, с которыми студенты предварительно ознакомлены. Дискуссия является одной из наиболее эффективных технологий группового взаимодействия, обладающей особыми возможностями в обучении, развитии и воспитании будущего специалиста.

Дискуссия (от лат. discussio - рассмотрение, исследование) - способ организации совместной деятельности с целью интенсификации процесса принятия решений в группе посредством обсуждения какого-либо вопроса или проблемы.

Дискуссия обеспечивает активное включение магистрантов в поиск истины; создает условия для открытого выражения ими своих мыслей, позиций, отношений к обсуждаемой теме и обладает особой возможностью воздействия на установки ее участников в процессе группового взаимодействия. Дискуссию можно рассматривать как *метод интерактивного обучения* и как особую технологию, включающую в себя другие методы и приемы обучения: «мозговой штурм», «анализ ситуаций» и т.д.

Обучающий эффект дискуссии определяется предоставляемой участнику возможностью получить разнообразную информацию от собеседников, продемонстрировать и повысить свою компетентность, проверить и уточнить свои представления и взгляды на обсуждаемую проблему, применить имеющиеся знания в процессе совместного решения учебных и профессиональных задач.

Развивающая функция дискуссии связана со стимулированием творчества обучающихся, развитием их способности к анализу информации и аргументированному, логически выстроенному доказательству своих идей и взглядов, с повышением коммуникативной активности студентов, их эмоциональной включенности в учебный процесс.

Влияние дискуссии на личностное становление студента обусловливается ее целостно - ориентирующей направленностью, созданием благоприятных условий для проявления индивидуальности, самоопределения в существующих точках зрения на определенную проблему, выбора своей позиции; для формирования умения взаимодействовать с другими, слушать и слышать окружающих, уважать чужие убеждения, принимать оппонента, находить точки соприкосновения, соотносить и согласовывать свою позицию с позициями других участников обсуждения.

Наличие оппонентов, противоположных точек зрения всегда обостряет дискуссию, повышает ее продуктивность, позволяет создавать с их помощью конструктивный конфликт для более эффективного решения обсуждаемых проблем.

Существует несколько видов дискуссий, использование того или иного типа дискуссии зависит от характера обсуждаемой проблемы и целей дискуссии.

Дискуссия- диалог чаще всего применяется для совместного обсуждения учебных и производственных проблем, решение которых может быть достигнуто путем взаимодополнения, группового взаимодействия по принципу «индивидуальных вкладов» или на основе согласования различных точек зрения, достижения консенсуса.

Дискуссия - спор используется для всестороннего рассмотрения сложных проблем, не имеющих однозначного решения даже в науке, социальной, политической жизни, производственной практике и т.д. Она построена на принципе «позиционного противостояния» и ее цель - не столько решить проблему, сколько побудить участников дискуссии задуматься над проблемой, уточнить и определить свою позицию; научить

аргументировано отстаивать свою точку зрения и в то же время осознать право других иметь свой взгляд на эту проблему, быть индивидуальностью.

Условия эффективного проведения дискуссии:

- информированность и подготовленность к дискуссии,
- свободное владение материалом, привлечение различных источников для аргументации отстаиваемых положений;

- правильное употребление понятий, используемых в дискуссии, их единообразное понимание;

- корректность поведения, недопустимость высказываний, задевающих личность оппонента; установление регламента выступления участников;

- полная включенность группы в дискуссию, участие каждого магистранта в ней.

Подготовка к дискуссии: если тема объявлена заранее, то следует ознакомиться с указанной литературой, необходимыми справочными материалами, продумать свою позицию, четко сформулировать аргументацию, выписать цитаты, мнения специалистов.

В проведении дискуссии выделяется несколько этапов.

Этап 1-й, введение в дискуссию: формулирование проблемы и целей дискуссии; определение значимости проблемы, совместная выработка правил дискуссии; выяснение однозначности понимания темы дискуссии, используемых в ней терминов, понятий.

Этап 2-й, обсуждение проблемы: обмен участниками мнениями по каждому вопросу. Цель этапа - собрать максимум мнений, идей, предложений, соотнося их друг с другом.

Этап 3-й, подведение итогов обсуждения: выработка студентами согласованного мнения и принятие группового решения.

Далее подводятся итоги дискуссии, заслушиваются и защищаются проектные задания. После этого проводится "мозговой штурм" по нерешенным проблемам дискуссии, а также выявляются прикладные аспекты, которые можно рекомендовать для включения в курсовые и дипломные работы или в апробацию на практике.

Семинары-дискуссии проводятся с целью выявления мнения магистрантов по актуальным и проблемным вопросам.

4. Методические рекомендации по подготовке к сдаче зачета

При подготовке к зачету по дисциплине обучающемуся рекомендуется:

1. повторить пройденный материал и ответить на вопросы, используя конспект и материалы лекций. Если по каким-либо вопросам у студента недостаточно информации в лекционных материалах, то необходимо получить информацию из раздаточных материалов и/или учебников (литературы), рекомендованных для изучения дисциплины. Целесообразно также дополнить конспект лекций наиболее существенными и важными тезисами для рассматриваемого вопроса;

2. при изучении основных и дополнительных источников информации в рамках выполнения заданий на зачете особое внимание необходимо уделять схемам, рисункам, графикам и другим иллюстрациям, так как подобные графические материалы, как правило, в наглядной форме отражают главное содержание изучаемого вопроса;

3. при изучении основных и дополнительных источников информации в рамках выполнения заданий на зачете (в случаях, когда отсутствует иллюстративный материал) особое внимание необходимо обращать на наличие в тексте словосочетаний вида «во-первых», «во-вторых» и т.д., а также дефисов и перечислений (цифровых или буквенных), так как эти признаки, как правило, позволяют структурировать ответ на предложенное задание.

Подобную текстовую структуризацию материала слушатель может трансформировать в рисунки, схемы и т. п. для более краткого, наглядного и удобного восприятия (иллюстрации целесообразно отразить в конспекте лекций – это позволит оперативно и быстро найти, в случае необходимости, со-ответствующую информацию);

4. следует также обращать внимание при изучении материала для подготовки к зачету на словосочетания вида «таким образом», «подводя итог сказанному» и т.п., так как это признаки выражения главных мыслей и выводов по изучаемому вопросу (пункту, разделу). В отдельных случаях выводы по теме (разделу, главе) позволяют полностью построить (восстановить, воссоздать) ответ на поставленный вопрос (задание), так как содержат в себе основные мысли и тезисы для ответа.

5. Методические рекомендации по написанию эссе

Эссе - это самостоятельная письменная работа на тему, предложенную преподавателем. Цель эссе состоит в развитии навыков самостоятельного творческого мышления и письменного изложения собственных мыслей. Писать эссе чрезвычайно полезно, поскольку это позволяет автору научиться четко и грамотно формулировать мысли, структурировать информацию, использовать основные категории анализа, выделять причинно-следственные связи, иллюстрировать понятия соответствующими примерами, аргументировать свои выводы; овладеть научным стилем речи.

Эссе должно содержать: четкое изложение сути поставленной проблемы, включать самостоятельно проведенный анализ этой проблемы с использованием концепций и аналитического инструментария, рассматриваемого в рамках дисциплины, выводы, обобщающие авторскую позицию по поставленной проблеме. В зависимости от специфики дисциплины формы эссе могут значительно дифференцироваться. В некоторых случаях это может быть анализ имеющихся статистических данных по изучаемой проблеме, анализ материалов из средств массовой информации и использованием изучаемых моделей, подробный разбор предложенной задачи с развернутыми мнениями, подбор и детальный анализ примеров, иллюстрирующих проблему и т.д.

Построение эссе - это ответ на вопрос или раскрытие темы, которое основано на классической системе доказательств.

Структура эссе

1. *Титульный лист* (заполняется по единой форме);
2. *Введение* - суть и обоснование выбора данной темы, состоит из ряда компонентов, связанных логически и стилистически.

На этом этапе очень важно правильно *сформулировать вопрос, на который вы собираетесь найти ответ в ходе своего исследования.*

3. *Основная часть* - теоретические основы выбранной проблемы и изложение основного вопроса.

Данная часть предполагает развитие аргументации и анализа, а также обоснование их, исходя из имеющихся данных, других аргументов и позиций по этому вопросу. В этом заключается основное содержание эссе и это представляет собой главную трудность. Поэтому важное значение имеют подзаголовки, на основе которых осуществляется структурирование аргументации; именно здесь необходимо обосновать (логически, используя данные или строгие рассуждения) предлагаемую аргументацию/анализ. Там, где это необходимо, в качестве аналитического инструмента можно использовать графики, диаграммы и таблицы.

В зависимости от поставленного вопроса анализ проводится на основе следующих категорий:

Причина - следствие, общее - особенное, форма - содержание, часть - целое, постоянство - изменчивость.

В процессе построения эссе необходимо помнить, что один параграф должен содержать только одно утверждение и соответствующее доказательство, подкрепленное графическим и иллюстративным материалом. Следовательно, наполняя содержанием разделы аргументацией (соответствующей подзаголовкам), необходимо в пределах параграфа ограничить себя рассмотрением одной главной мысли.

Хорошо проверенный (и для большинства — совершенно необходимый) способ построения любого эссе - использование подзаголовков для обозначения ключевых моментов аргументированного изложения: это помогает посмотреть на то, что предполагается сделать (и ответить на вопрос, хорош ли замысел). Такой подход поможет следовать точно определенной цели в данном исследовании. Эффективное использование

подзаголовков - не только обозначение основных пунктов, которые необходимо осветить. Их последовательность может также свидетельствовать о наличии или отсутствии логичности в освещении темы.

4. *Заключение* - обобщения и аргументированные выводы по теме с указанием области ее применения и т.д. Подытоживает эссе или еще раз вносит пояснения, подкрепляет смысл и значение изложенного в основной части. Методы, рекомендуемые для составления заключения: повторение, иллюстрация, цитата, впечатляющее утверждение. Заключение может содержать такой очень важный, дополняющий эссе элемент, как указание на применение (импликацию) исследования, не исключая взаимосвязи с другими проблемами.

Структура аппарата доказательств, необходимых для написания эссе

Доказательство - это совокупность логических приемов обоснования истинности какого-либо суждения с помощью других истинных и связанных с ним суждений. Оно связано с убеждением, но не тождественно ему: аргументация или доказательство должны основываться на данных науки и общественно-исторической практики, убеждения же могут быть основаны на предрассудках, неосведомленности людей в вопросах экономики и политики, видимости доказательности. Другими словами, доказательство или аргументация - это рассуждение, использующее факты, истинные суждения, научные данные и убеждающее нас в истинности того, о чем идет речь.

Структура любого доказательства включает в себя три составляющие: тезис, аргументы и выводы или оценочные суждения.

Тезис - это положение (суждение), которое требуется доказать. *Аргументы* - это категории, которыми пользуются при доказательстве истинности тезиса. *Вывод* - это мнение, основанное на анализе фактов. *Оценочные суждения* - это мнения, основанные на наших убеждениях, верованиях или взглядах. *Аргументы* обычно делятся на следующие группы:

1. *Удостоверенные факты* — фактический материал (или статистические данные).
2. *Определения* в процессе аргументации используются как описание понятий, связанных с тезисом.
3. *Законы* науки и ранее доказанные теоремы тоже могут использоваться как аргументы доказательства.

Требования к фактическим данным и другим источникам

При написании эссе чрезвычайно важно то, как используются эмпирические данные и другие источники (особенно качество чтения). Все (фактические) данные соотносятся с конкретным временем и местом, поэтому прежде, чем их использовать, необходимо убедиться в том, что они соответствуют необходимому для исследований времени и месту. Соответствующая спецификация данных по времени и месту — один из способов, который может предотвратить чрезмерное обобщение, результатом которого может, например, стать предположение о том, что все страны по некоторым важным аспектам одинаковы (если вы так полагаете, тогда это должно быть доказано, а не быть голословным утверждением).

Всегда можно избежать чрезмерного обобщения, если помнить, что в рамках эссе используемые данные являются иллюстративным материалом, а не заключительным актом, т.е. они подтверждают аргументы и рассуждения и свидетельствуют о том, что автор умеет использовать данные должным образом. Нельзя забывать также, что данные, касающиеся спорных вопросов, всегда подвергаются сомнению. От автора не ждут определенного или окончательного ответа. Необходимо понять сущность фактического материала, связанного с этим вопросом (соответствующие индикаторы? насколько надежны данные для построения таких индикаторов? к какому заключению можно прийти на основании имеющихся данных и индикаторов относительно причин и следствий? и т.д.), и

продемонстрировать это в эссе. Нельзя ссылаться на работы, которые автор эссе не читал сам.

Как подготовить и написать эссе?

Качество любого эссе зависит от трех взаимосвязанных составляющих, таких как:

1. Исходный материал, который будет использован (конспекты прочитанной литературы, лекций, записи результатов дискуссий, собственные соображения и накопленный опыт по данной проблеме).

2. Качество обработки имеющегося исходного материала (его организация, аргументация и доводы).

3. Аргументация (насколько точно она соотносится с поднятыми в эссе проблемами).

Процесс написания эссе можно разбить на несколько стадий: обдумывание - планирование - написание - проверка - правка.

Планирование - определение цели, основных идей, источников информации, сроков окончания и представления работы.

Цель должна определять действия.

Идеи, как и цели, могут быть конкретными и общими, более абстрактными. Мысли, чувства, взгляды и представления могут быть выражены в форме аналогий, ассоциации, предположений, рассуждений, суждений, аргументов, доводов и т.д.

Аналогии - выявление идеи и создание представлений, связь элементов значений.

Ассоциации - отражение взаимосвязей предметов и явлений действительности в форме закономерной связи между нервно - психическими явлениями (в ответ на тот или иной словесный стимул выдать «первую пришедшую в голову» реакцию).

Предположения - утверждение, не подтвержденное никакими доказательствами.

Рассуждения - формулировка и доказательство мнений.

Аргументация - ряд связанных между собой суждений, которые высказываются для того, чтобы убедить читателя (слушателя) в верности (истинности) тезиса, точки зрения, позиции.

Суждение - фраза или предложение, для которого имеет смысл вопрос: истинно или ложно?

Доводы - обоснование того, что заключение верно абсолютно или с какой-либо долей вероятности. В качестве доводов используются факты, ссылки на авторитеты, заведомо истинные суждения (законы, аксиомы и т.п.), доказательства (прямые, косвенные, «от противного», «методом исключения») и т.д.

Перечень, который получится в результате перечисления идей, поможет определить, какие из них нуждаются в особенной аргументации.

Источники. Тема эссе подскажет, где искать нужный материал. Обычно пользуются библиотекой, Интернет-ресурсами, словарями, справочниками. Пересмотр означает редактирование текста с ориентацией на качество и эффективность.

Качество текста складывается из четырех основных компонентов: ясности мысли, внятности, грамотности и корректности.

Мысль - это содержание написанного. Необходимо четко и ясно формулировать идеи, которые хотите выразить, в противном случае вам не удастся донести эти идеи и сведения до окружающих.

Внятность - это доступность текста для понимания. Легче всего ее можно достичь, пользуясь логично и последовательно тщательно выбранными словами, фразами и взаимосвязанными абзацами, раскрывающими тему.

Грамотность отражает соблюдение норм грамматики и правописания. Если в чем-то сомневаетесь, загляните в учебник, справьтесь в словаре или руководстве по стилистике или дайте прочитать написанное человеку, чья манера писать вам нравится.

Корректность — это стиль написанного. Стиль определяется жанром, структурой работы, целями, которые ставит перед собой пишущий, читателями, к которым он обращается.

Заключение

Методические указания по выполнению самостоятельной работы обучающихся являются неотъемлемой частью процесса обучения в вузе. Правильная организация самостоятельной работы позволяет магистрантам развивать умения и навыки в усвоении и систематизации приобретаемых знаний, обеспечивает высокий уровень успеваемости в период обучения, способствует формированию навыков совершенствования профессионального мастерства. Также внеаудиторное время включает в себя подготовку к аудиторным занятиям и изучение отдельных тем, расширяющих и углубляющих представления обучающихся по разделам изучаемой дисциплины.

Таким образом, обучающийся используя методические указания, может в достаточном объеме усвоить и успешно реализовать конкретные знания, умения, навыки и получить опыт при выполнении следующих условий:

1) систематическая самостоятельная работа по закреплению полученных знаний и навыков;

2) добросовестное выполнение заданий;

3) выяснение и уточнение отдельных предпосылок, умозаключений и выводов, содержащихся в учебном курсе;

4) сопоставление точек зрения различных авторов по затрагиваемым в учебном курсе проблемам; выявление неточностей и некорректного изложения материала в периодической и специальной литературе;

5) периодическое ознакомление с последними теоретическими и практическими достижениями в области управления персоналом;

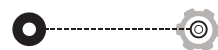
6) проведение собственных научных и практических исследований по одной или нескольким актуальным проблемам для *HR*;

7) подготовка научных статей для опубликования в периодической печати, выступление на научно-практических конференциях, участие в работе студенческих научных обществ, круглых столах и диспутах по проблемам управления персоналом.

Контроль результатов внеаудиторной самостоятельной работы магистрантов осуществляется преподавателем в пределах времени, отведенного на обязательные учебные занятия по дисциплине.

«Неважно, начинаете ли вы свой путь в DevOps или уже неплохо его освоили и хотите узнать, как применить его принципы в больших масштабах, – в процессе чтения книги вы несомненно оцените DevOps и его преимущества».

Д-р Баскар Гош



Во многих организациях формируется привычка к шаблонным методам работы, и сотрудники пасуют перед необходимостью совершенствования устаревшей ИТ-инфраструктуры. Мирко Херинг, специалист по управлению изменениями в области ИТ, предлагает отнестись к процессу обновления без предвзятости.

В своей книге Херинг рассказывает, как создать в компании правильную экосистему, организовать по-настоящему эффективную работу каждого сотрудника и правильно применять нужные технологии, которые поспособствуют развитию бизнеса.

Однако наличие правильных методов и инструментов не принесет успеха, если корпоративная культура останется прежней. Автор книги предлагает читателям практические упражнения, основанные на принципах Agile, Lean и DevOps, и описывает примеры из своей личной практики, которые помогут любой организации – малой или крупной, старой или новой – подготовиться к предстоящим преобразованиям, отказаться от консервативного стиля мышления и наладить ИТ-процессы таким образом, чтобы извлечь из них максимальную пользу.



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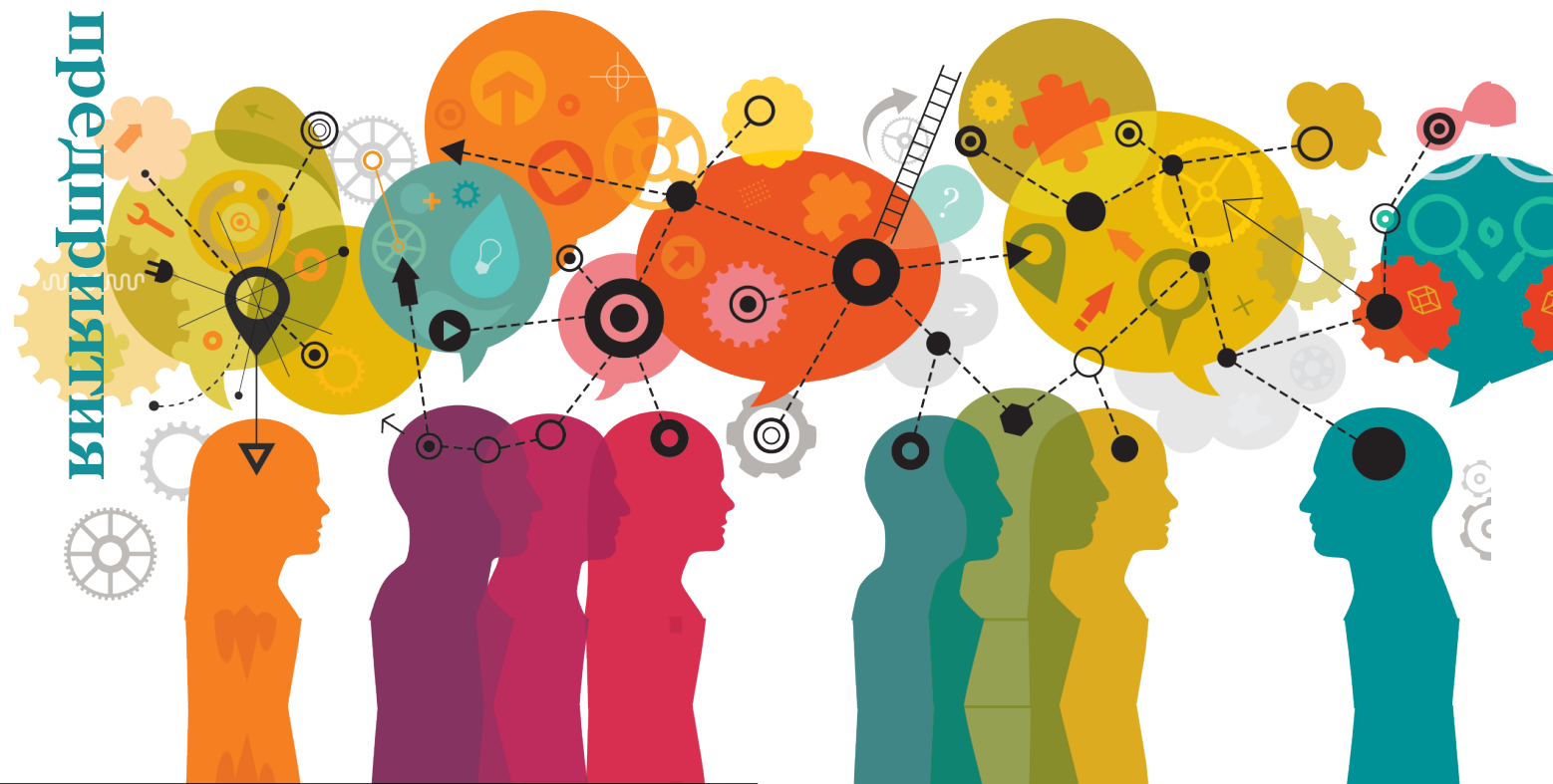
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Foreword by
Dr. Bhaskar Ghosh



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Мирко Херинг

Предисловие
д-ра Баскара Гоша



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DevOps – методика автоматизации рабочих процессов, существенно облегчающая задачи организации и способствующая действенным преобразованиям. Мирко Херинг, менеджер со стажем, рассказывает о том, как избежать распространенных ошибок на пути внедрения инноваций и добиться успеха в долгосрочной перспективе.

В первой части книги обсуждается экосистема предприятия, формирующая благоприятные условия для преобразований. Вторая часть посвящена работе с людьми, управлению ИТ-командой, внедряющей изменения, и выстраиванию рабочих процессов. В третьей части описываются технологические и архитектурные аспекты применения DevOps. В конце каждой главы приводятся практические упражнения.

Издание предназначено для менеджеров и ИТ-специалистов, занимающихся DevOps-проектами в организациях разного уровня.

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Впервые о DevOps заговорили в связи с переходом в эру цифровой экономики, когда скорость выпуска на рынок продуктов стала одним из ключевых конкурентных преимуществ. Технологиям, обеспечивающим стремительное развитие бизнеса, пришлось бежать со всех ног, чтобы только оставаться на месте, а для достижения дополнительных результатов – как минимум в два раза быстрее. Компаниям понадобились инструменты для быстрого и непрерывного улучшения качества существующих процессов разработки продуктов и их максимальной автоматизации, потому что хороший продукт стал равен хорошей ИТ.

Свой путь погружения в DevOps я начала несколько лет назад, когда возглавила отдел тестирования системы подготовки регулярной банковской отчетности Neoflex Reporting, которая отличалась большим количеством параллельных веток разработки и обилием ручных процессов. В ее разработку к этому моменту уже были вложены десятки тысяч человеко-часов.

Засучив рукава наша команда взялась за точечную автоматизацию этапов жизненного цикла продукта. В целом мы достигли неплохих результатов, но добиться слаженной и синхронной работы от всех участников процесса оказалось по-настоящему трудной задачей. Периодически возникающие «тут подкрутить», «там вручную запустить», «а это не на моей стороне», «я был на обеде», «исторически сложилось» тормозили ожидаемое от автоматизации ускорение.

Осознать, что же делать дальше, нам помогла книга, которую вы сейчас держите в руках. Мы прочитали ее всей командой и здорово переработали текущие процессы взаимодействия в парадигме слаженности, простоты и удобства. А процессы сборки, развертывания инфраструктуры, установки, тестирования и выдачи поставки объединили в непрерывный производственный конвейер.

«DevOps для современного предприятия» – книга об эффективной ИТ настоящего. Захватывающий и понятный путеводитель, способный обобщить, разложить по нужным полочкам существующий опыт и обогатить его ценными идеями.

В книге описаны основные шаги и принципы построения производственно-го взаимодействия, автоматизации процессов и развития культуры разработки ПО. Теория щедро сдобрена историями реальных людей и компаний, прошедших непростой, но интересный путь к DevOps.

Неоспоримая ценность этой книги в том, что она помогает вырваться из рутины бытия и взглянуть на текущие процессы совершенно другими глазами. Приходит осознание того, что на точечных «костылях» автоматизации далеко не уйти, появляется понимание того, как выглядит путь роста и развития, который подходит именно вашей компании, проекту, продукту.

Желаю вам приятного чтения, и пусть эта книга станет для вас источником неиссякаемого вдохновения!

Лина Чуднова,
руководитель практики DevOps компании «Неофлекс»



О компании «Неофлекс»

«Неофлекс» создает ИТ-платформы для цифровой трансформации бизнеса, помогая заказчикам получать устойчивые конкурентные преимущества в цифровую эпоху. Мы фокусируемся на заказной разработке программного обеспечения, используя передовые технологии и подходы.

Наш отраслевой опыт и технологическая экспертиза, усиленная собственными акселераторами разработки, позволяют решать бизнес-задачи любого уровня сложности. Среди наших заказчиков более половины российских банков, входящих в топ-100, а также компании из 18 стран Европы, Азии и Африки.

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Современный бизнес ожидает от ИТ все больше. Требования к производству программного обеспечения становятся жестче, планка качества – выше, времени и ресурсов – меньше. Бизнес хочет все сразу: Time2Market, снижение сбоев и отказов, и притом дешевле, а еще чтобы ИТ «прочитали мысли» и сделали правильно правильные вещи. Нужна магия, а время шаманов и энтузиастов ушло.

Необходим четкий процесс, который дает результат – когда это нужно заказчику или нужно быстрее. Все чаще информационные технологии не просто поддерживают бизнес, но становятся основным драйвером развития и трансформации.

На мой взгляд, DevOps не является революцией или универсальным лекарством. Это точно не магия, это лучше – качественный скачок, перевернувший принципы построения процессов производства ПО. Это то, что позволяет ИТ делать невозможное и при этом не ломаться от чрезмерного стресса и внутренних противоречий. Это вынужденная автоматизация рутинных операций. Это изменение требований к ИТ-специалистам, трансформация рынка труда ИТ и появление новой профессии «инженер DevOps».

Методики DevOps связывают ИТ в единый процесс, позволяя сделать его не только измеряемым и контролируемым, но и понятным и динамичным. Этот подход – если хотите, новая философия – связывает специалистов разных ИТ-областей в единую эффективную команду. Вы можете сосредоточиться на управлении, исходя из принципа достижения глобального оптимума, а не частных оптимумов на разных участках ИТ-производства. Узкие места процессов выходят из тени, а оптимизация становится неизбежной.

В цифровую эпоху скорость и возможность динамического изменения имеют первостепенное значение. Время – это не просто деньги. Зачастую это часть стратегии, основа конкурентной борьбы, а динамика изменений – это конкурентное преимущество, формирующее уникальность. В этой книге вы найдете советы и примеры, что позволит погрузиться в мир DevOps. Книга захватывает и вовлекает, так что вы сами не заметите, как DevOps станет частью вашей жизни и войдет в культуру производства.

Искренне желаю вам увлекательного чтения. Узнавайте, практикуйте и пробуйте подходы DevOps уже завтра. Поверьте, это полезно, и это пригодится!

Владимир Туровцев,
управляющий партнер, директор по развитию бизнеса Logrocon,
ведущий преподаватель программы MBA школы бизнеса МИРБИС,
победитель конкурса «Лидеры России» 2018–2019



О компании

Компания Logrocon – Microsoft Gold DevOps Partner. С 2012 года разрабатывает, тестирует и внедряет ПО. Организатор международной конференции DevOps Forum 2019, международных некоммерческих комьюнити-конференций DevOpsDays Moscow 2018 и 2017. Компания реализовала более 40 проектов по DevOps.

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Хотя мы приняли все возможные меры для того, чтобы обеспечить высокое качество наших текстов, ошибки все равно случаются. Если вы найдете ошибку в одной из наших книг – возможно, ошибку в основном тексте или программном коде, – мы будем очень благодарны, если вы сообщите нам о ней. Сделав это, вы избавите других читателей от недопонимания и поможете нам улучшить последующие издания этой книги.

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Мы высоко ценим любую помощь по защите наших авторов, благодаря которой мы можем предоставлять вам качественные материалы.



Об авторе



На протяжении десятков лет Мирко Херинг работал над ускорением доставки программных продуктов при помощи инновационных подходов (в современной терминологии – DevOps); десять лет назад он начал экспериментировать с Agile-методиками. Будучи руководителем по DevOps и Agile по Азиатско-Тихоокеанскому региону в компании Accenture, он оказывает поддержку крупным публичным и частным компаниям по всему миру, помогая им в поисках эффективных методов ИТ-доставки. Мирко ведет блог **NotAFactoryAnymore.com** и выступает на международных конференциях, делаясь своими знаниями и опытом. Вы также можете подписаться на его страницу в Twitter: **@MircoHering**.



Благодарности

То, что любят говорить о воспитании детей, справедливо и для написания книги – такую работу в одиночку не провернуть. И наверняка я упустил кого-то из тех, кто достоин упоминания на этих страницах. Когда мы встретимся на следующей конференции, с меня причитается угощение!

Прежде всего хочу поблагодарить фантастическую команду, которая поддерживала меня на протяжении всего процесса редактуры: Тодда, Джина, Лею и Карен – без вас мои мысли никогда не уложились бы в связный текст. Это был нелегкий труд, но работать с вами было мне в радость!

Еще хочу сказать спасибо за отзывы коллегам, которые посвятили этому свое время: Эрику, Енгу, Эджею и Эмили. Вы помогли отшлифовать конечный результат без ущерба для смысла.

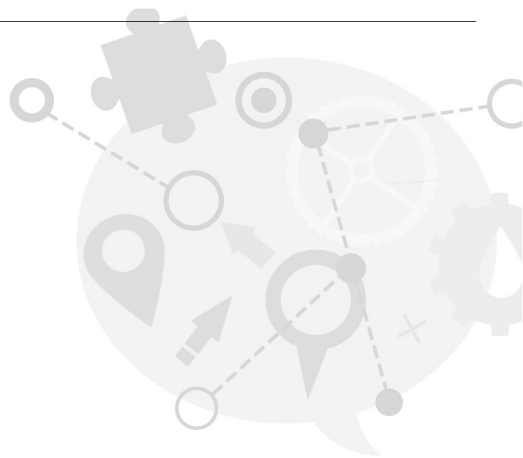
Особую благодарность я хотел бы высказать трем ребятам, без которых это издание не состоялось бы. Эрик, Тодд и Джин помогли мне преодолеть установку «я никогда не напишу стоящей книги» и сфокусироваться на мысли «у меня и правда есть что поведать миру». Без вашей поддержки я не решился бы приступить к делу.

Также я хочу выразить благодарность руководству компании Accenture – Баскару Гошу, Адаму Бердену и Питеру Ваккасу – за поддержку этого проекта и предоставление мне гибкого рабочего графика. В результате я мог отвести достаточно времени на свое «хобби».

Спасибо Гэри Груверу, который поделился со мной советами по поводу написания книги и помог найти оптимальную схему работы.

В дополнение хочу поблагодарить всех сотрудников Accenture – практикующих DevOps и всех прочих – за то, что они помогли мне выработать свой подход к трансформированию компаний. Хочу сказать спасибо клиентам, с которыми я работал и у которых я постоянно учусь чему-то новому. Некоторые из ваших идей нашли свое отражение в этой книге.

И последнее, но самое важное: огромное спасибо моей жене Аньяли, которая здорово поддерживала меня – даже тогда, когда ее внимание было поглощено очаровательным младенцем, появившимся на свет как раз в дни написания этой книги. Аньяли, ты просто чудо!



Предисловие

д-ра Баскара Гоша

На протяжении многих лет работы в ИТ-сфере я наблюдал не один кризис, связанный с появлением новых технологий, бизнес-моделей, а также со сменой глобальных экономических циклов. На волне подобных перемен DevOps приобретает особую значимость. Он замечателен не только своими принципами, но и изменениями, к которым ведет.

Мне нравится говорить, что DevOps можно использовать без Agile, но Agile нельзя использовать без DevOps. Это один из многих процессов трансформации, которые были запущены на заре DevOps. Помогая разработчикам наращивать эффективность и, соответственно, добиваться лучших результатов, DevOps способствует творческому самовыражению, что, в свою очередь, приводит к постоянному улучшению процессов поставки систем.

И хотя я люблю вспоминать те времена, что я провел, управляя процессами инфраструктур в крупных организациях, дело существенно осложнял тот факт, что мне приходилось разделять обязанности между разработкой и управлением процессами. Конечно, это была эпоха монолитных систем, использующих методологию водопада в больших масштабах и периодическую поставку программных пакетов. Для такой среды разработки разделение обязанностей представляло практичную и эффективную модель, которая соответствовала темпам изменений в системе.

Однако в цифровую эпоху скорость приобретает первостепенное значение. Разделение обязанностей сегодня не содействует все более ускоряющейся смене подходов, которые на данный момент необходимы бизнесу.

В этой книге Мирко раскрывает больше, чем просто технику DevOps, – он делится своей страстью к улучшению процессов проектирования программных

продуктов. Используя понятные аналогии и рекомендации, Мирко показывает, как помочь компании внедрить DevOps. Не важно, начинаете ли вы свой путь в DevOps или уже неплохо его освоили и хотите узнать, как применить его принципы в больших масштабах, – в процессе чтения книги вы несомненно оцените DevOps и его преимущества.

Д-р Баскар Гош,
исполнительный директор Accenture Technology Services
Бангалор, Индия
Март 2018 года



Предисловие автора

Обучение – дело не обязательное, а добровольное.

Совершенствование – дело не обязательное, а добровольное.

Но чтобы выжить, мы должны учиться.

Уильям Эдвардс Демминг

Одним из самых благодарных занятий в моей карьере был поиск наиболее эффективных способов создания значимых проектов и передача этой информации как можно большему кругу людей. Когда мы работаем неэффективно, то тратим время на ненужные вещи, на повторяющиеся и скучные задания, что не приносит никакого удовлетворения. Я не вынашиваю цели изменить мир, побуждая людей развлекаться на работе, но, мне кажется, труд должен быть человеку в радость. Когда сотрудники занимаются любимым делом, хороший результат не заставит себя ждать.

С того времени, как я пришел работать консультантом в Accenture – а было это более десяти лет назад, – я успел поработать с десятками команд, увеличивая эффективность и темп их работы, а следовательно, и качество поставки продукции. Но и прежде, чем стать консультантом, я думал о том, как сделать процессы в ИТ более эффективными.

На заре моей трудовой деятельности, в конце 1990-х, в ИТ только начинали привлекать к работе сторонних сотрудников. Первые несколько лет я набирался опыта в исследовательских лабораториях IBM, работая в области телематики и над инструментами для разработчиков (например, разрабатывая языки для особых CPU и предоставляя соответствующие компиляторы и IDE-расширения). Когда я начинал, разработка пакетного программного обеспечения была развивающейся отраслью, но основной объем работы осуществлялся

для частной разработки и штатно. Единственным способом увеличения продуктивности было усовершенствование автоматизации, и во всех моих ранних проектах мы выстраивали креативные решения при помощи различных shell-скриптов, Perl-скриптов и других оригинальных инструментов, которые облегчают жизнь разработчикам и администраторам. Я был очень доволен, когда выстраивал все эти решения по автоматизации и видел, как всем участникам проекта становится легче и веселее работать.

Был любопытный случай. В течение пяти лет я был занят в двух больших проектах и работал над созданием таких инструментов для разработчиков, которые позволяли успешно поставлять продукты. Когда я закончил работу на этих проектах, то начал оценивать разные организации, и мне показалось, что того уровня автоматизации на данный момент недостаточно. Все-таки я всю свою профессиональную жизнь решал задачи по автоматизации для команд поставки. Когда я говорил об этом с коллегами, мне становилось ясно, что пакетное программное обеспечение и возможности нештатной поставки открывают путь к увеличению продуктивности и снижению стоимости, чем многие организации пользуются, вместо того чтобы инвестировать в хорошие практики разработки и инструменты¹. Я потратил следующие несколько лет, осваивая ту нишу на рынке, которая, как считалось, помогает организациям реализовывать инструменты для поставки. Но, по правде, организации не были в восторге от предложения вкладываться в это.

Предложение увеличить объем нештатных поставок и сократить среднюю стоимость рабочего дня разработчика (известную также как *средняя суточная ставка*) казалось более привлекательным для организаций, чем нечто более сложное и трудноизмеримое – разработка хорошей платформы поставки, которая помогает всем повысить производительность труда в ИТ-сфере. В конце концов, как вы будете измерять производительность в ИТ? Я солидарен с Рэнди Шупом и Эдрианом Кокрофтом, которые на конференциях признавались, что на протяжении всей своей карьеры пытались выявить достойный показатель производительности, но не смогли найти ничего стоящего. Я поднимал эту тему в блоге, рассказав о том, что производительность в ИТ очень сложно измерять; вместо этого стоит оценивать время выполнения циклов, неоправданные расходы и поставленную функциональность. Важно брать во внимание некоторые значимые метрики, иначе вы не сможете наблюдать за вашим развитием, поэтому получается, что в общем случае производительность в ИТ – достаточно расплывчатое понятие, и нам необходимо искать другие показатели, которые помогут нам судить о том, насколько наша работа эффективна.

В дальнейшем я провел несколько лет, работая над тем, чтобы понять, откуда растут проблемы в ИТ и как их решить. Мне повезло, так как мои исследования совпали со временем распространения технологий и методологий,

¹ Подробнее об этом рассказывается в моей статье на DevOps.com: *Why We Are Still Fighting with the Same Problems in DevOps as 15 Years Ago* («Почему мы не можем справиться с проблемами в DevOps, существовавшими еще 15 лет назад»).

которые впоследствии заложили основы нового способа реализации поставки в ИТ: Agile, DevOps и *облако*, среди прочего, значительно упростили реализацию тех решений, которые я построил за всю свою карьеру. Ниша, в которой я работал, становилась все более привлекательной, – сегодня сложно найти организацию, которая не говорит об Agile и DevOps.

Но, оглядываясь назад и оценивая, где сегодня находится ИТ-индустрия, мы понимаем, что ИТ-поставка все еще не там, где она должна быть. Мы склонны считать, что *непрерывная поставка* является прекрасной практикой создания современных архитектур приложений, но если мы поищем организации, которые в совершенстве ей овладели, то обнаружим, что их совсем немного; к тому же их непросто найти. Многие организации выстраивают рабочие процессы, которые долгое время развивались с оглядкой на методы традиционного производства. В конце концов, эти практики были хорошо систематизированы во многих учебных планах MBA и накопили сотни лет практики. Но данные подходы и идеи уже не актуальны.

Я сам не овладел этим в совершенстве и все еще упорно учусь каждый день, но хочу, чтобы мои упражнения были доступны как можно большему кругу людей. Как вы видите на рис. 1, я разработчик до мозга костей: в первую очередь разрабатываю технические решения, вместо того чтобы думать о заинтересованных людях. Я на своих ошибках понял, что одно лишь применение правильных методов и инструментов не способно магическим образом преобразовать организацию. Сменить культуру – самая сложная задача, но также и самая значительная. Мне понадобилось совершить множество ошибок и промахов, чтобы узнать то, что я собираюсь раскрыть в этой книге, и понять, что необходимо вести преобразования только в готовой к этому культуре, дабы достичь устойчивого эффекта.

Последние несколько лет я разрабатывал практикум, который провожу для СІО и других ИТ-руководителей, чтобы показать их проблемы и помочь определить возможные пути решения. Самое замечательное в том, что ты встречаешься с умными и прогрессивными лидерами, – это возможность каждый раз узнавать нечто новое. Я уже проводил данный практикум в течение некоторого времени и невероятно благодарен за опыт и идеи, которые передали мне СІО: они помогают мне совершенствовать мой практикум. (Материал этой книги частично отражает и знания, полученные в ходе таких сессий.)

DevOps для современных компаний ссылается на различные испытания, с которыми сталкиваются организации во время их преобразования в современные ИТ-организации. А такая трансформация сейчас характерна для многих организаций: будь то производители автомобилей или банки, их бизнес зависит от ИТ. Мы видим, что технологии развиваются все быстрее и быстрее. Но в то же время у нас есть *устаревшие* приложения, оставшиеся с давних времен. А новые приложения, создаваемые сегодня, устареют через несколько лет. Я даже согласен с идеей о том, что устаревшим можно считать код, который был написан вчера! Программное обеспечение и технологии меняют ландшафт бизнеса, подсказывая людям новые способы взаимодействия и об-

мена информацией. Более того, технологии позволили нам преодолевать препятствия и расстояния. В итоге мир становится более сложным, он меняется быстрее, и из-за этого новые типы потребления разрушают установившиеся бизнес-практики. Многие организации сталкиваются с фундаментальной необходимостью модернизации ИТ-инфраструктуры. Наши старые *ментальные модели* и методы больше не работают. Нам нужно по-новому подходить к необходимости поиска новых решений. Но путь к современным решениям и улучшению технологии все еще кажется туманным и непростым. Очень немногие организации старого образца сегодня прошли через это преобразование.

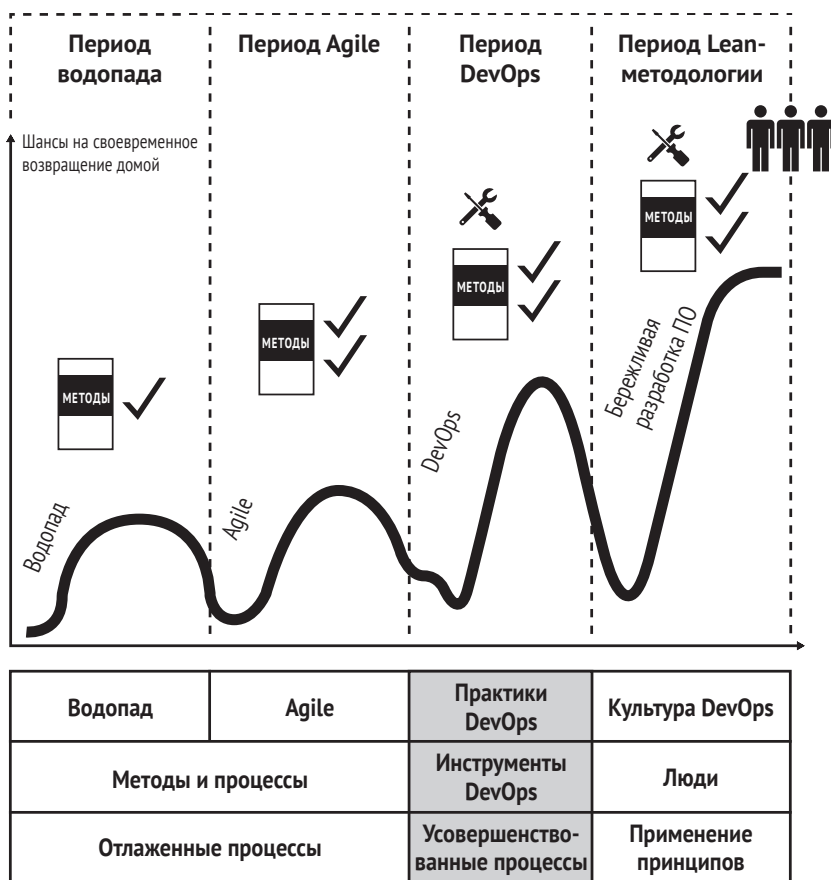


Рис. 1. Развитие представлений Мирко о переменах в организации

На протяжении своей карьеры я успел поработать с рядом крупнейших технологических организаций в каждой из вертикалей этой индустрии. И какие бы вы ни слышали оправдания, будь они связаны с технологией, сложностью или культурой, поверьте мне, я видал ситуации и похуже! Тем не менее эти

организации были способны к радикальному преобразованию и улучшению своих результатов. Хочу поделиться с вами некоторыми из открытий и достижений. ИТ не должна быть областью, в которой большая часть времени тратится на решение одних и тех же проблем.

Материал этой книги основан на принципах Agile, DevOps и Lean. На самом деле большинство разговоров с клиентами я начинаю с вопроса «Что эти принципы значат для вас?», ведь все эти методологии такие неоднозначные. Я часто применяю схему, показанную на рис. 2, чтобы ясно очертить для слушателей, как я пользуюсь этими принципами.

Выполняя роль консультанта, я в то же время поставил себе цель как можно больше дистанцироваться. Как только мои клиенты начнут успешно применять принципы Lean, DevOps и Agile, а также выходить на более эффективную работу, я смогу пойти дальше и посвятить свое время реализации существующих решений. Я не могу представить себе лучшей цели в жизни, чем предоставлять заказчику максимальную свободу и вовремя отступить, сосредоточиваясь на одном-двух новых проектах.

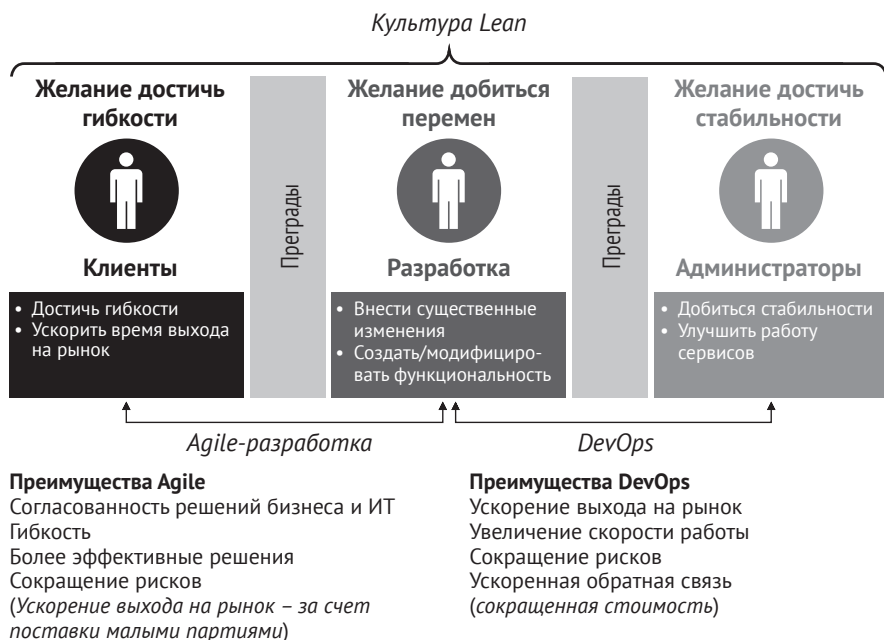


Рис. 2. Взаимосвязь Agile и DevOps: как принципы Lean, Agile и DevOps связаны друг с другом

Но пока в сфере ИТ слишком многое все еще делается неправильно и людям приходится каждый день преодолевать проблемы, я буду принимать участие в совершенствовании мира ИТ. Я буду помогать организациям пережить преобразования при помощи этой книги, ведь моя команда не может быть вез-

десущей. У каждого из нас работы предостаточно. Честный ответ на вопрос о сложных проблемах состоит в том, что описанные в книге методы – только начало. Вы можете экспериментировать, добавлять что-то от себя и использовать мои советы частично. Каждое преобразование зависит от контекста, и не существует универсального рецепта успеха.

Надеюсь, что эта книга поможет вам с честью преодолеть неизбежные трудности. Я делюсь своим опытом и практическими упражнениями, и вы можете использовать их в вашей организации (будь она крупная или небольшая, старая или молодая), чтобы добиться улучшений. Я с нетерпением буду ждать встречи с вами на этом пути: на конференциях, где вы расскажете о своих успехах и провалах, на митапах или, возможно, на одной из моих консультационных встреч, где мы вместе будем искать решения ваших вопросов.

Я разработчик до глубины души и хочу создавать полезные приложения. Давайте сообща менять нашу индустрию, чтобы мы могли больше времени посвящать созидательной стороне ИТ.

Мирко Херинг



ВВЕДЕНИЕ

Как мы к этому пришли

Основной опасностью кризисных времен является не кризис, а то, что вы будете действовать согласно вчерашней логике.

Питер Ф. Драйер. *Managing in Turbulent Times*
(«Менеджмент во время кризиса»)

Прежде чем подобраться к самой сути, я хотел бы объяснить, почему важно менять подход к поставке ИТ-услуг. Мы явно не планировали ситуацию, которая сложилась на сегодняшний день, когда много организаций прикладывают массу усилий, чтобы поставлять продукты, приносящие пользу бизнесу. Услуги ИТ либо запаздывают, либо слишком дорого стоят, либо не способны обеспечить то качество, которого ожидают заинтересованные лица на стороне бизнеса, и это не потому, что мы сознательно принимаем ошибочные решения. Поразмыслив, вы поймете, что мы все примерно одинаково представляем себе, как выглядит хорошая работа, – примеры Netflix и Google встречаются в сотнях презентаций об ИТ. Почти каждая ИТ-организация говорит об Agile и гибкой поставке, автоматизации в жизненном цикле поставки программного обеспечения (англ. *Software Delivery Life Cycle*, сокр. SDLC) и применении современных паттернов архитектур, таких как *cloud-native приложение*, приложение двенадцати факторов и *микросервисы*.

Однако нам с трудом удастся отыскать организации, которые в совершенстве овладели этим новым методом работы в ИТ. Многие компании, которые могут похвастать положительным опытом, относительно молоды и изначально развивались как облачная или интернет-платформа (компании, которые со времен основания делали ставку на интернет как основную платформу). Мы даже придумали для них название: DevOps-единороги. Потому что встретить их не проще, чем единорога, и их уровня слишком тяжело достичь средней организации с устаревшей ИТ-архитектурой.

Можно подумать, что основным испытанием для такой организации выступает трансформация старой архитектуры. В определенной степени это верно, но я склоняюсь к тому, что основная проблема – в менталитете. Многие лидеры в технологической отрасли используют идеи, заимствованные из области традиционного производства, несмотря на то что ИТ по своему характеру от него отличается¹, – они применяют ментальную модель производства для творческого, по своей сути, процесса. В традиционном производстве мы следуем предсказуемым процессам для получения одного и того же результата (продукта), раз за разом. В ИТ, наоборот, мы не занимаемся одним и тем же проектом дважды. Чтобы следовать созидательной природе ИТ и добиться изменений менталитета в компаниях, нам нужно обратиться к следующим трем областям: к организационной экосистеме, в которой мы находимся, к людям, с которыми работаем, и к технологиям, на которых держится наш бизнес. Этот трехчастный подход и определил структуру книги. Во введении я объясню, почему прежний стиль мышления более не актуален. Далее вы найдете рекомендации, которые помогут вам преобразовать свою организацию и свойственную ей линию поведения.

Структура книги такова:

1. Часть А «Создание подходящей экосистемы» (главы 1–4): как вы формируете организацию, которая должна быть способна обслуживать ИТ? Как вам необходимо работать с другими организациями, такими как поставщики программных продуктов и компании – интеграторы решений, для того чтобы соответствовать новому способу ИТ-поставки? Первая часть книги дает ответы на эти вопросы и адресуется СІО и другим лидерам в ИТ, тем, кто задает стратегию организации.
2. Часть Б «Люди и организация процессов» (главы 5–8): в организации ничего не происходит без участия людей. Мы так мало задумываемся об этом, что называем сотрудников «ресурсом»! В части Б этой книги мы сосредоточимся на людях и на том, как воодушевить их на ежедневное совершенствование: ведь в этом, помимо прочего, залог успеха организации.
3. Часть В «Технологические и архитектурные аспекты» (главы 9–12): я уверен в том, что недавние достижения в области технологий существенно расширяют способы работы и принуждают лидеров индустрии переосмысливать методы поставки ИТ-решений. Я расскажу о некоторых ключевых тенденциях и о том, как наилучшим образом ими воспользоваться. Технологии развиваются с невероятной скоростью, поэтому я не стану упоминать ничего конкретного – инструменты, поставщиков или методы. Чтобы помочь вам сориентироваться в этом пространстве, я все же предоставлю список ресурсов, который, надеюсь, не утратит актуальности с течением времени.

¹ Некоторые книги о DevOps, такие как *The Phoenix Project*, описывают современные модели производства, которые отличаются от этой традиционной модели.

Каждая глава основного блока содержит обсуждение определенной проблемы и предлагает возможные решения и подходы. Я старался делать главы покороче, чтобы проще можно было усвоить материал.

В конце каждой главы приводятся упражнения в стиле «сделай сам»: я предлагаю вам некоторые практические шаги, позволяющие применить знания, почерпнутые из соответствующей главы. Вашему вниманию представлены шаблоны, некоторые вопросы, которые вы можете задать себе или вашей организации, или пошаговое руководство. Это не заменит сотрудничества с опытным консультантом, но поможет совершить первые шаги на пути глобального преобразования.

Я также привожу ссылки на некоторые из моих статей там, где широко раскрываю некую тему, но желающим изучить ее глубже могли бы понадобиться дополнительные подробности. Можете полюбопытствовать и прочитать эти статьи.

Также в книге вы встретите фрагменты, резюмирующие вышесказанное и предлагающие некоторые общие рекомендации в отношении ваших следующих действий. Я уже говорил о том, что был вынужден изыскивать собственные методы, позволяющие развивать скорость работы в ИТ-индустрии. По сути, информация, приведенная в книге, должна подготовить вас к началу преобразования вашей компании в современную ИТ-организацию.

И наконец, в книгу включено приложение, где описываются подробные аналогии с заводами (фабриками), о которых говорится на протяжении всей книги. Если это совершенно новая для вас тема, вам, вероятно, стоит сначала прочесть приложение, перед тем как подойти к основному содержанию книги. Тем, кто хорошо знаком с такими аналогиями, приложение поможет понять их глубже и, возможно, сделать полезные для себя выводы. А теперь давайте немного поговорим о том, почему схемы, применяемые в традиционном производстве, помогают достичь быстрой и надежной ИТ-поставки, к чему мы и стремимся, используя DevOps.

Принципы традиционного производства не так просто применить в ИТ-поставке

В последние годы методы современного традиционного производства вдохновляли новаторов на появление таких течений, как Lean, системное мышление и теория ограничений. Производственная система компании Toyota на самом деле послужила одним из источников идей, которые переросли в Agile и DevOps. Тем не менее многие менеджеры занимаются управлением, все еще черпая вдохновение в старых подходах, не упуская из виду образ модели производства, сформировавшейся еще во времена Генри Форда. Она основана на идее о том, что мы выстраиваем процесс производства, чтобы максимально рационализировать процесс управления, в результате чего можно нанять менее квалифицированных работников, но добиться наиболее качественных

результатов. Однако в сфере ИТ, напротив, для достижения наилучших результатов необходимы сотрудничество и креативность. Мне кажется, что старые принципы производства привели ко множеству проблем, с которыми мы сегодня сталкиваемся в ИТ: например, строгие процессы с административным стилем управления, раздутые и сгруппированные по функциональным навыкам организационные структуры, а также частое делегирование обязанностей угнетают рабочий поток и повышают риск технологических ошибок и сбоев.

Я назвал свой блог «больше никаких заводов» (notafactoryanymore.com), чтобы таким образом призвать к переменам в мышлении, которые необходимы исполнительным ИТ-директорам для успешного преобразования организаций. Слово «завод» (или «фабрика», *factory*) отсылает к тому типу производства, который когда-то предложил Генри Форд: массовое производство осуществляется специалистами, работающими на сборочной линии и выполняющими узкоспециальные задачи, отчего при производстве продукта очень редко происходят какие-либо изменения, если вообще происходят.

Устаревшие методы производства были основаны на изобретении Фордом сборочных линий и на работе, написанной Фредериком Тейлором, о принципах научного менеджмента¹. Запуск завода был дорогостоящим и длительным процессом. Сама работа на заводах оптимизировалась так, чтобы работники направляли все свои усилия на выполнение одной узкой задачи и могли научиться осуществлять ее невероятно эффективно. Для сокращения затрат производитель мог бы инвестировать в автоматизацию производства, приобретая новейшее оборудование; он мог бы сменить материал для изготовления продукта или переместить свой завод туда, где рабочему можно было бы платить меньше. Любые изменения в отношении самого продукта или процесса производства превращались в настоящее испытание, так как для этого приходилось приобретать новые машины, перенастраивать их, обучать всех работников новым процессам или менять схемы поставки материала для продукта.

Сам продукт практически не менялся (даже Генри Форд говорил о модели Т: «Вы можете получить “Форд-Т” любого цвета, при условии что этот цвет будет черным»), поэтому было достаточно просто сравнить результаты работы и стоимость продукта. Если вы измените процесс производства или начнете использовать другой материал для изготовления продукта, то можно с научной точки зрения оценить результаты (как раз эту концепцию предлагает работа Тейлора). Можно поставить под сомнение, что современное производство все еще позволяет вам измерять стоимость и продуктивность, так как все продукты на сегодняшний день производятся массово. Это тот тип производства, на котором основаны все экономические программы обучения и, соответственно, менеджмент. Я поступил в университет около пятнадцати лет назад, а недавно получил степень MBA, поэтому знаю не понаслышке, что обучение

¹ Фредерик Тейлор считается основателем научного менеджмента, который он реализовывал в стальной промышленности. Он опубликовал свою работу «Принципы научного менеджмента» в 1911 году.

ИТ-процессам все еще следует этой модели. Так или иначе, такую модель легко понимать и контролировать, что позволяет использовать научный подход к процессам.

В самом начале ИТ-отрасль имела много общего с производственным бизнесом. Давайте вернемся в 1990-е и зайдем в ИТ-отдел автомобильной компании. (Я предлагаю подобный сценарий, потому что в школьные годы работал в таком отделе по выходным и именно благодаря этому решил строить карьеру в ИТ.) Рабочие процессы в ИТ в целом организовывались аналогично другим производственным процессам и следовали тем же тенденциям. Создание новой ИТ-системы обходилось дорого и занимало много времени. Сама работа оптимизировалась таким образом, чтобы сотрудники могли стать хорошими специалистами по тестированию, Java-разработчиками, SAP-конфигураторами или инженерами по эксплуатации. Каждый из них мог сосредоточиться на одной специфичной задаче и выполнять ее невероятно эффективно в рамках процесса разработки по методологии водопада.

Для сокращения расходов ИТ-отдел мог предпринимать следующие шаги: можно было инвестировать в автоматизацию, приобретая улучшенные инструменты, сменить используемый тип программного обеспечения (например, перейти с частной системы на SAP, чтобы пользоваться уже готовой функциональностью, вместо того чтобы создавать ее самостоятельно), а позднее можно было бы перенести разработку туда, где сотрудникам можно меньше платить. В большинстве случаев внесение изменений в продукт сулило большие испытания, так как это подразумевало изменение условий контракта с поставщиками ПО или значительное преобразование существующей команды.

Сам продукт представлял собой нечто стандартное: *систему планирования ресурсов предприятия (ERP)* или *систему управления взаимоотношениями с клиентами (CRM)*, использующую наилучшие практики, основанные на готовых решениях. И хотя выпускаемые продукты не были идентичными, общие усилия для их создания были сопоставимы (например, реализация SAP в одной автомобильной компании была сравнима с реализацией SAP в какой-либо другой компании).

Как вы видите, несмотря на то что ИТ – особая сфера, она все равно пересекается в управленческой части с другими отраслями, поскольку в ней используются практики, взятые из традиционного производства. И они работают уже довольно продолжительное время. Но за это время сфера ИТ уже сильно изменилась, а мы все еще не пытаемся управлять ей как-нибудь по-новому.

Применение в ИТ-области «заводских» методов порождает следующее представление о рабочем процессе: сотрудники ИТ-отдела сидят за перегородками и колдуют каждый над своей задачей; один человек преобразует требования в проект, передает его другому человеку, который пишет некоторый код, а затем передает его еще одному человеку, который его протестирует, – и при всем этом никто друг с другом даже не разговаривает. Все делается механически, как на конвейере. (Здесь вспоминается Чарли Чаплин в фильме «Новые времена».) Мир меняется, и на сцену выходит человек, готовый нести перемены:

сокращать усилия и расходы, затрачиваемые в ИТ на операции и подготовительные мероприятия.

Понятия операционных издержек и объема работы выступают основой для смены подхода

Операционные издержки (их еще называют издержками на подготовку) – это расходы, необходимые для преобразования механизма производства, чтобы начать выпускать другой продукт или сменить способ изготовления продукта. Размер операционных издержек определяет оптимальный объем работ по продукту, что позволяет добиться определенных экономических результатов, в то время как на издержки на хранение воздействовать довольно сложно. Возможное влияние операционных издержек на оптимальный объем работ показано на рис. 3¹.

На определение оптимального объема работ влияют издержки на хранение и операционные расходы (чем больше издержки на хранение, тем меньше будет оптимальный объем работ, а чем больше операционные расходы, тем оптимальный объем работ будет больше). В ИТ издержки на хранение являют собой комбинацию возрастающей стоимости исправления дефектов по мере продвижения по жизненному циклу разработки и упущенной выгоды от того, что готовая функциональность простаивает, будучи все еще не выпущенной в среду эксплуатации. Эти два фактора не сильно изменились с приходом практик DevOps; чего коснулись изменения, так это операционных издержек.

По мере того как традиционное производство менялось с течением времени, начала усиливаться тенденция к сокращению операционных издержек, для того чтобы появилась возможность производить более разнообразные продукты. За этим последовала экспансия массового изготовления по индивидуальному заказу и 3D-печати. Методологии в сфере ИТ Agile и DevOps были направлены на достижение такого же эффекта.

Ранее операционные издержки были большими в ИТ-проектах. Была необходимость в приобретении оборудования и установке всякого рода межплатформенного ПО, а разработка оригинального продукта включала в себя множество задач, выполняемых вручную, таких как, например, развертывание изменений в коде, регрессионное тестирование данного решения, внесение изменений в окружение (так, для создания MVP тогда было необходимо потратить 6–12 месяцев вместо трех, а релиз новой функциональности занимал месяц вместо нескольких дней).

¹ Штефан Томке и Дональд Райнертсен, вероятно, лучше всех описали это в статье от мая 2012 года для Harvard Business Review под названием *Six Myths of Product Development* («Шесть мифов о разработке продуктов»). И хотя они говорили непосредственно о разработке продуктов, а не об ИТ, так или иначе ИТ-услуги подразумевают поставку ИТ-продукта [1].

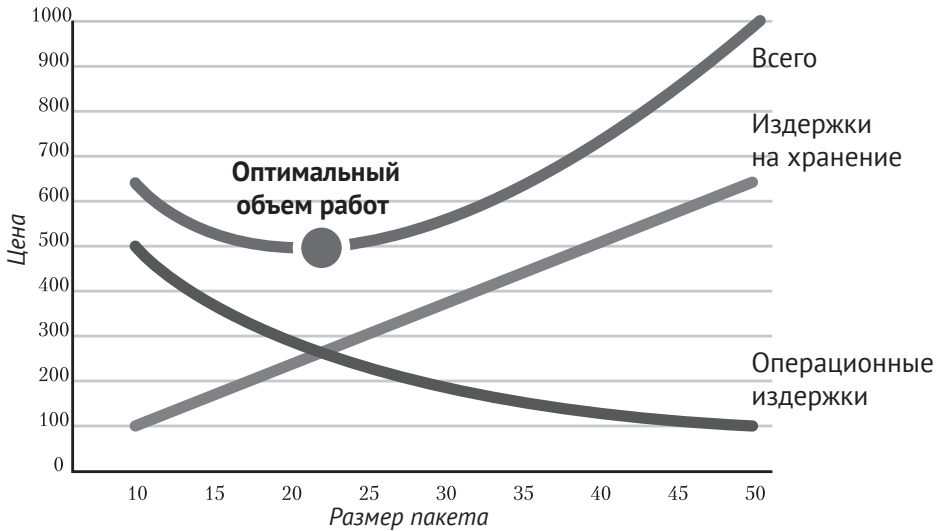
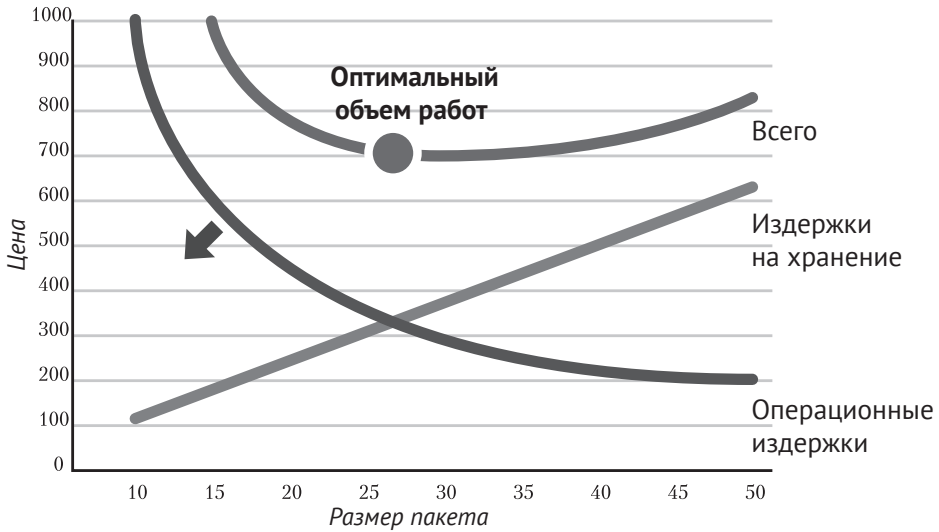


Рис. 3. Соотношение между операционными издержками и оптимальным объемом работ: уменьшение операционных издержек позволяет сократить объем работ

Сегодня это не так, и операционные издержки значительно снизились с началом применения облачных инфраструктур и Хаас и автоматизации процессов в жизненном цикле разработки, что позволило максимально сократить объем работ.

В этом малом оптимальном объеме работ таится настоящая выгода для бизнеса. Малый объем работ позволяет закладывать малые расходы на пробу бизнес-идеи и реже делать крупные ставки. Одну прекрасную аналогию этому по-

ложению высказал долгожитель в разработке продуктов, Дональд Райнертсен [2]: «Представьте себе лотерею, в которой вы получаете приз, если угадаете три цифры. Первый вариант ваших действий – дать мне пять долларов и попытаться угадать число из трех цифр, а затем я скажу вам, выиграли ли вы приз в \$1000. Второй вариант – дать мне два доллара и попытаться угадать первую цифру. Я в свою очередь могу сказать вам, что эта цифра верная, а вы сможете решить, давать ли мне еще два доллара ради того, чтобы попытаться угадать следующую цифру. Какой из вариантов выбрали бы вы? На мой взгляд, второй вариант очевидно более привлекателен. Обратная связь при малом объеме работ позволяет получать информацию, на которой можно основывать решения о том, стоит ли идея дальнейших вложений. Это именно то, что обратная связь от заказчика позволит вам, если вы будете вносить небольшие партии новой функциональности и иметь дело с малым объемом работ в ваших ИТ-проектах».

Малый объем работ привлекателен еще и по другим причинам. Он упрощает предоставление ИТ-услуг, так как изменения производятся пошагово и в малом объеме, так что приходится меньше беспокоиться при тестировании и выпуске в среду эксплуатации. В производстве можно легко увеличивать объемы работ, так как вы можете выполнять один и тот же процесс в увеличенных объемах, не рискуя сильно усложнить его, как это может произойти при масштабировании вашего ИТ-решения. Меньший объем работ в ИТ позволяет нам проверить, в том ли направлении движется продукт, и пользоваться обратной связью от заказчика, чтобы направлять созидательную природу ИТ-разработки¹. В производстве сложнее организовать циклы с проектированием, созданием и проверкой продукта: только представьте себе создание одного продукта на заводе (например, машины), его продажу и затем получение обратной связи, для того чтобы создать новый, и т. д. Задержки и расходы после запуска такого цикла вскоре начнут зашкаливать. Метод Lean-стартапа [3] Эрика Рая был адаптирован для продажи реальных товаров в технике Fast-Works, что позволило добиться замечательных результатов (уменьшение стоимости, увеличение скорости) [4] – по крайней мере, пока не стало нормой печатать все на 3D-принтерах и сокращать таким образом операционные и подготовительные расходы [5].

С малым объемом работ приходит совершенно другая экономическая модель для управления процессами с целью сокращения необходимых дополнительных издержек, требуемых от менеджеров. Другими словами, даже если технические операционные издержки были сокращены, это не значит, что автоматически снизятся и операционные расходы, связанные с менеджментом и обслуживанием архитектуры. А причина в том, что мы до сих пор следуем

¹ Так как в сфере ИТ свойственно совершать пробы и ошибки в процессе разработки продукта, меньший объем работ поможет сократить риски и ускорить получение обратной связи. Этим ИТ отличается от производства, в котором эффективность и продуктивность можно измерить.

принципам, перенятым из традиционного производства. Данная книга поможет вам отказаться от такого подхода.

В приложении я более детально рассмотрел некоторые идеи и принципы, которые перешли в сферу ИТ из производственной практики, и рассказываю о том, насколько они еще применимы сегодня.

Я надеюсь, что эта книга поможет вам создать предоставляющую ИТ-услуги организацию, которая не будет похожа на завод из фильма «Новые времена» с Чарли Чаплином: в ней люди будут работать вместе с заинтересованными сторонами, чтобы получить значимые для заказчиков решения. Как сказал мой коллега из Accenture Марк Рендел, «DevOps не стремится делать ИТ-услуги более эффективными. Речь идет об увеличении эффективности бизнеса с помощью ИТ» [6].

А теперь, осознав это, давайте приступим к преобразованиям.

ЧАСТЬ А

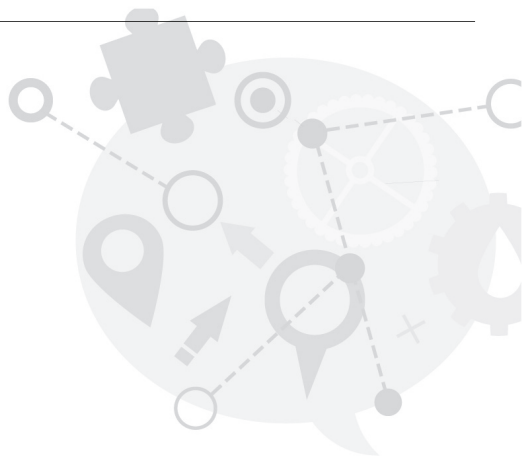
Создание подходящей экосистемы

Оказывая услуги консультанта, я часто говорю технологическим лидерам: представления о том, что такое хорошо, даже вкупе с благими намерениями, к сожалению, не всегда приносят наилучшие результаты. Экосистема, которую создает руководство компании, играет огромную роль в том, насколько успешными могут быть изменения. Скорее всего, экосистема, в которой вы работаете, была создана на фоне устаревших явлений – тех, которые были актуальны ранее, а также созданных ранее систем.

Понятие «устаревшие» применимо не только к вашим технологиям и приложениям. Как уже отмечалось во введении, существует консервативный тип мышления, вдохновленный командно-административной культурой, который желательно изменить. Итак, каким образом подготовить план, по которому будут проводиться изменения? Как выбрать правильные технологии? И кого же выбрать в надежные попутчики, чтобы уверенно двигаться от устаревших принципов к чему-то новому?

Владея инструментарием, предложенным в части А этой книги, вы сможете значительно приблизиться к созданию экосистемы, которая позволит ИТ процветать и преобразоваться. В этой части представлены высокоуровневые размышления о создании экосистемы, которая будет способствовать преобразованиям в современной ИТ-организации. Мы поговорим о пути преобразования, об ускорении работы в ИТ, о портфолио вашей компании, работе с устаревшими явлениями, выборе программного обеспечения и поиске подходящих партнеров, которые будут поставлять вам свои услуги. Также мы обсудим, как моя команда работает с клиентами – руководителями организации над изменением существующей экосистемы, стремясь к тому, чтобы это принесло пользу обеим нашим организациям; я покажу некоторые инструменты для анализа и действия, которые вы сможете создать самостоятельно. Иными словами, вы поймете, как работать с имеющимися в вашем распоряжении ресурсами так, чтобы они были для вас не помехой, а помощью.

ГЛАВА 1



Путь к изменениям

- Скажите, пожалуйста, куда мне отсюда идти?
- А куда ты хочешь попасть? – ответил Кот.
- Мне все равно... – сказала Алиса.
- Тогда все равно, куда и идти, – заметил Кот.

*Льюис Кэрролл, «Алиса в Стране чудес»
(пер. Н. Демуровой)*

Многие трудности в предоставлении ИТ-услуг связаны с узкими местами – такими «бутылочными горлышками», которые не позволяют вам быстро получить значимый отзыв от клиентов, который вы смогли бы использовать для улучшения ваших рабочих процессов и продуктов. Сделать работу видимой – это один из наиболее действенных способов для обнаружения узких мест, однако ИТ чаще всего сталкивается с неявной работой: в ИТ нет акций, стоимость которых показывала бы успехи команды или компании в процессе создания продукта, нет никакого склада, по наполнению которого видно, каков объем невостребованной продукции, и нет никакого явного процесса, за которым мы могли бы наблюдать, чтобы увидеть, как то, что поступает на вход, превращается в конечный продукт на выходе. Это ведет к интересной ситуации: в то время как большинство людей, работающих на традиционном производстве, хотя бы приблизительно понимают, как их продукция создается, в ИТ процессы не так очевидны. Я имею в виду реальные процессы, а не те, которые могут быть описаны на сайте компании или же в какой-нибудь методологии. Однако без четкого представления о работе действительно трудно улучшить рабочие процессы. Таким образом, принципиально важная задача руководства любой ИТ-организации – сделать процессы видимыми, в том числе четко обозначить текущий статус работы и такие показатели, как качество и скорость. В этой главе мы воспользуемся картами потоков ценностей, чтобы достичь этого результата, и положим начало пре-

образованиям при помощи начальной карты потоков ценностей и управленческого подхода.

Явные ИТ-процессы

Я предпочитаю начинать свою работу в качестве консультанта по DevOps с упражнения по составлению карты потока ценности. Причина достаточно проста: это упражнение наиболее эффективно поясняет, как все же выглядят процессы в ИТ. Вы, конечно, можете изучить описание методологий или взглянуть на какие-нибудь большие диаграммы в Visio, чтобы узнать что-то про предоставление ИТ-услуг, но зачастую реальность не вполне совпадает с процессами, описанными в документации.

В конце каждой главы я коротко описываю процессы, которые вы можете попробовать воспроизвести, – смело пользуйтесь этим. В двух словах: вы организуете собрание с участием представителей каждого подразделения вашей организации, чтобы составить такой план предоставления ИТ-услуг, который всех устроит, и, что даже более важно, найти те элементы системы, которые можно улучшить. Предполагаю, что на такую встречу надо пригласить помощника или кого-либо, кто может судить о деле беспристрастно.

В идеале мы хотим иметь возможность объективно измерять такие параметры ИТ-процессов, как производительность, длительность циклов и качество. К сожалению, зачастую это требует немалых усилий. Составление карты потока ценностей раз в три–шесть месяцев (в зависимости от того, насколько быстро происходят изменения и улучшения) позволит вам отслеживать процессы, затрачивая на анализ их состояния всего несколько часов в месяц. Это даст вам возможность сосредоточиться на текущем процессе, на продолжительности циклов и качестве. Позаботьтесь о том, чтобы результаты составления карты были очевидными для всех сотрудников; тогда люди обратят внимание на улучшение процессов. Подобная практика послужит явным напоминанием о том, что улучшение процесса – важная задача для организации.

Когда вы уже сформируете в компании хорошее понимание высокоуровневых ИТ-процессов и способность видеть области, нуждающиеся в улучшении, настанет время разрабатывать первую схему трансформации.

Создание первой схемы трансформации

Создание схем – это отчасти наука, отчасти искусство. Многие схемы на первый взгляд похожи, но при детализации можно заметить, что у двух разных людей никогда не получаются одинаковые схемы. Тем не менее стоит отметить, что не существует идеальных схем. Поступая строго согласно принципам Agile, очень важно понимать общее направление и определять для себя некоторые опорные точки, чтобы осуществлять оценку процессов и делать их видимыми. Многие вещи со временем изменятся, и вам придется это учиты-

вать по ходу дела. Приведу рекомендации о том, как создавать хорошие схемы трансформации вашего предприятия.

Основываясь на карте потоков ценностей ваших ИТ-услуг, вы сможете определять узкие места в процессах. Как нас учат *системное мышление, теория ограничений и теория очередей*, пока мы не справимся с «бутылочными горлышками» в наших процессах, ни одно из нововведений не приведет к их ускорению. Это очень важный момент, поскольку иногда мы тратим время на мелочи, упуская то, что может вызвать глобальный сдвиг. Один из прекрасных способов выявления «бутылочных горлышек» – проведение практикума с картами потока ценностей. Позвольте заинтересованным сторонам заострить внимание на значимых проблемах, к которым нужно пристально присмотреться, чтобы изменить тактику предоставления ИТ-услуг в целом. Коллективные размышления в большинстве случаев помогают выявить ряд узких мест.

Чтобы создать успешно работающую схему трансформации, необходимо еще уделить время установлению баланса между процессами и скоростью предоставления ИТ-услуг и их стоимостью и качеством. Уделять большое внимание процессам – это яркий пример тактики, основанной на системном мышлении, которая может поспособствовать устранению барьеров в вашей организации. Ранее «ответственный» за выполнение функции, например за работу на определенном участке – допустим, с центром тестирования (Testing Center of Excellence) или фабрикой разработки (Development factory), – вел инициативы по совершенствованию, чтобы воздействие на эту область и контроль над ней были более эффективными. Со временем это поспособствовало возникновению функций для обслуживания большего объема работ, хорошо оптимизированных, но в ущерб предоставлению ИТ-услуг в целом. Процессы улучшаются только при малых объемах работ.

Обычно для оценки ИТ-услуг пользуются тремя показателями: скоростью, стоимостью и качеством работы. Ранее было принято прилагать усилия к улучшению показателей стоимости или качества, что, в свою очередь, сокращало скорость поставки услуг. Если вы будете оценивать свои ИТ-услуги только с опорой на улучшение качества, то зачастую будете наблюдать расширение границ показателей качества, что увеличит стоимость работ и время, затрачиваемое на их анализ. Если же будете оценивать выполняемую задачу, основываясь на сокращении показателей стоимости, то наиболее распространенный подход – доверить больше работы менее опытным сотрудникам или не выполнять отдельные задачи в рамках процесса, что часто приводит к ухудшению качества и замедлению работы из-за необходимости ее переделывать. Принимать во внимание лишь стоимость или качество, не учитывая влияния процессов, по моему опыту, неразумно: это не принесет успеха ИТ.

И наоборот, если нам нужна скорость (особенно это касается «бутылочных горлышек», которые мешают быстро осуществлять поставку действительно малых партий продукта), то, обращая внимание на процессы, мы сможем ускорить поставку продукта – даже больших его партий, – что приведет к улучшению показателей качества и стоимости работ. Невозможно добиться скорой

поставки, если с качеством дела обстоят неважно, так как необходимость перерабатывать некачественно выполненную работу замедлит процесс. Единственное, что вы можете сделать для ускорения поставки, – автоматизировать процессы и избавиться от ряда неактуальных шагов. Если просто научиться быстро печатать на клавиатуре, это не ускорит выполнение процессов в целом. Между тем ИТ вынуждена стремиться к увеличению скорости поставки услуг. Я участвовал в процессах трансформации вместе с клиентами, которые поработали над сокращением показателя стоимости ИТ-услуг, но в целом впечатление заинтересованных лиц о процессах поставки оставалось неудовлетворительным. Я также был свидетелем множества инициатив по улучшению качества, которые сдерживали процесс поставки и даже почти полностью останавливали его. И я еще буду встречаться с инициативами по совершенствованию, связанными с ускорением процессов.

И еще несколько слов в предостережение тем, кто работает над ускорением процессов. Первое, о чем хочется сказать, – не такая уж большая проблема. Вы на самом деле можете обойти проблему проведения оценки быстроты поставки, уменьшая объем поставляемых партий продукта, которые, в свою очередь, можно будет поставлять быстрее. И хотя это не значит, что вы сможете добиться взаимозаменяемости партий разных размеров, данный подход все равно окажется выигрышным для организации, поскольку менее объемные партии так или иначе несут в себе меньше риска. Второе предостережение: люди могут предложить способы сократить путь, которые окажутся рискованными или ухудшат качество продукта. Чтобы этого избежать, вам нужно продолжать поиски способов оценки качества, помимо скорости, чтобы убедиться в том, что качество продукта не ухудшается при ускорении выполнения процессов. Для оценивания скорости процессов вам будет необходимо обратить внимание на работу, осуществляемую на протяжении всего цикла предоставления услуг, а также на изучение показателей, которые проинформируют вас о статусе этих работ. Полезными показателями для оценки быстроты процессов являются длительность цикла выполнения процессов (длительность цикла = период времени с утверждения рабочего процесса до его выполнения и выпуска результатов в среду эксплуатации) и объем работ, поставляемых за определенный период времени.

На рис. 1.1 показано, что в вашей схеме преобразования наверняка будут ключевые точки, связанные с основными функциями и возможностями (например, с автоматизированным регрессионным тестированием, упрощенным представлением бизнес-кейса), что логично. Тем не менее стоит обратить внимание и на нечто другое, а именно на схему покрытия областей применения и технологий. В следующей главе я расскажу, как создать портфолио областей применения, позволяющее вам определить ряд возможностей, которые вы будете стремиться развивать в процессе трансформации. Ваша схема должна содержать в себе приоритизированные списки (часто называемые волнами) областей применения, потому как ни одна крупная организация не сможет

развивать абсолютно все возможные направления. И не должна. Ведь некоторые области применения не стоят усилий и затрат.

И еще пару слов о схеме трансформации: для того чтобы добиться больших возможностей и перемен, потребуется много времени. К сожалению, организации не очень справляются с тем, чтобы терпеливо ждать завершения таких программ, поэтому вам нужно убедиться в том, что вы можете предоставить какой-то видимый результат на раннем этапе. Для этих ранних результатов можно не придерживаться всех правил. В них можно реализовывать области применения, которые не критичны для бизнеса, или те, которые не являются частью «бутылочных горлышек». Эти ранние результаты необходимы для того, чтобы сохранить поддержку и позволить организации увидеть первые успехи. Вам стоит рассматривать эту задачу как часть действий, необходимых для трансформации. Конечно же, в идеальной ситуации ранние результаты будут затрагивать одну из predetermined приоритетных областей.

Преобразование вашей организации займет время. На рис. 1.2 вы можете наблюдать шаблон схемы трансформации, который я часто использую в работе со своими клиентами. Паттерн, изображенный там, я довольно часто встречал. Он начинается с применения Agile, а затем приходит понимание того, что Agile без использования практик DevOps (таких как автоматизация тестирования, автоматизация развертывания и т. п.) не предоставит вам возможность ускорить процессы настолько, насколько вам это нужно. По мере внедрения DevOps ваша работа начнет ускоряться, вы начнете видеть ограничения организации и факторы, сдерживающие скорость работы, которые свойственны данной операционной модели. Для того чтобы преодолеть инерцию, потребуются значительные усилия организации и поддержка руководства. Не расстраивайтесь, если изменения не будут видны на следующее же утро.

Управление трансформацией

Как упоминалось ранее, схема – это очень важно, но без должного управления трансформацией вы не сможете добиться нужного результата. Довольно часто трансформация прекращается. Нет никакой возможности предвидеть все испытания, которые будут мешать продвижению, и без должного управления, которое поддерживало бы баланс между дисциплиной и гибкостью, процесс преобразований затормозится. Управление трансформацией позволяет сделать результаты видимыми, а также дает возможность влиять на них. Это отличается от обычного управления процессом предоставления ИТ-услуг, осуществляемого для ваших инициатив (например, в случае изменения плана технического наблюдения). На встрече совместно с рядом агентов и консультантов по трансформации на саммите DevOps Enterprise в 2015 году мы пытались определить, что необходимо для успешного внедрения DevOps. Все мы пользовались разными подходами и работали в разных организациях, но сходились в том, что отличает успешную организацию: способность постоянно совершенствоваться и успешно управлять этим процессом.

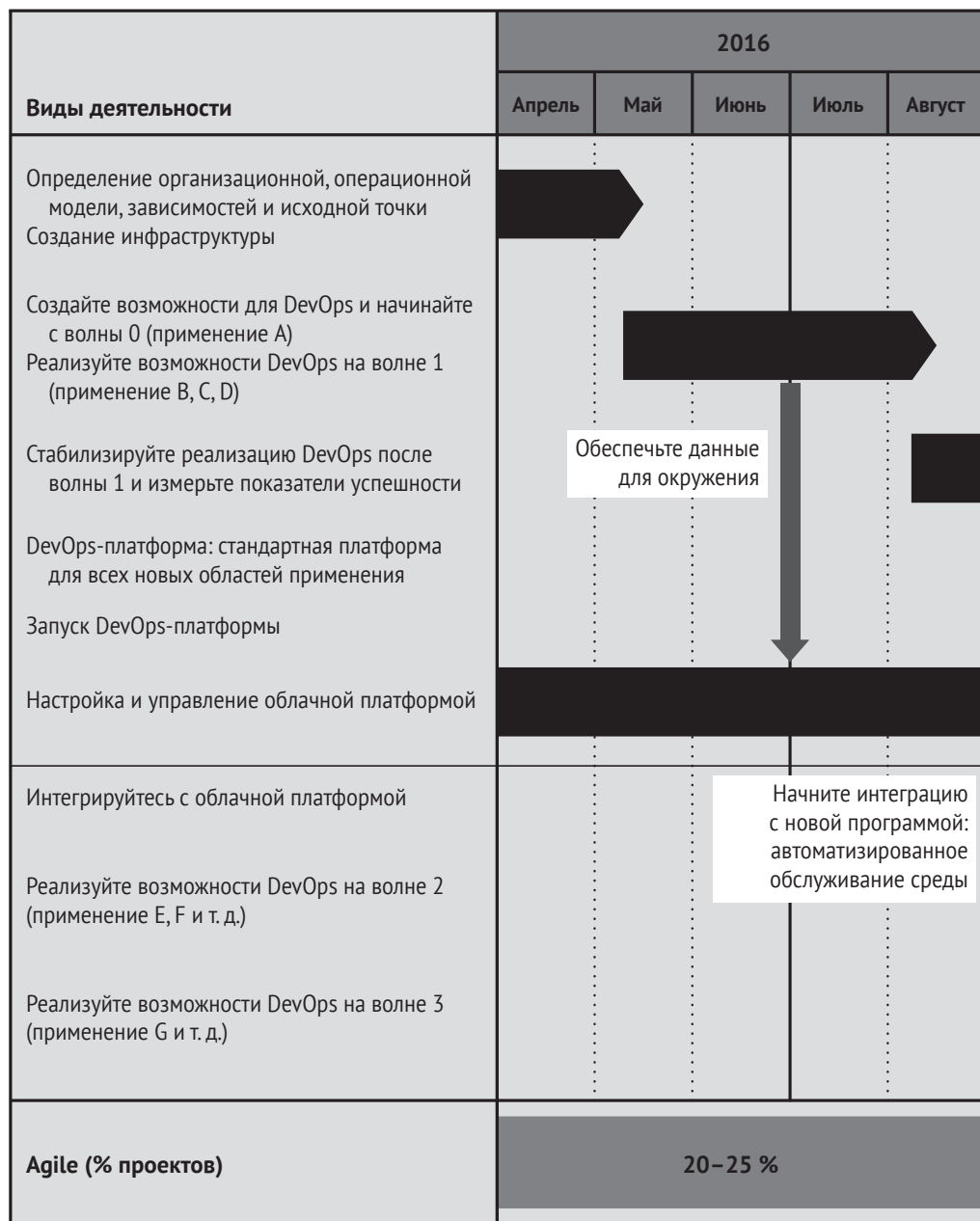


Рис. 1.1. Схема трансформации: пример, показывающий волны приложений и возможностей

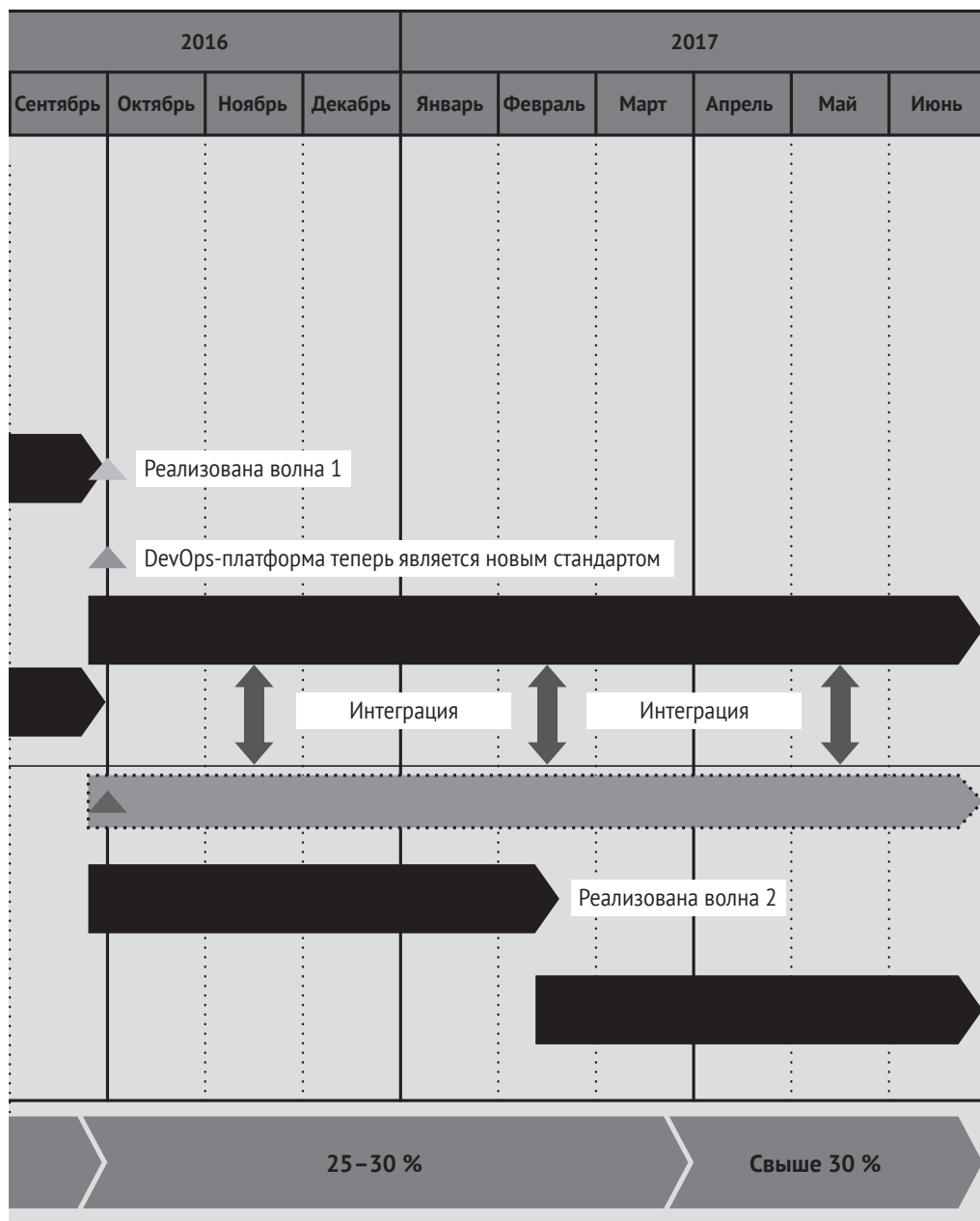


Рис. 1.1 (окончание)



Рис. 1.2. Распространенный шаблон схемы трансформации: изменение вашей организации займет время, пока вы будете пробовать различные методы



Рис. 1.2 (окончание)

Это непрерывное совершенствование и следование схеме трансформации вносит большой вклад в успешное преобразование вашей ИТ-организации. DevOps и Agile – не самоцель, поэтому не стоит стремиться к какому-либо конечному результату.

Как должно выглядеть успешное управление трансформацией? Управление трансформацией охватывает множество областей, поэтому важно, чтобы вы знали, с чем вам нужно сравнивать ваши успехи по мере реализации схемы. Это значит, что вам нужно определить точку отсчета перед началом преобразований, для того чтобы в дальнейшем оценивать показатели успешности. Слишком часто я встречался с инициативами по трансформации, когда шесть месяцев уходило на то, чтобы улучшить ситуацию, но затем нельзя было представить никаких доказательств тому – разве что анекдотичное «зато теперь у нас есть непрерывная интеграция с *Jenkins*». К сожалению, это не всегда убеждает руководство компании или другие заинтересованные стороны продолжать инвестировать в трансформацию. Даже если исполнительный директор будет за, компания не профинансирует дальнейшую работу по внедрению изменений: ведь никаких промежуточных результатов не достигнуто.

Тем не менее если вы сможете доказать, что с внедрением непрерывной интеграции вы смогли на 30 % снизить количество сбоев в работе запущенных экземпляров в окружении для сборки продукта, то у вас будут аргументы. Поэтому я настоятельно рекомендую выполнять упражнение по определению точки отправления в самом начале процесса трансформации. Подумайте обо всем, что вам важно, а также обо всем, что необходимо изменить; найдите подходящий способ определить текущее состояние. (Я привел несколько примеров в табл. 1.1.) Об использовании метрик я расскажу, когда мы немногим позже в этой главе будем говорить об управлении процессом предоставления ИТ-услуг.

Другой важный аспект управления трансформацией – поддержание гибкости и отслеживаемости работы. Для каждой инициативы по совершенствованию, согласно схеме, вам нужно применять научный подход:

- сформулируйте гипотезу, основанную на показателях успеха;
- составьте набор показателей;
- как только реализация будет готова, оцените результаты, используя гипотезу.

Что-то работает, что-то – нет; в процессе управления трансформацией вам понадобится тот и другой опыт. Не вините проектную команду за неверную гипотезу (все-таки на их месте должны быть мы, руководители, которые заваривали кашу, – кого здесь винить?). Тревогу стоит бить только в случае, когда сотрудники не следуют процессу (например, показатели не были предоставлены или результаты были искажены), что, в свою очередь, мешает вам двигаться дальше.

Таблица 1.1. Показатели базовой метрики, которые доказали свою эффективность в управлении трансформацией

| Показатель | Определение | Измерение |
|----------------------------------|---|---|
| Длительность цикла релиза | Среднее время, затрачиваемое на объем работ от утверждения рабочего пакета (пользовательской истории, функциональности, набора требований) и до его релиза | Обычно показатель измеряется как временная разница между моментами приобретения рабочим пакетом какого-либо состояния в вашей трекинговой системе |
| Стоимость релиза | Объем работы, необходимый для выпуска новой функциональности, измеряемый как усилия, затрачиваемые на всю деятельность для релиза (или же может учитываться только работа, совершаемая в нерабочее время) | Обычно данные основаны на табелях рабочего времени |
| Длительность регрессии | Время, требуемое для подтверждения того, что при внесении изменений не появились дефекты | Период с момента развертывания до «зеленого света» после автоматизированной или ручной валидации |
| Доступность в среде эксплуатации | Доля времени, в течение которого среда эксплуатации доступна для должного предоставления услуг | Измеряется как доля времени, в течение которого среда эксплуатации доступна для использования, или как доля успешно проведенных операций |
| Среднее время восстановления | Время, которое требуется для исправления дефектов в среде эксплуатации | Измеряется как время с момента возникновения дефекта до момента полного его исправления |
| Долговечность команд | Средняя продолжительность времени, в течение которого команды не распадаются | Время (в месяцах) до того момента, когда команды начинают распадаться и перенаправляться на другие проекты |

Пока вы развиваетесь, развивается и ряд жизнеспособных инициатив по совершенствованию. Критерии оценки для инициатив, которым вы хотите дать ход, должны быть основаны на:

- более раннем опыте;
- размере инициативы в рамках системы WSJF (Weighted Shortest Job First);
- уровне лояльности: насколько команда готова постоять за инициативу.

Не смущайте себя тем, как обстоят дела у крупного бизнеса, которому на начальном этапе необходимы большие вливания. Вам стоит поначалу ставить небольшие задачи, чтобы проверить, насколько реализуема идея. Понадобится приглядывать за общей схемой, чтобы видеть и понимать, что цели, обозначенные в ней, вполне достижимы. Если это не так, вы можете изменить количество инициатив по совершенствованию или обновить схему (если этого никак не избежать).

В процессе управления трансформацией вам необходимо иметь некоторое представление обо всех частях организации, чтобы следить за тем, что изме-

нения не дают крен (например, в сторону тестирования, разработки или администрирования). Встречи, на которых будет обсуждаться процесс управления трансформацией, должны проводиться хотя бы раз в месяц, и необходимой документации для таких встреч должно быть как можно меньше. Если команда будет тратить кучу времени на то, чтобы оценивать презентации PowerPoint для каждой встречи, это не принесет пользы процессу трансформации. В идеальном случае для поиска путей к совершенствованию я бы посоветовал вам наблюдать за данными в реальном времени, за картой потоков ценностей и за несложными бизнес-кейсами.

Видимые ИТ-услуги

Если говорить о том, что можно визуализировать вещи при помощи реальных данных, стоит упомянуть, что некоторые возможности DevOps могут весьма и весьма для этого пригодиться. Одним из лучших помощников в таком деле может оказаться конвейер развертывания¹. Конвейер развертывания –



Рис. 1.3. Пример конвейера развертывания:
DevOps-платформа Accenture предоставляет возможность наблюдать за процессом развертывания

¹ Гэри Грувер написал целую книгу, *Starting and Scaling DevOps in the Enterprise*, о конвейере развертывания как о средстве, способствующем трансформации.

это визуальное представление процесса, в результате которого программный продукт проходит путь от разработчика к среде эксплуатации с определенными промежуточными стадиями. Это визуальное представление показывает, что происходит с программой, а также любой положительный или отрицательный результат ее работы. На рис. 1.3 я оставил пример одного решения, с которым часто работаю. Вы можете видеть, как различные стадии жизненного цикла и связанных с ними задач представлены в виде конвейера [1]. Этот конвейер развертывания непосредственно предоставляет информацию о качестве вашего программного продукта в реальном времени. Вы можете также подумать о том, чтобы агрегировать дополнительную информацию на панели мониторинга (или дашборда) либо скомбинировать основные данные с дополнительными, но так или иначе конвейер развертывания предоставляет некоторый фундамент. Он несет в себе вместе с тем и действенную функцию, так как все его шаги имеют некоторое представление и обязательно исполняются, а результаты можно просмотреть непосредственно на панели мониторинга (или дашборда) – это снизит вероятность того, что люди начнут осуществлять неотслеживаемые действия. Любые улучшения и изменения процесса можно видеть в конвейере развертывания до тех пор, пока это единственный разрешенный способ поставки изменений. Если доступ к метрикам затруднен, вы можете добавить шаги на каждом этапе конвейера, для того чтобы логировать метрики, необходимые для дальнейшего анализа.



Рис. 1.3 (продолжение)

Сегодня важно иметь в своей компании аналитическое решение для создания панелей мониторинга за данными в реальном времени. Многие компании пользуются готовыми решениями для визуализации или аналитики либо же создают нечто на основе open-source вариантов (наподобие Graphite). Основной целью здесь является использование данных, генерируемых на протяжении всего жизненного цикла, чтобы наполнять панели мониторинга (или дашборды), которые можно будет использовать не только для целей управления трансформацией, но и в любом подходящем случае. Высокопроизводительные команды связали цепочку DevOps-инструментов с аналитическими панелями мониторинга, и это позволяет им видеть важную информацию в реальном времени. Например, мы можем наблюдать за качеством текущего релиза, за тем, как качество выпускаемого пакета связано с проблемами, возникающими после развертывания, а также за тем, насколько автоматизация тестирования улучшила показатели по дефектам на более поздних стадиях жизненного цикла продукта.

Управление процессом поставки ИТ-услуг

Управление ИТ-процессами, по-моему, недооценено как составляющая часть процесса трансформации. Правда в том, что большинство подходов к управлению имеют существенные недостатки и помогают достичь лишь малой доли запланированных результатов. На большинстве встреч по управлению, на которых я присутствовал или в которых принимал участие, использовались текущие отчеты, составленные по системе «светофора», которые я считаю довольно субъективными по своей природе, и они не совсем подходят для представления статуса работы. Более того, даже если критерии для цветовой гаммы где-либо прописаны, зачастую руководство предпочитает узнавать личное мнение проектного менеджера. Проектные менеджеры из *Института проектного менеджмента* (PMI) используют *показатель эффективности стоимости* (CPI) и *показатель эффективности рабочего графика* (SPI); они немного лучше, но все еще основываются на необходимости иметь подробный, правильно составленный проектный план, в соответствии с которым будет готовиться отчетность. Я придерживаюсь того мнения, что, поскольку большинство проектов со временем меняются, составлять подробный план всего проекта в целом – напрасная затея: вы наверняка обнаружите, что в какой-то момент отклонились от курса.

Кроме того, к тому времени, как текущий отчет будет представлен на встрече, он будет существовать уже как минимум пару часов. В худшем случае вы будете дезинформированы из-за того, что было упущено множество различных сообщений, а проектному менеджеру пришлось работать с не вполне корректными результатами. Слишком часто текущие отчеты пестрят зеленым цветом на протяжении многих недель и внезапно «краснеют», когда плохие новости уже невозможно игнорировать. Или, например, оцениваемое состояние под-

нимается по цепочке управления и все чаще и чаще маркируется зеленым цветом по мере продвижения вверх по списку, ибо все стараются показать, что владеют ситуацией. Помните: одна из наших целей – сделать работу видимой, и мы не сможем добиться значительных успехов, если представляемая нами информация будет далека от реальности.

Что имеет смысл использовать в управлении доставкой ИТ-услуг, так это объективные показатели, например: число работающих элементов функционала, время восстановления после инцидента, длительность циклов для доставляемой функциональности, а также истории/функциональность, поставляемые и принимаемые после каждой итерации. Эти показатели предоставляют достойные способы оценивать успехи и качество. Данную информацию, а также другие метрики не стоит собирать вручную. Вы должны иметь возможность получать информацию из панели мониторинга (или дашборда) в режиме реального времени. Некоторые метрики можно брать из вашего конвейера доставки, но для многих из них потребуются дополнительные источники данных (например, ваш инструмент для управления жизненным циклом Agile). «Цветной комментарий» предоставляется проектной командой, и его можно накладывать на презентацию, так как обсуждение или аннотированные скриншоты можно создавать для встречи, на которой будет обсуждаться управление (см. пример аннотированного графика выполнения работ на рис. 1.4).

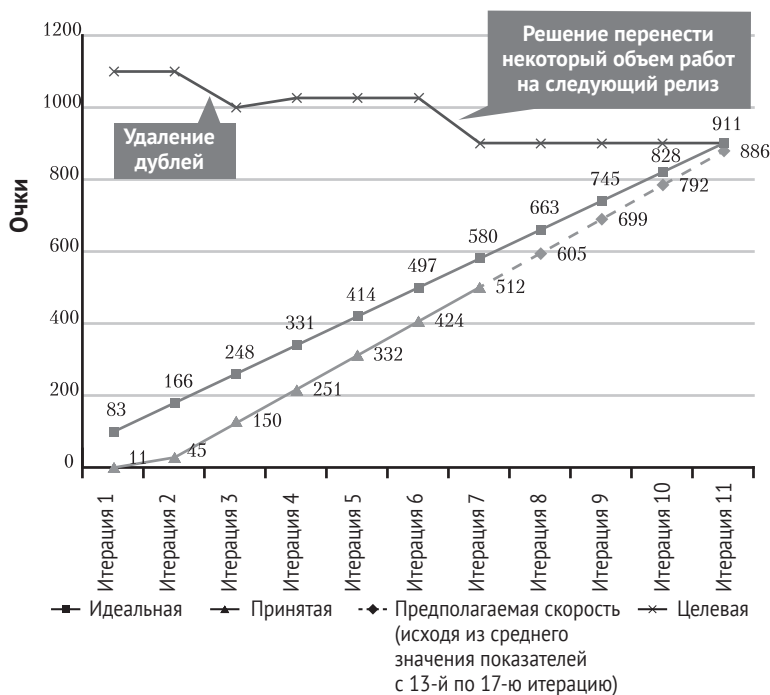


Рис. 1.4. Аннотированный график выполнения работ: на графике отображены аннотации статуса проекта

То же самое справедливо и для метрик, которые вы используете для управления ИТ-услугами. Нет весомых причин для того, чтобы не иметь таких данных по каждой стадии вашего процесса предоставления ИТ-услуг. Меня удивляет, что мы пользуемся ИТ для того, чтобы создавать замечательные аналитические решения для бизнеса, но сами же эти мощные решения не применяем в целях улучшения процессов организации. Ручной сбор данных для метрик неприемлем, если есть возможность внедрить в ваш процесс шаги по автоматическому логированию. В худшем случае вы немного автоматизируете каждый из шагов, который выводит данные в распространенном для логов формате. Мне часто приводилось такое делать, поскольку большинство используемых инструментов в жизненном цикле продукта не выводили извлеченные данные в формате, который можно было бы легко использовать. Использование большинства инструментов предполагает применение встроенной функциональности по составлению отчетов, что не всегда подходит. Вам нужно иметь возможность связывать данные из одного инструмента с другим (и, возможно, с инструментами различных поставщиков), поэтому вам придется создавать свои инструменты, чтобы убедиться, что данные в жизненном цикле вашего продукта остаются доступными для анализа. Подобное внимание к данным со временем значительно окупится.

Такой большой объем данных запросто может оказаться непосильным, и объем данных, генерируемых в процессе поставки ИТ-услуг и администрирования, чрезвычайно велик, так что подходы к работе с ними можно сравнить с подходами, применяемыми к большим данным. Самое главное здесь будет сосредоточиться на узких «бутылочных горлышках». Пробуйте создать метрики, которые смогут описывать их состояние, и следите за ними в процессе трансформации. Когда вы справитесь с основной проблемой, акценты сместятся на другие, и тогда вам уже понадобятся новые метрики. К счастью, если создать хороший фреймворк для анализа метрик, включая панели мониторинга (или дашборды) и подготовку данных, то у вас на руках будет вся необходимая информация. Панели мониторинга (или дашборды), как описывалось ранее, – прекрасный инструмент, позволяющий агрегировать информацию и сделать ее доступной для других инструментов.

Предоставление ИТ-услуг по принципу Lean

В процессе трансформации внимание часто уделяется техническим практикам, хотя многое можно улучшить, если применять принципы Lean к подходам по управлению ИТ-услугами. Под управлением ИТ-услугами я подразумеваю любой этап в ходе ИТ-поставки, когда необходимо подтвердить нечто перед тем, как продвигаться дальше. Это могут быть ключевые точки по финансированию проекта, принятие решения о развертывании в тестовой среде, смена панели управления и т. п. В жизненном цикле разработки продукта обычно бывает множество таких шагов, требующих подтверждения или проверки, ко-

торые отнимают довольно много времени и сил. А процессы управления со временем разрастаются. После возникновения проблемы мы совершаем проверку реализованного функционала и добавляем еще один шаг, для того чтобы данная проблема больше не возникала. В конце концов, никому не повредит лишний раз убедиться дважды, правда? Со временем это спровоцирует появление процесса управления, шаги которого обесмыслятся, и отследить их станет нереально. Я наблюдал процессы подтверждения развертывания, на которые уходило значительно больше времени, чем обычное развертывание, не подразумевающее добавления ценности и улучшения качества. Мне кажется, что некоторые шаги подтверждения превратились в этакие управленческие шаблоны, не несущие особого смысла, так как информация сейчас не оценивается должным образом. Следующие рассуждения помогут вам сократить ненужные шаги в ваших процессах.

Я хотел бы, чтобы вы внимательно оценили каждый этап в вашем процессе управления, чтобы понять: 1) насколько этот этап важен (например, в контексте отклонения некоторой заявки); 2) насколько рискованно его проходить и 3) сколько это стоит.

Давайте рассмотрим каждый из этих трех аспектов в отдельности.

1. Если обратить внимание на шаги рассмотрения заявок в жизненном цикле разработки ПО, как часто заявки отклоняются и как часто при рассмотрении обнаруживаются реальные проблемы, которые требуют решения? (Я имею в виду действительно важные проблемы, не просто отказы по формальным причинам вроде неправильного заполнения бланка заявки.) Чем реже обнаруживается, что процесс приносит должные результаты, тем более вероятно, что он не несет в себе ценности. То же самое можно сказать в случаях, когда заявки одобряются с вероятностью 90 %. Наверное, стоит обойтись уведомлением, вместо того чтобы заставлять людей ждать рассмотрения заявки, которая с высокой вероятностью будет одобрена. Или же вы можете совершенно избавиться от этого шага. Я работал с одним клиентом, у которого сотрудники команды разработки были вынуждены просить одобрения заявок перед каждым развертыванием после того, как все подготовительные шаги были осуществлены, что увеличивало этап подготовки перед развертыванием. Рассматривающий заявку не делал никакой полезной работы, если учесть, насколько быстро принималось решение. Это была сущая формальность. Я порекомендовал избавиться от этого шага и изменить процесс так, чтобы информация просто отправлялась на рассмотрение до и после развертывания; то же самое касалось и результатов тестирования. Подготовительное время значительно сократилось, у сотрудника уменьшился объем работы, и из-за того, что мы убрали шаг, выполняемый вручную, у нас появилась возможность автоматизировать процесс развертывания с самого начала.
2. Если мы и далее будем выполнять процесс без этого шага и что-то пойдет не так, насколько большими будут риски? Как много времени понадобится,

чтобы выявить проблему и исправить ее или отказаться от изменений? Если риск небольшой, то, опять же, шаг можно пропустить или ограничиться отправкой уведомлений.

3. Сколько усилий и времени требуется на выполнение этого шага? Как долго готовится документация на данном этапе? Сколько времени тратит на этот шаг каждая из заинтересованных сторон? Сколько времени в жизненном цикле уходит на ожидание одобрения?

Имея на руках такую информацию, вы сможете оценить, нужно ли продолжать использовать этот шаг или его стоит убрать либо как-то упростить. По моему опыту, около половины шагов, подразумевающих рассмотрение заявок, можно или автоматизировать (так как человек при этом следует повторяемым шагам), или свести их к отправке уведомления, в результате чего процесс перестанет замедляться. Я советую вам попробовать этот подход в вашей организации. Вы увидите, как легко на самом деле отказаться от всего ненужного и приблизиться к достижению минимального жизнеспособного процесса управления. Упражнение на такие случаи приведено в конце этой главы.

Первые шаги вашей организации

Здесь я представляю три упражнения, которые считаю невероятно полезными, так как они помогают достичь значительных результатов относительно малыми силами: 1) составление карты потока ценностей для вашего процесса поставки ИТ-услуг; 2) формирование основных метрик и 3) пересмотр подходов к управлению процессами. В результате вы сможете лучше понять ИТ-процессы и начать совершенствоваться.

Составление карты потоков ценностей для ИТ-процессов

Существует формальный процесс для составления карты потоков ценностей, однако здесь я представляю сокращенную версию, которая, по моему опыту, сравнительно неплохо помогает достичь поставленной нами цели: сделать процессы видимыми и справиться с некоторыми узкими местами¹. Вот этот краткий план по составлению карты потоков ценностей:

1. Соберите на переговоры всех заинтересованных участников цепочки выноса поставок (supply chain): например, представителей бизнеса, сотрудников отделов разработки, тестирования, менеджеров проекта, администраторов и бизнес-аналитиков).
2. Подготовьте высокоуровневую схему процесса. Стоит для наглядности упомянуть на ней такие понятия, как, например, «бизнес-идея», «старт проекта», «разработка», «тестирование/QA», «развертывание/релиз» и «создание ценности».

¹ Вам стоит обратиться к Value Stream Mapping Карен Мартин и Майка Остерлинга, если нужно в большей степени формализовать процесс.

3. Попросите всех за 15 минут совместно записать краткое пошаговое описание ИТ-процесса на карточках. Затем попросите приклеить эти карточки на доску, чтобы общими усилиями составить полноценную картину процесса. Внимание: вам, возможно, понадобится воодушевить людей на сотрудничество или самому вступить в обсуждение, если ситуация будет развиваться в нежелательном направлении.
4. Как только карта будет составлена, попросите нескольких человек заново описать весь процесс, а также спросите, стоит ли что-то добавлять.
5. Теперь, когда у вас есть осмысленное представление процесса, вы можете попытаться подробно обсудить его циклы, ключевые точки представлений заинтересованных сторон о качестве или каких-либо других аспектах, а также инструменты, которые будут помогать обслуживать процесс.
6. Попросите людей проголосовать за наиболее важные узкие места (например, дайте возможность каждому оставить лишь три отметки на доске напротив трех самых значимых в этом отношении шагов).

По моему опыту, это упражнение наилучшим образом помогает сделать ваш процесс видимым. Вы можете повторять данное упражнение каждые три–шесть месяцев, чтобы понимать, правильно ли вы обращаетесь с узкими местами, и видеть, как развивается процесс. Можете наглядно представить результаты этого процесса, вывесив их где-нибудь в офисе, чтобы показать всем приоритетные направления совершенствования. Узкие места, которым было уделено наибольшее внимание на встрече, могут стать ключевыми точками в вашей начальной схеме, поскольку это то, на что должны ссылаться ваши инициативы.

Формирование основных метрик

Так как наличие метрик невероятно важно для процесса управления трансформацией, я хочу, чтобы вы посвятили несколько минут заполнению табл. 1.2. Выделите для себя метрики, которые важны для вас сейчас и в будущем, и определите механизм, согласно которому вы будете их составлять. Существует несколько способов формирования основного ряда метрик. Они могут быть основаны на опросах, текущих исследованиях или, в идеальном случае, на существующих либо исторических данных. Если задача чересчур сложна, то вам стоит подумать об автоматизированном способе измерения метрик. Там, где это не сработает, вы можете проводить исследование вручную и оценивать процесс самостоятельно (например, во время текущих исследований), но такие метрики будут вызывать меньше доверия и их составление потребует больше времени.

Таблица 1.2. Пример формирования метрик: метрики должны иметь описание, механизмы составления и базовое значение

| Метрика | Описание | Механизм составления | Основной (базовый) подход | Базовое значение |
|--------------------|--|--|--|------------------|
| Длительность цикла | Среднее время, необходимое для того, чтобы продвинуться от готовой истории до развертывания в среде эксплуатации | Извлечение даты и времени из Agile-системы управления жизненным циклом | Анализ пользовательских историй, которые были успешно развернуты в среде эксплуатации за прошедшие шесть месяцев | 168 дней |

Пересмотр подходов к управлению процессами

Многое можно обсудить в части автоматизации, которая способна помочь усовершенствовать скорость и качество ИТ-процессов. Что люди часто недооценивают, так это то, каких результатов можно добиться за счет одной лишь коррекции процесса управления. Ниже я привожу небольшой список вопросов, который вы можете использовать для того, чтобы пересматривать ваш процесс. Задавайте эти вопросы, чтобы сосредоточиться на тех элементах, где управление ИТ-процессами действительно необходимо. Ваши ответы позволят оценить эффект и риски от сокращения шага в процессе, в идеальном случае даже с применением экономической модели, отражающей финансовое воздействие и сформированной вероятностью рисков.

Список вопросов об управлении процессом:

- Как часто кто-либо отклонял заявку на выполнение одной из задач, основываясь на причинах, не связанных с правилами соответствия процессу?
- Что может произойти с процессом, если будет совершен неверный выбор?
- Какую ценность принесет человек, одобряя эту заявку вручную вместо компьютера, который может осуществить этот шаг при помощи ряда параметров?
- Как много времени и средств будет затрачено на управление процессом (включая обычное время ожидания одобрения заявки)?
- Основан ли этот шаг на объективных показателях или на субъективных? Как вы это определили?



ГЛАВА 2

Принятие быстро меняющейся реальности

Если все кажется одинаково важным, значит, ничего из этого таковым не является.

Анонимный автор

У клиентов, с которыми я работал, были тысячи приложений в портфолио. Вполне очевидно, что мы не можем вносить изменения в каждое из них одновременно. В этой главе мы посмотрим, как ориентироваться в мире новых инновационных систем и устаревших приложений. Мы определим *минимальные жизнеспособные кластеры* приложений, для того чтобы приступить к трансформации управления, и для этого проанализируем портфолио.

Одной из тенденций, обусловившей возрастание интереса к практикам Agile и DevOps, в ИТ-индустрии стал приход интернет-поколения, о котором я говорил во введении. Компании, у которых приложения новее, чем большинство приложений в мире крупных корпораций, имеют большое преимущество. Слово «устаревший» часто используется в нашей индустрии с негативным подтекстом, но правда в том, что любой код, развернутый в среде эксплуатации, уже устарел. И любой новый код, который мы напишем сегодня, завтра уже устареет. Пытаться отличить устаревший код от неустаревшего со временем станет еще труднее.

В прошлом организации пытались справиться с устаревшими приложениями с помощью проектов по трансформации, которые занимали много лет, и заменить устаревшие системы новыми. Но довольно часто старые системы выживали по той или другой причине, и архитектура приложения в целом становилась все сложнее. Больше нет тенденции заниматься радикальными пре-

образованиями, так как для ускорения эволюции организациям необходимо уметь подстраиваться в процессе изменения их ИТ-архитектуры.

Думаю, вы согласитесь с тем, что мы все хотим выработать действительно быструю, гибкую и надежную тактику предоставления ИТ-услуг. Должны ли мы при этом избавляться от устаревших приложений и создавать ряд быстрых приложений? Полагаю, что реальный мир не так прост. Я работал с десятками организаций, которые метались между быстрыми цифровыми приложениями и медленными приложениями крупных компаний. Некоторые из этих организаций, только завершившие большой процесс трансформации, который должен был решить эту проблему, уже имели новые приложения, которые к концу трансформации стали медленными и устарели. Нужен был более практичный подход, который принесет результаты.

В то время как нам необходимо, чтобы все работало быстро, придется смириться с тем, что архитектура некоторых приложений и накопленный *технический долг*¹ могут не позволить поставлять каждое из приложений с одинаковой скоростью. Сегодня ведутся дискуссии о бимодальных ИТ (использующих два метода предоставления ИТ-услуг, таких как водопад для предсказуемости и Agile для экспериментов) [1] или о мультимодальных ИТ (использующих различные методы, такие как Agile и разновидности водопада), в которых приложения разделяются на типы (*системы взаимодействия* для общения с клиентами и *системы учета* для внутренних процессов) [2]. Я думаю, что эта сложная классификация в некотором роде может помешать, если вам нужно добиться большей скорости; если ваш бизнес полагается на системы учета для разграничения обязанностей, то такие системы должны поставляться настолько быстро и надежно, насколько это возможно. Многие организации используют эту классификацию в качестве аргумента для того, чтобы не улучшать некоторые приложения, но с точки зрения бизнес-ценности это неверно.

В этой главе я представлю альтернативный метод, который использую в работе с моими клиентами, чтобы помочь им сформировать быстро развивающийся подход, благодаря которому все будет работать настолько быстро, насколько позволяют реализуемость и экономическая целесообразность. Это может привести к различающейся скорости поставки продуктов в будущем.

¹ Я немного расскажу о техническом долге в этой главе, поэтому хотел бы предложить вам подумать о том, как его можно измерять. Существуют, конечно, инструменты для анализа кода, которые позволяют получить некоторое представление о техническом долге, основанное на проблемах кода. Пожалуй, они для начала вполне сгодятся. Вместе с тем я бы использовал стоимость развертывания приложения (например, как много человеко-часов необходимо для развертывания продукта в тестовой среде или в среде эксплуатации), стоимость регрессионного тестирования продукта (как много человеко-часов необходимо для того, чтобы проверить, что ничего не сломалось) и стоимость создания новой среды с приложением. Если вы готовы пойти еще дальше, то можете взглянуть на показатели сложности и зависимости от других приложений, но я еще не встречал хорошего воспроизводимого способа измерить их. Другие же четыре показателя относительно несложно определить, и, таким образом, они должны лечь в основу измерения технического долга.

Анализируем портфолио приложений

У крупных организаций часто имеются сотни, если не тысячи приложений, поэтому было бы слишком самонадеянно предполагать, что мы можем усовершенствовать все приложения разом. Некоторые приложения и не надо улучшать, так как они довольно редко изменяются и не представляют стратегической ценности. В заключительном разделе главы, где приводится упражнение, я покажу подробнее, как вы можете осуществлять анализ самостоятельно.

При помощи такого анализа мы можем делать несколько вещей: приоритизировать приложения по кластерам (я расскажу об этом немного позднее) и распределить все приложения по трем группам, которые помогут определить, как обращаться с каждым приложением по мере осуществления трансформации. От того, к какой группе относится приложение, будет зависеть, как вы будете выделять на него ресурсы и как будете работать с поставщиками программных продуктов и вашими партнерами по предоставлению ИТ-услуг.

В первую группу мы поместим приложения, от которых собираемся избавляться или которые не собираемся часто изменять. Давайте назовем их *истинно устаревшими*, чтобы отличать их от «просто устаревших», то есть просто от более старых систем. В категорию истинно устаревших попадают приложения, которые весьма редко изменяются, которые не обслуживают процессы, важные для бизнеса, и в которые вы не вкладываете ресурсы. Вполне очевидно, что вам не хочется тратить много средств на автоматизацию жизненного цикла таких приложений. Ради их обслуживания вы вряд ли будете тратить много времени на выбор поставщиков и предпочтете партнера, который обеспечит базовую работоспособность по низкой цене, если не желаете поручать работу с такими приложениями штатному сотруднику. И вам действительно не стоит уделять этому вопросу слишком много внимания.

Во вторую группу мы поместим приложения, которые обслуживают ваш бизнес, но немного далеки от ваших клиентов. Вспомните о ERP- или HCM-системах – это «рабочие лошадки» для ваших приложений. Вы тратите кучу денег на запуск и поддержку этих систем, и они, вероятнее всего, определяют скорость поставки в крупных проектах. Занимаясь этими «рабочими лошадками», вы сможете позволить себе поставлять продукт более быстрым и надежным способом, но технологии, по которым они работают, не так легко адаптировать под Agile и DevOps. При работе с такими системами крайне важно сотрудничество с поставщиками, чтобы эти технологии могли лучше сочетаться с DevOps (мы поговорим об этом в следующей главе). Если вы все-таки решите поддерживать и развивать эти системы, убедитесь в том, что ваш партнер разделяет ваше желание совершенствовать способы работы и саму систему.

В третью группу войдут приложения, которые будут выступать «двигателями инноваций». Это приложения, обращенные к клиентам, которые вы можете использовать для продвижения инноваций, но, с другой стороны, они могут и навредить, если клиентам не понравится то, что вы им представляете. Проб-

лемы возникнут, если большинство из них будет полагаться на тех «рабочих лошадок», которые помогают создать правильные ощущения от продукта. Мой любимый пример – банковское мобильное приложение, которым вы можете спокойно пользоваться, пока оно отображает правильную информацию о ваших банковских счетах; в противном случае вы будете весьма расстроены как клиент. Для этой группы приложений вы будете использовать оригинальные технологии. Вам стоит плотно работать с вашим поставщиком программных продуктов, если вы решите использовать готовые коммерческие компоненты (COTS), и партнер по поставке должен быть участником созидательного процесса, а не просто партнером по предоставлению ИТ-услуг.



Рис. 2.1. Радар приложений: визуализирует статус каждого приложения

И на самом деле эти группы приложений не статичны. По мере развития архитектуры ваших приложений некоторые из них переместятся в другие группы, и сообразно этому будет развиваться ваша стратегия выбора поставщиков и партнеров. Действенное управление портфолио приложений становится все более важным аспектом, так как скорость развития увеличивается и архитектура приложений становится все более модульной. Продолжая начатый в пер-

вой главе разговор о том, что необходимо делать процессы видимыми, скажу, что наилучшим способом представления проведенного анализа будет радар приложений с группой для «двигателей инноваций» с самой его середины и группами для «рабочих лошадок» и истинно устаревших приложений, соответственно, в двух внешних кругах.

Поиск минимального жизнеспособного кластера

Принцип Agile о партиях с малым объемом работ применим также и к процессу трансформации. Для руководства мы можем использовать информацию из анализа портфолио приложений. Весьма вероятно, что приложения из категорий с «рабочими лошадками» и «двигателями инноваций» часто будут работать одновременно. Вместо того чтобы брать первые несколько приложений, вам нужно сначала провести анализ, который позволит найти то, что я называю минимальным жизнеспособным кластером.

Приложения не живут отдельно друг от друга. Следовательно, большинство функциональных изменений в ландшафте вашего приложения потребуют от вас обновления более чем одного приложения. А следовательно, даже если вы способны ускорить работу приложения, это не значит, что вы сможете ускорить поставку: ведь вам все еще придется ждать, пока в другие приложения будут внесены изменения.

Здесь напрашивается аналогия со слабым звеном. В нашем случае слабое звено определяет, с какой скоростью будет происходить поставка. Что вам нужно определить, так это минимальный жизнеспособный кластер приложений. Для этого лучше всего оценить ваши приложения по нескольким факторам, таким как клиентоориентированность и частота и объемы внесения изменений. Идея нахождения минимального жизнеспособного кластера состоит в том, что вы с некоторой периодичностью пересматриваете высокоприоритетное приложение и анализируете его зависимости. Вам нужно выделить небольшой ряд приложений, в котором вы сможете замечать увеличение скорости поставки с увеличением скорости поставки каждого приложения в этом ряду. (Иногда придется иметь дело и с дополнительными зависимостями, но в большинстве случаев составление данного ряда приложений позволит вам независимо вносить значительные изменения, проявляя некоторую креативность.)

Вы можете не останавливаться и проводить анализ и далее, формируя другие кластеры, чтобы получить лучшее представление о приложениях, к которым вы будете обращаться в дальнейшем. Не тратьте слишком много времени на кластеризацию всех приложений. По мере продвижения вы сможете волнообразным способом определять кластеры.

Отдельно нужно сказать несколько слов по поводу приоритизации приложений. В первую очередь я считаю, что важно начинать работу над критичными приложениями как можно раньше. Многие организации экспериментируют

в изолированных приложениях с новыми техниками для автоматизации, при условии что это не окажет значительного воздействия на бизнес. Многие техники, которые работают в таких приложениях, не получается масштабировать и распространить на весь остальной ИТ-ландшафт, и вся организация не видит значительной перемены в этом приложении. («Они не работают в наших реальных системах», – комментарий, который можно услышать в такой ситуации.)

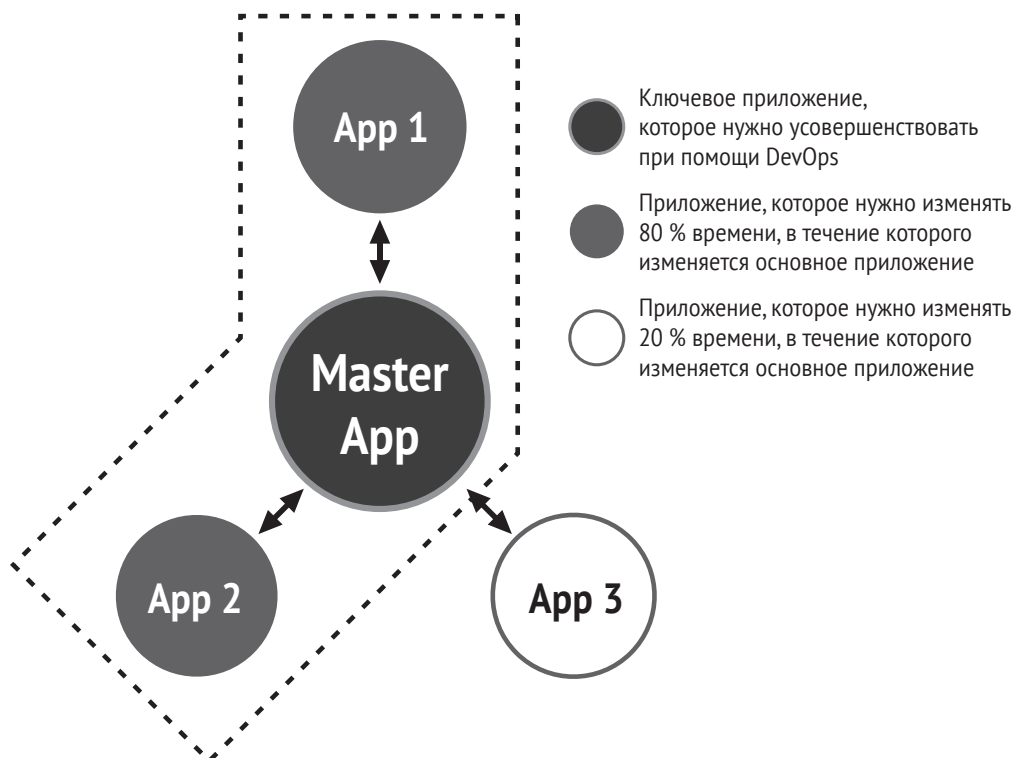


Рис. 2.2. Минимально жизнеспособный кластер: применение системного мышления в анализе приложений

Поскольку формирование минимального жизнеспособного кластера может потребовать от вас времени, стоит попытаться найти какое-либо руководство для того, чтобы можно было: а) как можно раньше предоставить результат и б) иметь возможность узнать о более продвинутых техниках, прежде чем начать составлять ваш первый минимальный жизнеспособный кластер. Чтобы это сделать, вам нужно убедиться в том, что выводы о минимальном жизнеспособном кластере подтверждаются на примере более простого приложения; так организация сможет увидеть целесообразность вашей идеи. Согласованная работа заинтересованных сторон различных приложений крайне важна для достижения такого результата.

Что делать с истинно устаревшими приложениями

Мы поговорили о стратегии, которую вам необходимо применять к приложениям, остающимся частью вашего портфолио, но что же делать с истинно устаревшими приложениями?

Очевидно, что самое лучшее решение – полностью от них избавиться. Спросите себя, действительно ли данная функциональность еще востребована. Довольно часто мы продолжаем эксплуатировать старые системы ради нескольких функций, которые невозможно воспроизвести где-либо еще, и скрытая стоимость поддержки таких приложений неочевидна; на выведение устаревших компонентов из системы отведено недостаточно ресурсов.

Если это не вариант, мы должны использовать архитектуру, которую разработчики уже давно используют для кода, – *паттерн подавления* (strangler pattern) [3]. При помощи этого паттерна мы пытаемся отстраниться от устаревших приложений, раз за разом перемещая все больше и больше функциональности в наши новые приложения. Со временем все меньше функциональности будет оставаться в устаревших приложениях, и, наконец, настанет ситуация, когда стоимость поддержки приложения только ради оставшихся функций будет признана слишком большой, и от него решено будет отказаться.

Последний прием, который вы можете применить к устаревшим приложениям, – визуализация стоимости их поддержки. Здесь могут фигурировать следующие факторы:

- задержки, с которыми сталкиваются другие приложения из-за устаревшего приложения;
- дефекты, возникающие из-за устаревшего приложения;
- количество средств, затраченных на поддержку и исполнение устаревших приложений, а также
- стоимость того, что вы не можете осуществить из-за устаревшего приложения.

Чем больше экономический ущерб от использования устаревших приложений, тем больше ваши шансы на то, что со временем вы убедите организацию начать что-то с ними делать.

Я уже говорил, что каждое из приложений, созданное вами, в ближайшем будущем устареет. В свете возрастающей скорости развития ИТ это вселяет опасения: скоро мы придем к тому, что сделанное нами сегодня уже завтра никуда не годится. Отсюда резюме: от устаревших приложений лучше избавляться, заменяя их новыми устаревшими приложениями, созданными с правильным подходом. Больше не существует конечной архитектуры (и, по сути, никогда не было, как стало известно на сегодняшний день, – несмотря на то что говорили нам архитекторы в компаниях). Согласно данному подходу каждое приложе-

ние должно создаваться так, чтобы его можно было бы легко отстранять и минимизировать его зависимость от других приложений. Мы глубже рассмотрим эту тему в главе 10.

Управление вашим портфолио и контрольными точками

Портфолио ваших приложений постоянно развивается, и, чтобы оставаться на плаву в такой подвижной среде, нужно использовать правильные подходы к управлению им. Ранее управление давалось тяжело, на сегодняшний день оно еще сложнее. Стало больше вещей, о которых нужно заботиться; сама скорость поставки изменений возросла, и если не изменять подходы, то управление или будет замедлять поставку, или станет неоправданно дорогим.

Ниже приведены четыре контрольные точки управления для любой перемены:

- контрольная точка 1 (КТ1): здесь мы должны ответить на вопрос, достаточно ли хороша наша идея об изменениях и заслуживает ли она финансирования, необходимого для того, чтобы продвигать идею дальше и находить возможные решения;
- контрольная точка 2 (КТ2): здесь нужно ответить на вопрос, нашли ли мы возможное решение, достаточно хорошее для того, чтобы совершить первые эксперименты или выпустить первый релиз, подтверждающий нашу идею;
- контрольная точка 3 (КТ3): здесь мы ответим на вопрос, достаточно ли качественно реализованное нами решение, чтобы выпустить его для хотя бы небольшой аудитории в среде эксплуатации;
- контрольная точка 4 (КТ4): здесь мы ответим на вопросы, был ли эксперимент успешным и что делать дальше.

Контрольная точка 1 (КТ1)

В КТ1 мы по большому счету будем говорить о заинтересованных сторонах. Где-то на просторах организации появилась хорошая идея или была обнаружена проблема, требующая внимания. Перед тем как начать тратить средства, согласно первой контрольной точке мы проверяем, правильные ли проблемы мы изучаем, а возможности – имеют ли они вес для бизнеса, являются ли крайне важными и способны ли наши «исследовательские идеи» привести нас к новым областям в бизнесе. Эта точка – ворота, проходя через которые мы убеждаемся в том, что не начинаем делать слишком много вещей одновременно и сосредоточили свои усилия на наиболее многообещающих идеях.

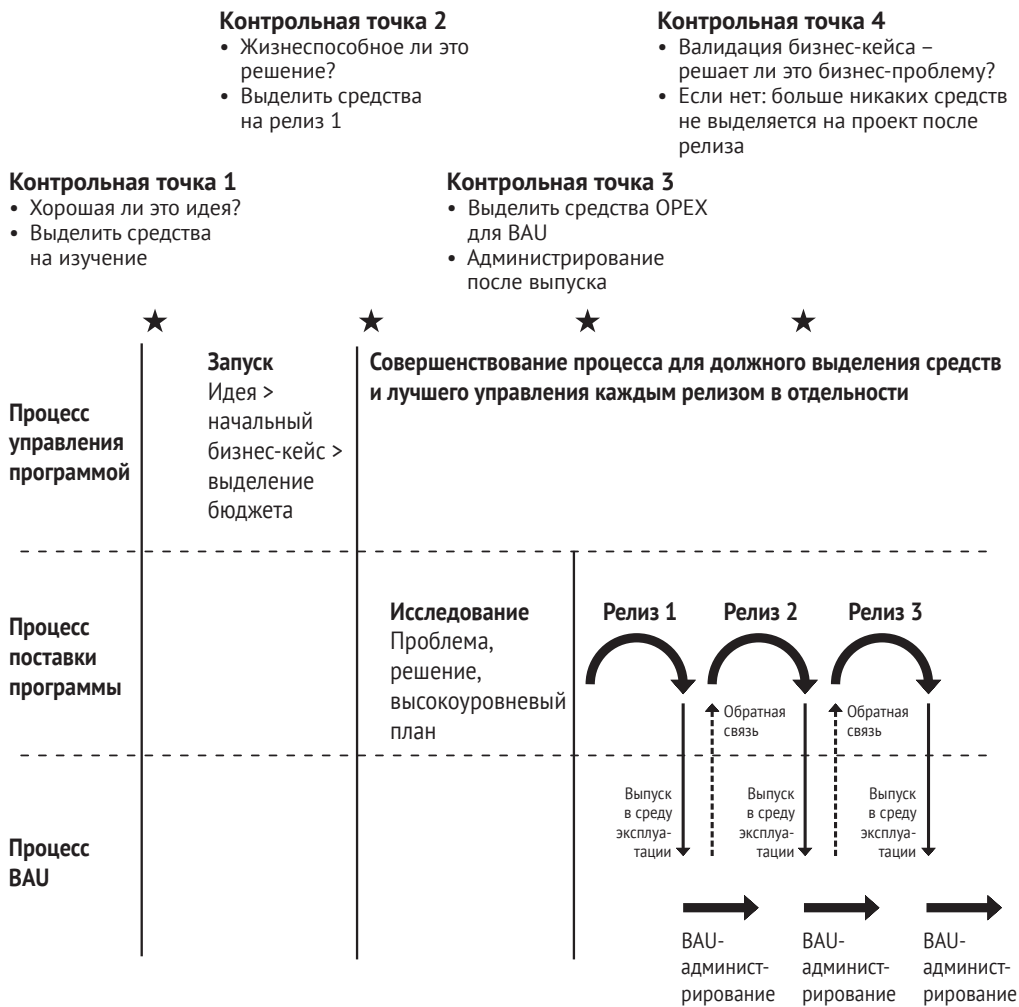


Рис. 2.3. Контрольные точки управления:
Agile-процесс управления с четырьмя контрольными точками

В положении между точками 1 и 2 организация изучает идею и бизнес, вместе с ИТ кооперируется для запуска *исследовательского* практикума, проведение которого может занять от пары часов до нескольких недель, в зависимости от масштаба проблемы. Вы можете проводить практикум в течение всей бизнес-трансформации или вовсе для небольших изменений. Цель исследования касается трех крайне важных аспектов: 1) все должны понимать проблему и идею; 2) мы изучаем, что может быть сделано при помощи ИТ, и 3) мы хотим понять, как могла бы выглядеть реализация, исходя из графика и команды. Эта исследовательская сессия крайне важна, так как она поможет людям в организации добиться наилучших результатов.

Контрольная точка 2 (КТ2)

Второй шаг после исследования – проверить, что мы обнаружили нечто, что стоит реализовать. На этой стадии мы должны убедиться, что у нас есть ресурсы для того, чтобы поддерживать реализацию со всех сторон: ИТ, представители бизнеса, специалисты по эксплуатации, безопасности и все, кого это касается. Это важная контрольная точка, на которой нужно собрать все архитектурные требования, так как потом их собирать будет уже труднее. Слишком часто бизнес-инициативы реализуются без должного осмысления архитектурных аспектов, что со временем ведет к увеличению технического долга.

Мне кажется, что каждая инициатива, которая поддерживается организацией даже с малыми финансовыми и человеческими ресурсами, принесет большую пользу организации в двух аспектах: она больше поможет бизнесу и улучшит ИТ-ландшафт. Это единственный разумный способ, который со временем сократит технический долг и поможет сладить с устаревшими приложениями. КТ2 – прекрасный период для того, чтобы убедиться, что на проекте запланировано улучшение ИТ-ландшафта и уменьшение технического долга, прежде чем дело дойдет до реализации. Это должно быть обязательной установкой, иначе пружинка постепенно вернется в исходное состояние. Довольно просто дать слабину и сказать себе, что «только один разок» мы быстренько реализуем временное решение. За много лет работы я понял, что нет ничего более постоянного, чем временные решения.

В промежутке между точками 2 и 3 цикл разработки продукта включает в себя дизайн, разработку и тестирование, осуществляемые в манере Agile. Я уверен, что Agile – единственная методология, которая нам нужна для того, чтобы двигаться дальше, но тогда в нашем процессе предоставления ИТ-услуг будут различные уровни мотивации и скорости поставки. Когда решение окрепнет, пройдя несколько итераций, оно станет кандидатом на релиз, а мы перейдем к КТ3.

Контрольная точка 3 (КТ3)

В контрольной точке 3 мы убедимся в том, что кандидат на релиз достиг необходимого уровня качества, чтобы можно было его выпустить в среду эксплуатации. Мы убедимся, что к идеям по архитектуре прислушались и технический долг был погашен, как было договорено, и мы не будем незаметно накапливать новый технический долг. (Иногда мы сознательно решаем взять на себя небольшой долг, чтобы пораньше что-либо протестировать, а потом закрыть долг в следующем релизе. Но все-таки подобное не должно происходить часто.) Эта контрольная точка часто ассоциируется с панелью управления изменениями, при помощи которой необходимо пересматривать и утверждать любые изменения, вносимые в среду эксплуатации. И конечно же, нам нужно добиться минимального жизнеспособного продукта, и вы можете обратиться

к предыдущей главе, чтобы припомнить общие принципы управления, которым можно следовать в контрольной точке 3.

В промежутке между контрольными точками 3 и 4 продукт находится в среде эксплуатации и используется. Если мы будем должным образом следовать Agile-процессу, то команда уже работает над реализацией следующего релиза, одновременно поддерживая версию, которая уже была выпущена в среду эксплуатации. Внешние или внутренние заинтересованные стороны пользуются продуктом, а мы получаем обратную связь напрямую из систем (мониторинг, аналитика и другие средства) или непосредственно от заинтересованных сторон при помощи опросов, анкет или каких-либо других каналов взаимодействия.

Контрольная точка 4 (КТ4)

Контрольную точку 4, по моему мнению, часто недооценивают. Это тот процесс, важность которого все понимают, но немногие готовы проявлять энтузиазм и решительность, чтобы воспользоваться его потенциалом. Эта точка нужна для того, чтобы убедиться в том, что наша идея и подход к ее решению верны. Так как проекты – явление временное по определению, к этому моменту команда начинает переформировываться, и некоторые сотрудники уходят в другие проекты. КТ4 начинает казаться формальным упражнением, которое люди не могут оценить сполна. Если наши команды долгое время существуют в неизменном составе, идея о том, что надо анализировать выводы предыдущих релизов, и мнение заинтересованных лиц становятся намного более важными. Эти проектные команды становятся ключевой аудиторией КТ4, хотя, конечно же, заинтересованные стороны в организации выступают другой аудиторией, которая должна видеть, что финансирование себя оправдало и что стоит инвестировать и далее.

КТ4 должна способствовать получению ценного опыта и дать возможность отпраздновать успех; негативные эффекты тут ни к чему. Если идея не сработала, то мы все равно получили полезную информацию о нашем продукте и нам стоит действовать как-то иначе в следующий раз. Вы можете использовать КТ4 вместе с оценкой внедрения, чтобы взглянуть на то, как поставлялся релиз, и усовершенствовать процесс и продукт в целом. Я лично предпочитаю проводить анализ (ревью) внедрения отдельно для усовершенствования продукта и для процесса поставки – как двух различных видов деятельности.

Используя модель управления и эти контрольные точки, вы сможете управлять процессом поставки с различной скоростью, а также справляться с быстрым развитием. Каждая контрольная точка позволяет вам оценивать прогресс и жизнеспособность инициативы; также вы сможете переносить инициативу на иную модель поставки, которая может реализовываться на другой скорости (быстрее или медленнее).

Первые шаги вашей организации

Чтобы закрепить знания, полученные в этой главе, попробуйте использовать в вашей организации следующие два упражнения. В этот раз они довольно тесно связаны друг с другом: первое касается анализа вашего портфолио приложений, а второе – определения минимального жизнеспособного кластера, для которого расширение возможностей принесет ценность.

Анализ портфолио приложений

Если вы похожи на большинство моих клиентов, то у вас ИТ-портфолио наверняка состоит из тысячи приложений. Если вы начнете изменять их все, то, вероятнее всего, не сможете увидеть прогресс и начнете думать, действительно ли выделенные средства оправдали себя в этих приложениях. Так что в первой главе упражнения были составлены для одного измерения, а область приложений – это уже второе, не менее важное измерение. Давайте посмотрим на то, как должны быть классифицированы ваши приложения.

Каждая организация обладает различной информацией о своих приложениях, но в целом можно проводить анализ по следующим четырем пунктам:

- **Важность приложения:** насколько важным для бизнеса является приложение? Насколько большое влияние проблемы с этим приложением окажут на пользовательское впечатление наших клиентов или работников? Насколько это приложение соответствует нормативным требованиям?
- **Объем инвестиций для приложения:** сколько средств мы выделим на это приложение в течение следующих трех лет? Сколько мы уже потратили на него? Сколько важных приложений будет связано с этим приложением в течение следующих нескольких лет?
- **Предпочитаемая частота внесения изменений:** если бизнес имеет возможность высказать предпочтения по частоте внесения изменений в приложение, то каков будет выбор: каждый час, неделю, месяц, год? Как часто мы вносили изменения в это приложение в течение последнего года?
- **Технологический стек.** Это важный аспект, так как некоторые технологии легче освоить, нежели другие. Вдобавок, как только у вас появится возможность ускорить поставку, например, приложения на Siebel, то и другие Siebel-приложения получатся поставлять быстрее, так как инструменты, практики и методы – это то, что можно использовать многократно. Примите во внимание все аспекты приложения при осмыслении технологического стека: базу данных, сами данные, код, серверы приложений и инфраструктуру.

Для первых трех измерений вы можете использовать абсолютные значения (если они у вас есть) или относительные, которые будут представлять собой номинальную шкалу для оценки приложений. Для составления технологического стека вы можете группировать приложения в порядке приоритетности, исходя из вашего технического опыта в практиках DevOps по этим технологиям. Я рекомендую пользоваться таблицей с заголовками, подобной табл. 2.1. Пользуясь этой информацией, вы сможете упорядочить приложения согласно эвристическому алгоритму либо прибегая к сортировке вручную. Здесь важно не выработать идеально точное решение, а хотя бы добиться достоверных результатов.

Понятно, что мы не будем тратить много времени, сил и средств на приложения, которые редко изменяются, – приложения, которые не критичны для нашего бизнеса и на которые мы не собираемся выделять много средств в будущем. К сожалению, одного лишь упорядочивания приложений бывает недостаточно, так как ИТ-ландшафт организаций очень сложен и требует внедрения дополнительного уровня анализа для разрешения проблем с зависимостями в архитектуре приложений.

Таблица 2.1. Пример анализа приложений: подобная таблица поможет вам структурировать процесс анализа приложений

| # | Приложение | Технология | Стратегическое приложение | Частота изменений | Объем, занимаемый приложением в портфолио |
|----|------------|--------------------|---------------------------|-------------------|---|
| 95 | App A | Java, .NET, Oracle | 4 – Критичное | 9 | 4 – Очень большой |

Определение минимального жизнеспособного кластера

Как обсуждалось ранее, минимальный жизнеспособный кластер – это ряд приложений, на которых вам нужно сосредоточиться таким образом, чтобы с их развитием ускорялась поставка всего кластера. Следуйте следующим шагам для определения минимального жизнеспособного кластера:

1. Выберите наиболее приоритетные приложения (в идеале основанные на анализе портфолио из предыдущего упражнения) для вашего начального набора приложений (состоящего лишь из одного приложения).
2. Обдумайте, какие другие приложения нужно изменять, чтобы осуществить изменение для выбранного набора приложений.

3. Разумно ограничьте список этих приложений (например, охватывающих 80 % обычного или планируемого объема изменений, вносимых в выбранное приложение).
4. Теперь у вас есть новый, увеличенный набор приложений, и вы можете повторять шаги 2 и 3, пока не добьетесь того, чтобы набор приложений превратился в минимальный жизнеспособный кластер.
5. Если кластер становится слишком большим, выберите другое начальное приложение или действуйте более радикально на этапе 3.

Когда вы справитесь с определением минимального жизнеспособного кластера, то сможете развивать процесс далее, реализуя практики DevOps, такие как автоматизация тестирования и применение облачного окружения, или формируя Agile-команду, которая будет поставлять изменения в этот кластер.



ГЛАВА 3

Готовые программные пакеты и поставщики программных продуктов

«Если вы не знаете, что вам нужно, – говорит швейцар, – то вы получите много того, чего не хотите».

Чак Паланик

Во многих организациях довольно нелестно отзываються о готовых программных пакетах – обычно это коммерческие продукты (COTS), в пользу которых был сделан выбор из-за поставляемой функциональности. Понятно, что это ПО, часто называемое устаревшим, не появилось в организации из ниоткуда: кто-то решил приобрести программный пакет, для того чтобы решить бизнес-проблему. Существует множество весомых причин не изобретать колесо, а вместо этого пользоваться готовыми программными пакетами. К сожалению, множество программных пакетов сегодня не соответствуют тому, как должны выглядеть современные приложения. В этой главе мы обсудим критерии, которые должны рассмотреть при выборе программных пакетов, а также то, что вам стоит делать, чтобы улучшить имеющийся у вас программный пакет. Как всегда, я дам несколько упражнений в конце главы, чтобы вы могли лучше воспринять теоретическую часть. Давайте немного поговорим о том, что же представляют собой программные пакеты.

Изначально программные пакеты задумывались как средство поддержки стандартных процессов организации. Такие процессы не сильно отличаются

в разных организациях, и совсем не они определяют ваше отличие от конкурентов. И даже несмотря на то, что многие из этих программных пакетов сегодня поставляются в виде *ПО как сервис* (SaaS), в вашей организации наверняка работают устаревшие решения, на поддержку которых уходят ресурсы.

Проблема в том, что многие организации, применяющие программные пакеты, в итоге настолько существенно адаптировали продукт под свои задачи, что этот путь его совершенствования стал обходиться слишком дорого. Например, я наблюдал множество обновлений для Siebel, которые стоили миллионы долларов. Когда путь обновлений заводит слишком далеко, новая, улучшенная, более безопасная функциональность, которая поставляется с более свежими версиями пакета, часто оказывается недоступной для организации на протяжении нескольких лет. Кроме прочего, серьезная адаптация пакета под требования бизнеса со временем приведет к тому, что каждое следующее изменение будет обходиться все дороже и дороже и технический долг будет расти соответственно.

Еще если мы признаем, что концепция конечной архитектуры больше не применима, станет понятно, что программные пакеты должны проектироваться таким образом, чтобы они могли соответствовать жизненному циклу, который подразумевает естественное отстранение компонентов новой, отличной системы, чтобы можно было свободно отделять их от остальной архитектуры. Каждый компонент архитектуры должен представлять собой нечто временное, чтобы вы не были привязаны к какому-то одному поставщику. Рынок ИТ так быстро развивается, что выбор в пользу беспроигрышного варианта может завтра стать жизненной необходимостью. Иметь дело с пакетом, поставщик которого больше не присутствует на рынке или перестал считать этот продукт стратегически важным для себя, – это кошмар, ведь исправления дефектов и другого рода поддержки в таком случае крайне тяжело добиться. Я часто встречался с такими ситуациями, и мне приходилось заниматься обратным проектированием вместе с командой, для того чтобы решить проблемы, а это стоило немалых денег и времени.

Архитектура приложения – ключевой фактор, определяющий быстроту, с которой вы сможете поставлять продукт; и вместе с тем именно этот фактор тяжелее и дольше всего изменять. Вы должны осознавать, что, выдвинув решение внедрить новый программный пакет в организации, следует учитывать его влияние на архитектуру и не руководствоваться лишь желанием получить определенную функциональность.

Многие процессы ИТ-поставки сегодня больше напоминают сборку конструктора LEGO, чем лепку из пластилина. Чтобы вы могли такое осуществить, ваши приложения должны быть модулярными, пользоваться открытой архитектурой и хорошими практиками проектирования, – тогда вы сможете добиться наибольшей выгоды. В противном случае все это станет похоже на конструктор LEGO с различными механизмами соединения, и в один прекрасный момент вы придете к тому, что для поддержания всей конструкции нужен клей. Это подрывает саму идею использования конструктора, и изменения в такую структуру будет вносить крайне тяжело.

Как выбрать подходящий продукт для вашей организации

Касательно выбора ИТ-продукта для выполнения какой-либо бизнес-функции высказывалось множество мнений. Например, какую из CRM-систем стоит использовать: Salesforce, Siebel или Microsoft? Рассматривать лишь функциональность сегодня уже недостаточно: да, от нас зависит выбор того или иного продукта, но организация с наименьшей вероятностью станет использовать его в первоизданном виде. Архитектура приложения, в состав которой войдет этот продукт, продолжит развиваться, что, скорее всего, потребует модификации продукта.

Принципы построения архитектур и проектирования сегодня играют намного большую роль, нежели ранее, благодаря постоянному развитию архитектуры. Это позволяет взглянуть по-другому на выбор продукта. И конечно же, выбор зависит от контекста для каждой компании и каждой бизнес-области. Фреймворк, который вы выберете, должен соответствовать всем рассмотренным факторам. И хотя это решение каждый будет принимать по-своему, я тем не менее представлю фреймворк выбора технологий (TDF), который поможет вам более широко взглянуть на ряд технологий, прежде чем сделать выбор.

В моем фреймворке TDF есть три стороны, которым необходимо давать оценку: 1) функциональность; 2) архитектура и 3) принципы проектирования.

Функциональность

Очень часто предоставляемая функциональность играет определяющую роль при выборе программного пакета. Чем больше функциональность соответствует требованиям процесса, который вы хотите обслужить, тем лучше выбор. Чтобы вы могли определить, подходит ли программный пакет или вам стоит создать свое собственное решение (надеюсь, не с нуля, а при помощи открытых библиотек и модулей), вам необходимо внимательно взглянуть на свою организацию. Два фактора могут значительно повлиять на ваше решение: гибкость, с которой вы хотите обслуживать процесс, и ваши способности в проектировании. Если ваши процессы не очень гибкие и у вас оригинальный процесс, то используемый программный продукт, вероятнее всего, потребует серьезных изменений. Если у вас в штате нет людей с сильными навыками проектирования, да и ваши партнеры ничего не могут предложить в этом плане, то здесь наверняка подойдет использование программного пакета. Нужно четко видеть разницу между гибким процессом, созданным с низким навыком проектирования (случай для пакета), и самостоятельно созданным процессом, созданным с хорошим навыком проектирования (случай для оригинального решения).

Если вы останавливаетесь на использовании программного пакета, вам нужно составить список нужной функциональности в виде требований или *пользовательских историй*, а также необходимо оценить пакеты-кандидаты. В идеальном случае стоило бы привлечь к оценке представителей бизнеса,

чтобы они подтвердили, что в этой функциональности действительно есть необходимость. Основная идея состоит в том, что пакет предоставляет готовую широкую функциональность, и для того чтобы заполучить ее, вам не придется тратить много сил на установку данного пакета в некотором окружении. Если трудности возникают, это сигнал, что надо что-то менять.

Зрелость (завершенность) архитектуры

Зрелость архитектуры приложения – весьма важный фактор для процесса текущей поддержки вашего приложения, так как хорошо спроектированное приложение облегчит задачу обслуживания и поддержки самого приложения. Если вы создаете приложение самостоятельно, то вам придется размышлять над архитектурными проблемами, например над масштабируемостью и мониторингом, и чем лучше при этом ваш навык проектирования, тем больше у вас возможностей самостоятельного построения этих архитектурных аспектов. Так или иначе, вы можете выбрать пакетное решение, которое будет делать это за вас.

Ниже представлены четыре критерия, которыми вы можете пользоваться для оценки зрелости архитектуры:

1. Автоматическое масштабирование: когда ваше приложение достигает успехов и начинает использоваться все чаще, нужно масштабировать функции, подверженные нагрузке. Архитектура должна разумно поддерживать гибкое масштабирование различных частей приложения (например, вы масштабируете не все приложение, а только ряд необходимых функций).
2. Самовосстанавливаемость: когда что-то идет не так, архитектура приложения должна быть способна распознавать такие ситуации и принимать контрмеры. Это может подразумевать традиционный перезапуск серверов/приложений, удаление очередей сообщений или запуск новой версии приложения/сервера.
3. Мониторинг: вам нужно понимать, что происходит с вашим приложением. Какие элементы используются? Какие части приложения несут ценность для вашего бизнеса? Чтобы это можно было узнать, архитектура приложения должна позволять вам наблюдать за многими его аспектами и предоставлять данные для вашего программного решения по мониторингу.
4. Способность к переменам: необходимо понимать, во что обойдутся попытки подстроить систему под текущие требования. Насколько данная архитектура модульна? Если в ней будет присутствовать множество общих компонентов, это помешает вам вносить независимые изменения и, вероятно, увеличит объем работы из-за наличия зависимостей в общих модулях. Архитектура приложения должна быть модульной по своей природе, чтобы у вас была возможность заменять и обновлять компоненты без необходимости изменения всей системы. Прямая и обратная совместимости также важны для обеспечения гибкости обновлений.

Принципы проектирования

Важность принципов проектирования растет вместе с вашей убежденностью в том, что приложению суждено расширяться; а это, в свою очередь, часто определяется степенью стратегической важности приложения для процессов взаимодействия с вашим заказчиком. Следование хорошим принципам при построении приложения позволит вам быстро обновлять его и масштабировать процесс поставки, чтобы можно было поддерживать растущие объемы вносимых изменений. Чем опытнее ваш ИТ-отдел, тем больше люди будут способны применять эти принципы и паттерны. Если такого навыка у ваших сотрудников нет, то вы сосредоточитесь на встроенных особенностях архитектуры. Вот несколько моментов, на которые стоит обратить внимание:

- Управление исходным кодом: весь код и конфигурации должны быть извлекаемыми. Вам важно использовать инструменты для управления конфигурациями в масштабах корпорации, для того чтобы обслуживать зависимости между системами. Следовательно, нужна возможность получать полную конфигурацию приложения и быстро ее восстанавливать. Встроенные или проприетарные (собственные) решения обычно не позволяют вам интегрироваться с другими приложениями, тем самым лишая ваши приложения возможности иметь некое единое состояние в пределах ваших корпоративных систем. При необходимости вы должны восстанавливать приложение до исходного состояния при помощи внешней системы управления исходным кодом, что осуществимо только в случае, если вы можете экспортировать конфигурацию из приложения в *систему управления конфигурациями программного обеспечения (SCM)*. Это также значит, что конфигурации не должны быть применимы лишь к одному из готовых коммерческих продуктов. Легкость, с которой можно осуществлять экспорт и импорт конфигураций, покажет вам, насколько хорошо такой подход будет интегрироваться в жизненный цикл поставки вашего продукта. Извлекаемые данные должны представлять собой текст, чтобы SCM-системы имели возможность сравнивать различные версии, анализировать разницу и поддерживать слияние веток.
- Автоматизация при помощи API: приложение должно создаваться с учетом дальнейшей автоматизации, и в нем нужно оставлять средства (например, *программный интерфейс приложения, API*), которые позволят автоматизировать жизненный цикл поставки. Они включают в себя статический анализ кода, юнит-тесты, компиляцию и сборку. Ни одно из этих занятий не должно подразумевать использование графического пользовательского интерфейса. То же самое касается развертывания и конфигурирования приложения в целевом окружении; эти процессы развертывания и конфигурирования не должны подразумевать участия человека. В результате успешной автоматизации время сборки и развер-

тивания сократится (например, это будет занимать не более нескольких часов или, еще лучше, не более нескольких минут).

- Модульность приложения: это свойство сокращает время сборки и развертывания, обеспечивая выпуск в среду эксплуатации малыми партиями, а малый объем работы в среднем сокращает операционные издержки на внесение изменений. Это уменьшает вероятность того, что разработчики будут одновременно работать над одним и тем же кодом. Это, в свою очередь, сократит риски возникновения сложных случаев слияния веток.
- Облачные возможности: в первую очередь мы не должны строить монолит, поэтому нужно иметь возможность масштабировать необходимые компоненты, не затрагивая при этом приложение в целом. Существуют гибкие планы, которые могут поддерживать использование облачных решений. Механизмы встроены в систему таким образом, чтобы обеспечить мониторинг на низком уровне.

Для того чтобы помочь вам выбрать продукт, наиболее подходящий для ваших требований, оцените каждый из рассматриваемых продуктов по четырем критериям, упомянутым выше: функциональности, архитектуре, способности к проектированию и навыкам ИТ-отдела. Ниже представлен пример оценочной таблицы (табл. 3.1), которой вы можете пользоваться в качестве начальной точки для развертывания процесса оценки.

Таблица 3.1. Пример оценочной таблицы: новые приложения должны оцениваться по четырем критериям, а не только по функциональности

| | | Продукт А | Продукт Б | Продукт В |
|-------------------------------------|---------------------------------|-----------|-----------|-----------|
| Функциональность | Функ. область 1 | | | |
| | Функ. область 2 | | | |
| | Функ. область 3 | | | |
| Архитектура | Автоматическая масштабируемость | | | |
| | Самовосстанавливаемость | | | |
| | Мониторинг | | | |
| | Изменяемость | | | |
| Способности к проектированию | Исходный код | | | |
| | API | | | |
| | Модульность | | | |
| | Облачные технологии | | | |
| Навыки ИТ-отдела | | | | |

Что же тогда делать с существующими устаревшими приложениями

Рекомендации из предыдущего раздела прекрасно подходят для создания новых приложений, но вам все еще придется иметь дело с существующими

устаревшими приложениями. Позднее я расскажу, как развивать архитектуру ваших приложений, когда все ее элементы обслуживаются вами. Сейчас же мы обсудим, что можно сделать, когда приложения не полностью обслуживаются вами.

У вас наверняка есть ряд приложений, над которыми вы работаете, и некоторые из них поддерживаются поставщиками программных пакетов, которые занимаются созданием ПО, или внесением в ваше ПО специфичных изменений, или тем и другим. Но тем не менее если вы взглянете на приложение, то вряд ли сможете сказать, что оно следует современным принципам построения архитектуры и проектирования, как я говорил ранее. Весьма вероятно, что вы не захотите вкладываться в полную замену этих систем, поэтому вам придется поискать другие методы обхождения с ними. Существует четыре основных принципа, которым я рекомендую следовать при работе с такими поставщиками: 1) пользуйтесь вашими системными интеграторами; 2) пользуйтесь ассоциациями пользователей; 3) сокращайте пользование функциональностью приложения и/или 4) подталкивайте поставщика улучшать продукт.

Понятно, что количество поставщиков не соответствует количеству приложений. Существуют мультимиллионные организации, с которыми вам придется взаимодействовать иначе, нежели с мелкими поставщиками, поддерживающими одно приложение.

Пользуйтесь системными интеграторами

На протяжении всей своей карьеры я работал с поставщиками ПО или системными интеграторами и много раз дивился тому, сколько упускается возможностей, между тем как стоило бы наладить эффективное взаимодействие, и не только ради выполнения срочного задания. Если вы работаете с крупным системным интегратором (SI) для поддержки и разработки приложения, то весьма вероятно, что SI способен работать со многими аспектами приложения. В то время как вы работаете с некоторым поставщиком ПО, SI, исходя из потребностей ряда его клиентов, может больше воздействовать на поставщика. Чем лучше у вас взаимопонимание с SI в части разработки, тем легче вам сообщать влиять на поставщика. Тесная работа с поставщиками ради улучшения их архитектуры – только одно из многих преимуществ, к которому ведет изменение ваших отношений с SI.

Пользуйтесь ассоциациями пользователей

Среди большинства популярных приложений часто формируются ассоциации, которые могут стать действенным каналом для получения обратной связи от поставщика. Иногда они организуются самим поставщиком, а иногда независимо от него. В любом случае будет полезно найти единомышленников, которые хотят улучшить архитектуру приложения в соответствии с современными практиками. И обращение целой группы клиентов к поставщику может оказаться более действенным подходом. Несколько лет назад я работал

с некоторым ПО, которое не было способно предоставлять отчеты на основе *стори-поинтов*, а позволяло лишь пользоваться отслеживанием рабочих часов. Поставщик продукта всегда говорил моему клиенту, моим коллегам и мне, что наш запрос в его практике единичный и потому не имеет для него высокого приоритета. Мы смогли чего-то добиться только тогда, когда связались с некоторыми другими организациями, которые, как ни удивительно, тоже делали такой запрос и получали такой же ответ! Поставщик явно чего-то недоговаривал. Как только мы смогли объединить усилия, поставщик начал серьезно воспринимать наши запросы и исправил проблему.

Я рекомендую вам искать такие пользовательские группы, чтобы найти потенциальных союзников, а также способы решения проблем, к которым вы впоследствии сможете прибегнуть. Сейчас люди со всего мира находят решения, для того чтобы использовать практики DevOps в тех приложениях, в которых формально не получается реализовывать эти практики. И к счастью, сторонники DevOps обычно весьма рады поделиться этой информацией.

Отгораживайтесь от этих приложений и вкладывайтесь в нечто новое

Как уже было сказано в предыдущей главе, когда приложения не изменяются и вы уже считаете, что пора от них отказаться, можно воспользоваться чем-то, подобным паттерну подавления, медленно отстраняясь от использования приложения. Сокращайте инвестиции в это приложение и вкладывайтесь в построение новой функциональности – той, которая будет лучше сочетаться с вашей архитектурой. Будьте честны и сообщайте вашему поставщику ПО о том, что вы делаете это, поскольку он не предоставляет необходимых вам возможностей, но вы готовы пересмотреть свое решение, если такие возможности появятся. Для поставщика это серьезный мотив вкладываться в создание улучшенной инфраструктуры (ведь эта функциональность, возможно, не существует как раз потому, что о ней никто ранее не просил). Последовательно объясните, почему неразвивающаяся архитектура и инструменты не помогают вам двигаться дальше и для соответствия вашим современным требованиям об архитектуре необходимо вносить изменения в архитектуру приложения. Если поставщик решит, что эти возможности не нужно реализовывать в приложении, вряд ли вам стоит с ним сотрудничать: полезнее вложить ваши средства куда-либо еще, чтобы ваша архитектура вышла на новый уровень.

Подталкивайте поставщика к действиям

Я всегда предпочитаю пряник, а не кнут; в идеале стоит искать возможности достижения взаимовыгодных договоренностей. Совершенствование архитектуры и проектирования принесет выгоду для вас; этим вы можете воспользоваться, чтобы подтолкнуть поставщика к изменениям в работе. Чтобы еще

больше заинтересовать его, можно показать, как изменения сделают приложение более привлекательным для вашей организации и насколько больше лицензий необходимо будет приобрести со временем. Это заметно способствует тому, чтобы поставщики улучшали свою архитектуру. И конечно же, вы можете рассказать другим, какое замечательное у вас приложение, и тем самым привести еще больше клиентов – выигрывают все.

Как я говорил в начале главы, многие организации не очень высокого мнения о программных пакетах. Тем более удивительно, что организации пассивно подходят к работе с пакетами и редко подталкивают поставщиков к исправлению ситуации. Я верю, что поставщики будут рады пойти навстречу, если больше организаций будут задавать правильные вопросы. В конце концов, зачем поставщику вкладываться в архитектуру, подходящую для методик DevOps и Agile, если каждый из клиентов запрашивает лишь новую функциональность, а не улучшение архитектуры? Если компании плотнее будут работать с поставщиками и обсуждать методы, при помощи которых они хотят управлять программным пакетом, и то, насколько важны для них в этом процессе практики DevOps, поставщики начнут обращать на это больше внимания.

Будьте креативными

Если ничего из этого не работает и вы смелы и любознательны, то можете проигнорировать руководства ваших поставщиков и попытаться приспособить техники DevOps самостоятельно – даже к программным продуктам, которые не так легко поддаются этим техникам. Вот как вы можете начать:

- Найдите и обслуживайте исходный код. Правда, проще это сказать, чем сделать. Вам, возможно, придется извлекать конфигурации из базы данных или из файловой системы, чтобы получить текстовую версию кода.
- Ищите способы управления этим кодом при помощи общих конфигураций и инструментов для слияния кода, вместо того чтобы пользоваться оригинальными системами, которые мог порекомендовать поставщик. Стоит также рассмотреть синтаксис кода, чтобы узнать, присутствуют ли в нем части кода, которые представляют собой несоответствующие метаданные, которые вы можете пропустить во время процесса слияния. Нечто подобное в Siebel, например, позволило моей команде сэкономить сотни часов.
- Попытайтесь найти в приложениях API или сигнальщики, с помощью которых можно автоматизировать шаги процесса, в противном случае требующие ручного вмешательства (даже если изначально предполагалось, что они будут использоваться для других целей).

В моей команде мы использовали эти техники в таких приложениях, как Siebel, SAP, Salesforce и Pega¹.

¹ Я составил более детальное описание этих техник в блоге *InfoQ* [1].

Я надеюсь, что техники, описанные выше, помогут вам проложить свой путь и стать частью экосистемы, в которой ИТ – настоящий двигатель. Последний элемент экосистемы, о котором я хочу вам рассказать, – роль системного интегратора. Эта тема очень мне близка, и о ней я поговорю в следующей главе.

Первые шаги вашей организации

Определите основные принципы работы новых приложений

Составьте оценочную таблицу для вашей организации, взяв за основу табл. 3.1. Принимайте следующее решение по продукту (называйте его историческим, если хотите), пользуясь этой оценочной таблицей, и посмотрите, появились ли отличия в процессе. Проследите, приносит ли использование оценочной таблицы, сосредоточенной на архитектуре, заметный результат. Я бы порекомендовал приглашать заинтересованных лиц из организации, чтобы проводить практикумы с обсуждением результатов и предстоящих шагов к переменам по мере вашего продвижения вперед.

Создавайте поддерживающую экосистему для улучшения вашей архитектуры

Итак, в вашей организации, как и во многих других, уже имеются программные пакеты. В предыдущей главе мы проанализировали портфолио приложений, которым вы можете пользоваться, для того чтобы определять, какие из программных пакетов будут стратегически важными для вашей организации.

1. На основе проведенного анализа портфолио приложений (или на основе чего-либо еще) определите небольшой ряд стратегических приложений (например, как первый минимальный жизнеспособный кластер), чтобы сформировать стратегию для создания поддерживающей их экосистемы.
2. Теперь выберите стратегические программные пакеты и пройдитесь по оценочной таблице, описанной в этой главе. По большому счету, вы можете не ориентироваться на функциональные аспекты, так как они используются при выборе между пакетом и собственным решением. Тем не менее вы могли бы пройти по всей таблице, чтобы проверить, является ли ваше решение правильным. Учитывая, что вы будете делать эту оценку уже постфактум, вы узнаете, насколько подходящим оказался пакет, основываясь на количестве адаптаций решения, выполненных вашей организацией.
3. Продумайте стратегию работы со слабыми местами в программных пакетах. Каким образом работать с поставщиком, чтобы улучшить ваши возможности? Будете ли вы работать с ними напрямую? При-

влечете ли вы системного интегратора или будете искать пользовательские группы?

4. Для получения результатов нужно время. Определите реалистичную частоту проведения инспекции улучшенной экосистемы, чтобы понять, помогает ли она улучшить приложения, над которыми вы работаете. Вы можете использовать принципы измерения технического долга из предыдущей главы в качестве отправной точки, если у вас не найдется иных средств для оценки улучшений в пакетных приложениях.

ГЛАВА 4



Поиски подходящего партнера

Партнерство подобно бракосочетанию. Все усилия и лучшие намерения в мире не принесут должных результатов, если вы в первую очередь выбрали не того партнера.

*Сесилия Грант,
«Рождество, которое пошло
совершенно не по плану»*

В большинстве крупных организаций работа не ведется в одиночку. Где-то в вашей организации для мелких или крупных задач в рамках ИТ-отдела привлекаются сторонние работники, или, по крайней мере, SI помогает вам поставлять продукт, который необходим вам, чтобы вести бизнес. Нужно правильно управлять подобными отношениями, дабы быть уверенным, что вы получаете надлежащую интеллектуальную собственность и работаете с опытным партнером.

В индустрии ведется множество разговоров о том, как важна культура, и о том, что Agile и DevOps стали, по большому счету, культурными движениями. Вы услышите множество историй о том, как улучшить культуру в организации, когда будете посещать конференции или вести блоги. Я полностью согласен с тем, что культура организации крайне важна для достижения успеха, но мне любопытно, почему сейчас ведется множество дискуссий о том, как выстроить культуры SI и организаций, с которыми они работают. На сегодняшний день большинство взаимоотношений компаний и SI основаны на сделках и на управлении отношениями с поставщиками. Такие слова, как *партнер*, *парт-*

нерство и сотрудничество, нередко используются, но на деле между «партнерствующими» сторонами по ряду причин нередко разногласия.

В этой главе я хочу помочь вам улучшить ситуацию, представив свой опыт работы и с SI, и в качестве клиента SI. Существуют методы улучшения взаимоотношений, которые помогут сделать их более значимыми для обеих сторон. Есть и распространенные ошибки, которых стоит избегать. Каждая из сторон прежде всего хочет наладить взаимовыгодные отношения – по крайней мере, так было в моей практике. Зачастую расширению организационной культуры мешают отсутствие контекста и ограниченный опыт.

Как добиться выгодных стратегических партнерских отношений с системным интегратором

Многие организации, которые следуют пути Agile и DevOps, решают, что наилучший способ успешного перехода к этим практикам – изначально полагаться на штатные возможности, так как при этом сохраняется больше возможностей управлять сотрудниками и средой, в которой они работают (учитывая их зарплату, цели, мотивацию, принятую внутреннюю политику), чем в случае работы с SI.

До тех пор пока вы не захотите перевести все процессы в обратный штат, вы, вероятнее всего, будете работать с SI-партнерами. К счастью, в работе с партнерами есть множество преимуществ. Подходящий партнер способен поделиться с вами опытом работы с другими компаниями, у него наработаны более богатые связи с вашими поставщиками, а кроме того, он предоставит для вас среду, привлекающую таланты, – среду, которую вы сами создать не смогли бы. ИТ сегодня являются основой всякого бизнеса, но не каждая компания способна стать ИТ-компанией. Наличие стратегических партнеров позволит вам пользоваться преимуществами каждой из сторон – иметь достаточно прав на интеллектуальную собственность и представления о том, как создаются и работают ваши системы, в то же время позволяя вашему стратегическому партнеру оперировать большим объемом ИТ-задач. Не бойтесь и будьте готовы передавать ИТ-задачи при необходимости, чтобы поддерживать баланс – и в целом оставаться успешными.

Мир технологий меняется крайне быстро; это означает, что нам постоянно необходимо узнавать новые технологии. Если у вас будут хорошие отношения с партнером, то вы сможете вместе взяться за изучение новых технологий и обеспечить обучение сотрудников вашего партнера, а в то же время получить выгоду от успехов партнера в освоении этой новой технологии. Я всякий раз умиляюсь, наблюдая, как две компании работают вместе над поиском взаимовыгодных решений. Важно проявлять внимание к интересам вашего партнера.

Работая над некоторыми проектами, я входил в состав смешанных команд, в которых опыт моих людей в технологиях использовался вместе с глубокими познаниями в бизнесе сотрудников клиента. Эти команды клиента могли поддерживать и улучшать наше решение даже спустя долгое время после нашего ухода; именно в этом и проявляется успех! Мы не только создали улучшенную систему, но еще и обогатили организацию, подтянув навыки сотрудников в новых для них методах работы. И, как обсуждалось ранее в главе о портфолио приложений, у вас смогут быть приложения, к работе с которыми вы не хотите привлекать штатных сотрудников и с которыми данный подход не работает.

В контексте ваших основных и вспомогательных приложений вам нужно использовать технологии и опыт предыдущих проектов у SI, а также познания в бизнесе и области – право на интеллектуальную собственность в вашей ИТ-организации. Стоит избегать партнеров, которые не ориентируются на предпочтительные методы работы в вашей организации и процессы и культура которых для вас непрозрачны, а следовательно, нельзя быть уверенным, что они соответствуют вашим. В противном случае знания о ваших системах останутся только у отдельных сотрудников таких партнеров, и все изменения будут происходить в т. н. *режиме «черного ящика»*. В итоге, когда что-то пойдет не так, вы не сразу это поймете. Один из способов решения проблемы выбора поставщиков – сужение их ряда до небольшого количества стратегических партнеров, ради которых вы готовы потратить усилия на то, чтобы сделать партнерство успешным. Чем меньше партнеров, тем меньше будет зависимостей при попытках приблизиться к их культуре. Культурное сближение в принципах работы, способах мотивации, ценностях, а также требуемом опыте должно стать основным критерием при выборе SI, помимо стоимости.

Важно контролировать свой путь в ИТ

Вашей организации необходимо понимать, как работает ИТ, и обладать достаточными возможностями, навыками и интеллектуальной собственностью, чтобы самостоятельно определять свою судьбу. Как говорилось ранее, ИТ сейчас находится в самом сердце бизнеса; минимальное понимание того, как это работает, важно для того, чтобы с вашей помощью ИТ поддерживали бизнес сегодня, завтра и послезавтра. Но что же это означает – контролировать свою судьбу в ИТ? В то время как существуют некоторые тенденции, снимающие головную боль с вашего ИТ-отдела (cloud, SaaS, COTS), на самом деле нет способа стопроцентной отслеживаемости рисков, связанных с ИТ.

Вам также придется думать об инструментах и процессах, которые принесут с собой ваши партнеры. Прекрасно, когда поставщик привносит дополнительные инструменты, методы и т. п., но если вы не сможете продолжать использовать эти инструменты и методы после смены поставщика, то окажетесь один на один с крупной проблемой, если они успели стать крайне важными для всей ИТ-поставки. Если отношения с поставщиком непрозрачны и вы не вполне по-

нимаете, как он работает, то вам придется брать на себя все риски таких взаимоотношений: вы ведь связаны с ним прочнее, чем, возможно, этого желаете.

К счастью, существует тенденция движения в сторону методов и стандартов, которые облегчают взаимодействие, несмотря на барьеры, присутствующие в компании. Хорошие примеры – такие Agile-методологии, как SAFe и LeSS. Очень вероятно, что вы будете приспосабливать ваши собственные методы, основанные на влиянии многих фреймворков. Когда этот метод становится обязательным условием для работы организации, вам легче все контролировать. И все равно стоит убеждаться в том, что ваши методы верны, и не бояться обратной связи от партнеров. Ваши партнеры, безусловно, должны привносить свой опыт, что поможет вам усовершенствовать свои методы.

Следование стандартам – неплохая практика на стороне проектирования. Многие организации либо не оказывают влияния на разработку решений своими партнерами, либо не видят этот процесс. Такие практики, как модульное тестирование, статический анализ кода и автоматизированное развертывание, лежат в основе всего. Но, так или иначе, многие организации не имеют представления о том, используют ли эти практики их партнеры, а если да, то в какой мере. Поддержание правильной структуры и взаимодействия может помочь вашим партнерам начать пользоваться этими практиками, но от вас зависит, сможете ли вы начать видеть, какие практики применяются для ваших проектов.

Довольно практичный подход в такой ситуации – наличие в организации стандартов проектирования, которых будет придерживаться каждая из ваших команд, будь то штатные сотрудники, поставщик или множество поставщиков. Вместе с этими стандартами у вас появится общий язык, на котором вы сможете говорить с партнерами, когда будете описывать свое видение предоставляемых вами ИТ-услуг (например, ваше определение непрерывной интеграции). К счастью, в этом направлении уже было проделано много работы, и не нужно начинать все сначала. Для вдохновения можете почитать популярные книги по разработке: «*Непрерывное развертывание ПО. Автоматизация процессов сборки, тестирования и внедрения новых версий программ*» Джеза Хамбла и Дэвида Фарли, «*Программист-прагматик. Путь от подмастерья к мастеру*» Эндрю Ханта и Дэвида Томаса, а также «*Release it! Проектирование и дизайн ПО для тех, кому не все равно*» Майкла Т. Найгарда.

Смена парадигмы

«Разработка – администрирование – внедрение»

Ранее контракты с системными интеграторами работали в макиавеллиевском стиле: компания создавала невыносимую среду, в которой никто не выходил победителем. Одна из моделей, которая невольно испытывала подобные последствия, – это модель «*Разработка – администрирование – внедрение*» (DOT). Не знаю, насколько вы знакомы с этим понятием, поэтому давайте я коротко расскажу, что имеется в виду. Контракты DOT работают на основе

представления о том, что существуют три отдельные стадии проекта: стадия разработки, когда продукт создается, стадия администрирования, когда продукт поддерживается другой стороной, и стадия внедрения, когда продукт возвращается в штатное обслуживание.

Многие организации пользуются услугами двух различных поставщиков для осуществления разработки и администрирования или обдумывают передачу стадии администрирования другому поставщику, одновременно сотрудничая с партнером по разработке. Есть несколько причин считать эту модель неверной. Во-первых, если ваш партнер отвечает лишь за поставку, то по понятным причинам соображения об администрировании не будут иметь для него большого веса. В конце концов, не ему же предстоит осуществлять администрирование! Сторона, которая будет заниматься этой фазой, точно так же будет отстаивать лишь свои интересы, все чаще освещая проблемы ближе к моменту передачи продукта. Здесь нет злого умысла, просто каждый сосредоточивается на своей зоне ответственности – в зависимости от круга задач, очерченного контрактом.

Вторая проблема в том, что многие DOT-проекты ведутся по принципу «черного ящика», когда клиентская организация вовлечена лишь в качестве заинтересованной стороны и до тех пор, пока не подоспеет стадия внедрения в штат, не имеет представления о том, как поддерживать и обслуживать систему. Это приводит к возникновению проблем не только на стадии внедрения, но еще и при урегулировании несоответствий в момент перехода со стадии разработки к администрированию. Вы можете изменить эту модель вовлеченности в переход от одной стадии к другой, так чтобы она соответствовала ряду характеристик. Убедитесь в том, что обеспечиваете длительное существование команды на протяжении нескольких стадий, осуществляемых вашими партнерами, чтобы сотрудники, которые будут администрировать решение, были уже вовлечены в разработку.

На протяжении всего жизненного цикла проекта внедряйте своих людей в команду, чтобы вы могли расширять свои представления о данном решении и о том, чего стоит его создавать и поддерживать. В идеальном случае желательно найти пару таких представителей от вашей организации и от вашего партнера (например, в качестве проектного менеджера, лида команды поставки, системного архитектора), чтобы можно было разделить обязанности. Такая модель предусматривает правильное обхождение с недостатками DOT-модели, и с ней вы все-таки сможете пользоваться общей концепцией DOT-проектов и комбинировать ее с принципами DevOps. Лучшие из моих проектов пользовались такой моделью, и результаты ее применения функционировали еще довольно долгое время, не требуя моего вмешательства.

Культурное взаимодействие в партнерстве

Как я упоминал ранее, мне приходилось бывать по обе стороны партнерства с системным интегратором (SI), предоставляя услуги клиенту, а также вы-

ступая в роли ответственного за совершенствование навыков сотрудничества, когда я работал с SI. Довольно легко винить SI в каких-то неполадках, в том, что не применяются все практики DevOps и Agile, а также в том, что он не готов экспериментировать, чтобы улучшить дела.

Действительность такова, что каждый человек и каждая организация, оглядываясь на свой контекст, делает то, что считает правильным. Никто не пытается достичь заведомо плохих результатов. К сожалению, иногда взаимоотношения выстраиваются на недоверии: я не доверяю тебе, поэтому у меня будет человек, который будет следить за тем, что ты делаешь. Поставщик затем выделяет отдельную должность, и обе стороны увеличивают количество процессов и документации, чтобы прикрыть свои тылы. Больше и больше процессов, ролей и прочих сложностей – пока не появится несколько отдельных уровней, отдаляющих настоящую работу от сотрудников обеих организаций, взаимодействующих друг с другом. Будет еще хуже, если эта деятельность не привнесит никакой ценности, а только усугубляет взаимное недоверие партнеров.

Представьте, что вы доверились вашему SI как наилучшему сотруднику в команде. Какими процессами и документами можно пренебречь и как это повлияет на стоимость и быстроту поставки? Несмотря на эти потенциальные преимущества, выстраиванию такого эффективного взаимодействия уделяется слишком мало внимания. Как можно создать культуру сотрудничества, которая будет мотивировать всех партнеров двигаться вперед, преследуя идею выстроить рабочие методы Agile и DevOps, и как нам это сделать, если у нас уже есть долгосрочные контракты?

Во-первых, я думаю, что важно понимать вашего партнера. Как в хорошем браке, необходимо знать, что работает в отношениях с партнером, а что – нет. И в слово «партнер» я вкладываю особый смысл. Если вы работаете с поставщиком над неким сторонним проектом и отношения между вами преимущественно формальные, то вам нет повода о чем-либо беспокоиться. Но если вы работаете с одной и той же компанией в течение многих лет над какими-то основными системами, формальности уже не настолько значимы. Вам необходимо выстроить партнерские отношения и выработать общую DevOps-культуру.

В действительности вы можете понять, как SI определяет свою успешность, и каждая из сторон не боится показать, что рассчитывает получить от этого взаимодействия. Один из весомых факторов – карьерные мотивы, и мне, в свою очередь, повезло, так как множество моих клиентов с пониманием относились к тому, что я обсуждал карьерный рост своих сотрудников и объяснял, почему мне нужно менять их текущие роли на проектах. При взгляде со стороны компании кажется, что выгоднее иметь одного человека на одной и той же роли в течение многих лет, но меня это категорически не устраивало, поскольку моим сотрудникам было интересно как-то развиваться. И конечно же, у другой стороны также могут быть и свои интересы, поэтому надо задуматься, если SI использует непрозрачную тактику – вам нужно, чтобы взаимоотношения были как можно более понятными! Вы, конечно, можете приобрести услуги,

как кота в мешке, и пользоваться ими лишь при помощи интерфейса. В таком случае вам все равно, как много сотрудников работает над проектом и что они делают; вы просто платите за предоставление услуги. Это дает SI право на независимость – и вы, возможно, встретитесь с аспектами ваших ИТ-стратегий, которые могут работать в манере ХааS.

В случае с другими проектами, которые подразумевают работу с вашими основными системами и сотрудниками из вашей или сторонней организации, вам нужна прозрачность. Поставщик, который приносит свои инструменты и методы, в принципе, увеличивает стоимость вашего перехода к другим моделям. Вам нужно иметь ваши собственные методы и инструменты, и каждый SI может поделиться своим опытом, чтобы помочь вам улучшить их. Вам не нужен «черный ящик». К счастью, общие фреймворки в индустрии, такие как SAFe или Scrum, действительно помогают выстроить базовый подход к совместной работе организаций, подразумевающий малые траты времени на подготовительные действия. Обдумывая партнерство, вы должны помнить о том, что нельзя совершенно исключить риски. Часто я встречал клиентов, которые просто говорят: «ну, это уже ваша проблема», – когда SI начинает описывать возможное развитие ситуации. На самом деле если проект провалится, то клиент пострадает в первую очередь. Закрывать глаза и уши и перекладывать проблему на плечи SI – непροститeльная слабость. Вспомните о катастрофе Australian census, когда партнер по поставке вынес на публику тонны негатива [1], или Healthcare.gov в США, поставщики которой обвиняли друг друга в проблемах [2]. Даже если поставщики были и вправду виноваты, репутация той и другой организации понесла потери, а с учетом того, что это были публичные сервисы, появление множества негативных отзывов в прессе было вполне предсказуемо.

Контракты с партнерами

Используя Agile, мы хотим добиться гибкости и прозрачности процессов. Но насколько хорошо вы ради этого проработали свои контракты? В таком случае в контракте уже нельзя упоминать все ту же фиксированную оплату и фиксированные результаты, которые используются тогда, когда каждое изменение должно подвергнуться тщательной проверке. Контракты часто составляются на основе некоторых представлений, но если их не придерживаться, это может привести к проблемам. Упоминание времени и материалов в Agile-контрактах может навлечь проблемы, так как это не будет способствовать тому, чтобы решения принимались согласно предыдущим результатам работы – такое может сработать, только если ваш партнер имеет большой опыт в Agile и ваши взаимоотношения зрелые и выстроены на доверии.

Составление Agile-контрактов потребует от вас, чтобы вы уделяли больше времени отслеживанию результатов работы и вовлечению в регулирование объема работы. По моему опыту, лучшие Agile-контракты строились на наличии фиксированных возможностей, достижении некоторого результата

и гибком регулировании объема работы (поставка определенной функциональности, подробности реализации которой определяются по мере развития проекта).

Существуют способы составления Agile-контрактов, которые будут выгодны каждой из сторон, поэтому давайте познакомимся с некоторыми основами типичного Agile-проекта. Agile помогает командам по завершении каждого из спринтов поставлять код, готовый к среде эксплуатации, и процесс поставки делится в этих целях на четыре фазы:

- 1) изучение объема работы и предстоящая работа по уточнению деталей (*definition of ready*);
- 2) поставка пользовательских историй по завершении спринта/итерации (*definition of done*);
- 3) подготовка к релизу/совершенствование и передача в среду эксплуатации (*definition of done-done*);
- 4) пострелизная поддержка / гарантийное обслуживание (*definition of done-done-done*).

По сути, контракт нужно составлять с учетом этих четырех фаз. Назначайте размер стоимости работы, основываясь на артефактах поставки или на фазах, когда ваш партнер получает оплату только после поставки (например, проектных документов) или по завершении некоторой стадии проекта (например, стадии проектирования или разработки): такие контракты отражают суть пользовательских историй в виде очков для пользовательских историй. Каждая из историй проходит стадии, описанные выше, и с этим должна быть связана оплата. Стоит, конечно, выделять определенную долю выплат за историю, которая достигает стадии *definition of ready*, а также других таких стадий. Ниже приведен хороший пример такого деления.

- У нас есть три сотни очков для пользовательских историй, которые нужно поставить в течение трех итераций, а также один релиз в среду эксплуатации: итоговая стоимость – \$1000.
- График выплат – 10/40/30/20 % (первая выплата – на старте проекта, вторая – по завершении итераций работы над историями, третья – по выпуске их в среду эксплуатации, последняя выплата – после некоторого периода гарантийного обслуживания).
- Подписание контракта: 10 % = \$100.
- Итерация 1 (50 очков завершено): $50/300 \times 0,4 \times 1000 = \66 .
- Итерация 2 (100 очков завершено): $100/300 \times 0,4 \times 1000 = \133 .
- Итерация 3 (150 очков завершено): $150/300 \times 0,4 \times 1000 = \201 .
- Отладка и выпуск в эксплуатацию: 30 % = \$300.
- Гарантийные обязательства: 20 % = \$200.

Пользуясь такой моделью для составления контракта, мы получим модель, которая сможет связать поставку объема работы и размер вознаграждения

поставщика. По моему опыту, эта модель выступает связующим звеном между обеспечением гибкости и оплатой лишь необходимого объема работы. Есть еще некоторый элемент, который вам бы захотелось включить в ваш контракт: опытного представителя, который способен принимать своевременные решения, определенные принципы управления и рабочую среду, которая сопутствует методам Agile-поставки (физическое рабочее пространство, ИТ, инфраструктура и т. д.). Зрелые организации упоминают затраты времени и материалов, поскольку используют свою надежную методологию для обслуживания качества и объема результатов. Менее же опытные организации прекрасно управляют с контрактами, составленными на основе фаз, упомянутых выше.

Еще одним аспектом составления контрактов выступает мотивация. Представим ситуацию: у вас налажены многолетние рабочие отношения с SI, но, все еще обслуживая устаревшие приложения, вы не подумывали о том, чтобы применять DevOps-практики. Теперь вы хотите исправить положение дел. Вы договариваетесь о схеме совместного инвестирования и вскоре соглашаетесь о единой схеме работы с вашими приложениями. Несколькими месяцами позднее вы видите первые положительные результаты на демонстрациях непрерывной интеграции и автоматизации тестирования. Ваш SI подходит к вам на одной из обычных встреч и предлагает обсудить с вами контракт по причине того, что изменилась средневзвешенная рабочая ставка у его команды. Что вы ожидаете увидеть в будущем? Не то ли, что средневзвешенная рабочая ставка будет уменьшаться в результате автоматизации? Я имею в виду, она станет менее оплачиваемой, не так ли?

Давайте присмотримся к этому вместе. Средневзвешенная ставка – это средняя ставка, рассчитываемая исходя из того, что менее квалифицированная работа стоит дешевле, а работа, подразумевающая наличие определенных навыков, более дорогая и оплачивается соответственно. Соотношение этих двух типов оплаты и определяет средневзвешенную ставку. Когда дело доходит до автоматизации, что мы автоматизируем в первую очередь? Конечно же, работу, которая требует меньше навыков! Автоматизация же сама по себе требует больших навыков. Это означает, что доля высококвалифицированной работы увеличивается, а вместе с ней и средневзвешенная ставка. Но позвольте... не означает ли это, что вся работа дорожает? Нет. Так как мы заменили некоторую работу автоматизированными задачами, то в перспективе все должно, наоборот, удешевиться. Если вы все еще оцениваете ваших SI по средней дневной ставке, то вам нужно переосмыслить свою оценку. То, что для нас важно, – это не средняя дневная ставка, а общая стоимость.

Диаграмма на рис. 4.1 может помочь вам визуализировать этот противоречивый вывод. В то время как средневзвешенная ставка за выполнение одного и того же объема работы увеличивается (относительная доля высококвалифицированной работы растет), общая стоимость уменьшается (так как в итоге получается, что работы, выполняемой вручную, меньше). Довольно много

организаций пользуются показателем средневзвешенной ставки для оценки своих партнеров и тем самым способствуют дальнейшему применению низкоквалифицированной ручной работы вместо автоматизации. Автоматизация – это действительно взаимовыгодный сценарий, так как системный интегратор получает возможность сократить риски, связанные с задачами, выполняемыми вручную, но в то же время увеличивается уровень средневзвешенной ставки. В итоге клиент тоже извлекает выгоду из того, что сокращаются риски и общий показатель стоимости.



Рис. 4.1. Общая стоимость и средневзвешенная ставка: работа по автоматизации сокращает общую стоимость, но увеличивает средневзвешенную ставку

Партнерство со стороны SI

Также я хочу взглянуть на взаимоотношения поставщика сервиса и компании с позиции системного интегратора. Об этой стороне мало кто говорит, но учитывая то, что это обычно *моя* сторона, я бы хотел рассказать, что мы об этом думаем и какие препятствия видим.

Влияние культуры DevOps начало менять отношения в сторону более открытых. Даже в запросах на процессы поставок я наблюдаю все большую открытость к обсуждению объема работ и подхода к поставке. Я работал с клиентами из правительства и прямо во время процесса имел возможность помочь им сменить запрос на нечто, более соответствующее тому, чего они добивались, когда переняли составление Agile-контрактов, наподобие тех, что я упоминал ранее. Изначально они хотели осуществлять оплату по завершении каждой из поставок, что не очень соответствует принципам Agile-поставки. Вместе мы обычно приходили к некоему решению, которое работало для обеих сторон и позволяло убедиться в том, что все получают запланированный результат.

Часто считают, что именно системные интеграторы обязаны вести переговоры с отделами по снабжению, которые имеют мало общего с поставкой современных технологий. Контракты составляются с такой эффективностью, что не остается места для экспериментов, а там, где эксперименты возможны, единственным приемлемым результатом будет положительный. Анализируя взаимоотношения с вашими SI, подумайте о способах повысить доверие, стать более открытыми и более эффективно преследовать свои цели. В конце этой главы я привожу небольшой тест для определения того, насколько тесно смыкаются ваши культуры.

Оценка партнера

В завершение хотелось бы поговорить об оценке партнера. Понятно, что вас никак не устроит партнер, который за немалую плату предоставит организации неудовлетворительную услугу. Так как же обеспечить достойные взаимоотношения, при этом стремясь к открытой культуре? И к тому же сохранить некоторые механизмы влияния на ситуацию, если производительность начнет падать?

Возьмем для примера проект, которым занимается некоторый SI. Можно использовать оценочные таблички, которые учитывают несколько аспектов.

Один из них – поставка; в этой области вам важны качество и предсказуемость. Как много дефектов ускользает в эксплуатацию, насколько точны предположения о поставке и как отслеживаются финансы? Вам, возможно, также захочется использовать оценку заинтересованными сторонами качества предоставления ИТ-услуг в виде потенциального внутреннего показателя лояльности клиентов (NPS, который отображает долю людей, рекомендующих ваш сервис) от заинтересованных сторон из бизнеса. Время продолжительности цикла и объем работ – вот два показателя, которые вам стоит использовать для того, чтобы улучшить рабочие процессы в целом.

Второй аспект – это техническое мастерство. В первую очередь вам необходимо добиваться соответствия вашим методам проектирования (модульное тестирование, автоматизация тестирования, непрерывная интеграция, непрерывная поставка...). Если ваш партнер по поставке использует легкие пути, то тем самым он будет накапливать технический долг, и в какой-то момент вам придется за это расплачиваться. По моим наблюдениям, клиенты хорошо справляются с проверкой качества конечного продукта, но часто не уделяют время тому, чтобы научиться следовать практикам проектирования, которые предотвращают нарастание технического долга. Обеспечение четкого и понятного ряда ожиданий от методов проектирования и регулярная их проверка (например, при демонстрации автоматизации развертывания, статической проверке кода и т. п.) сокращают шансы на дальнейшее увеличение технического долга. Я проводил развернутые дискуссии с клиентами о стратегиях проектирования, когда представлялся случай для таких демонстраций.

Третий аспект – пропускная способность. Вы можете рассматривать этот аспект с учетом очков пользовательской истории или даже с учетом количества историй, выпускаемых за один релиз. Я полагаю тем не менее, что ваши релизы начнут отличаться по структуре, по мере того как ваши профессиональные возможности будут расти. Интересный момент, касающийся продолжительности цикла: если вы оптимизируете его скорость, вы зачастую будете добиваться качества и меньшей стоимости, не прикладывая больших усилий, как говорилось выше.

Также вам стоит оставлять некоторое количество оценочных таблиц для улучшений. Какими узкими местами вы занимаетесь в данный момент и как составляете планы, учитывающие ваши предположения? Здесь вы можете использовать стоимость предоставления одной услуги (например, стоимость развертывания или стоимость выпуска в среду эксплуатации), чтобы видеть специфичные улучшения ключевых сервисов своей организации.

И последнее, но не менее важное: учитывайте интересы вашего партнера. Продвижение в карьере, предсказуемость и две другие области интересов, которые вам наверняка захочется обсудить, – доход и рентабельность; является ли ваше партнерство взаимовыгодным? Я рекомендую учитывать этот аспект в оценочных табличках, в которых вы отслеживаете две или три задачи, являющиеся приоритетными для вашего заказчика, и регулярно оценивать все показатели вместе.

Первые шаги вашей организации

Каждому свое – поиски подходящих партнеров

Вся эта глава была посвящена поискам правильного партнера, который будет соответствовать вашим запросам и культуре. Но, вероятнее всего, для поддержки различных элементов вашего портфолио понадобятся различные партнеры. Если вы не проигнорировали задание по составлению портфолио из главы 2, то это упражнение будет легче выполнить. Нам пригодятся три типа приложений:

- ключевые приложения. Эти приложения развиваются невероятно быстро и обычно непосредственно доступны клиентам, а также являются фактором, определяющим восприятие вашей компании на рынке;
- «рабочие лошадки». На этих приложениях держатся все основные процессы в вашей организации, например управление взаимоотношениями с клиентами, выставление счетов и процессы каналов поставок. На них часто ссылаются как на системы для корпорации или как на устаревшие системы. Они могут не быть непосредственно доступными клиенту, но компания получает значительную ценность от применения этих приложений и продолжает вносить в них изменения, чтобы поддерживать развивающиеся потребности бизнеса;

- истинно устаревшие приложения. Они довольно стабильны и не требуют внесения многих изменений. В общем и целом они используются для поддержки ваших основных стабильных процессов или побочных аспектов вашего бизнеса.

Основываясь на этих классификациях, пересмотрите свою стратегию работы с партнерами, чтобы понимать, нужно ли вам менять партнера или стоит развивать тесное сотрудничество с уже проверенным. Для обслуживания первых двух категорий приложений понадобится развивать сотрудничество со стратегическими партнерами. Для работы с устаревшими приложениями стоит искать партнера, который предложит выгодные условия по стоимости работы и которому вы будете платить за поддержание жизнеспособности системы. Продумайте особые методы мотивирования ваших стратегических партнеров. Ваших партнеров по «рабочим лошадкам» стоит оценивать по степени эффективности услуг, предоставляемых для обслуживания приложения. В случае же обслуживания ключевых приложений партнер должен уметь проявлять гибкость и быть готовым вносить нововведения вместе с вами.

*Проводите практикум со стратегическими партнерами
по вашим «рабочим лошадкам»*

Организации тратят львиную долю средств на своих «рабочих лошадок». И для этого есть весомые причины, так как эти приложения выступают фундаментом всего бизнеса. Для выполнения этого упражнения вам желательнее пригласить на практикум своих стратегических партнеров, которые поддерживают ваши приложения («рабочих лошадок», а также ключевые приложения). Вы можете делать это вместе со всеми партнерами, но это будет труднее осуществить, либо вы можете провести практикум с каждым из них в отдельности. Важно убедить их в том, что текущую структуру контракта можно уточнять и изменять, а на протяжении всего практикума стоит быть открытыми к обсуждению.

Ниже представлена структура самого практикума:

- Объясните вашему партнеру, что для вас важно с точки зрения приоритетов бизнеса и ИТ.
- Обсудите, как вы можете измерять успешность с учетом ваших приоритетов.
- Попросите партнера сформулировать, что важно для него во взаимоотношениях с вами и что ему требуется, чтобы эти взаимоотношения рассматривались как успешные.
- Вместе подумайте, как вы можете соблюсти ваши интересы.
- Активно поразмышляйте над тем, какие цели стоит преследовать, чтобы достичь взаимовыгодных договоренностей между вашими организациями.

Ключевым моментом в этом практикуме должны стать обоюдная открытость и стремление к взаимовыгодному сотрудничеству. Моя практика показывает, что для достижения такого результата может потребоваться несколько заходов – не расстраивайтесь, если все проблемы не решатся прямо во время практикума. Как и все, о чем мы говорим, – это тоже итеративный процесс, и, возможно, вы поймете, что еще не нашли подходящего партнера и нужно внести некоторые изменения в вашу экосистему.

*Проводите самостоятельную оценку
культуры партнерства*

Небольшой тест для оценки вашей DevOps-культуры взаимоотношений с системным интегратором:

- Используете ли вы средненебольшую ставку в качестве показателя для измерения продуктивности, соотношения ценности и стоимости и т. д.?
+1, если вы сказали «нет».
- Есть ли у вас разработанный механизм, который позволит вашему SI наряду с вами получить выгоду от того, что он улучшит свои техники и подходы при помощи автоматизации или других практик?
+1, если вы сказали «да». Не стоит ожидать, что SI будет вкладывать все силы в новые практики, если для него это не принесет выгоды. С чисто этической позиции он, конечно, не прав, но давайте будем честны. У всех нас есть экономические цели, и если не обсуждать их с вашим SI, то и заинтересованность в деле будет наблюдаться только с вашей стороны.
- Есть ли у вас и вашего SI возможность маневра, которая обеспечит поле для экспериментов, суть которых понятна вам обоим?
+1, если вы сказали «да». Вам необходимо знать, как много времени SI тратит на апробацию новых инструментов или практик. Если сейчас SI просто получает достаточно бюджета, который обеспечит выполнение задачи ровно таким образом, который ожидается, то начните просить о выделении бюджета на инновации и управляйтесь с ними вместе с SI.
- Готовы ли вы принять или хотя бы гипотетически допустить риск неудачи при проведении экспериментов?
+1, если вы сказали «да». Если вы выделяете бюджет на инновации, сможете ли вы остаться хладнокровным, когда ваш SI сообщит вам о том, что идея по совершенствованию не сработала? Или вы готовы принимать только успешные эксперименты? Думаю, для вас очевиден ответ, который соответствует культуре DevOps.
- Знаете ли вы о том, что ваш SI подразумевает под успехом?
+1, если вы сказали «да». Понимать цели вашего SI важно; это касается не только финансовой выгоды, но еще и сотрудников, которые работают

на SI. Мотивы карьерного роста и другие личные интересы должны приветствоваться, чтобы взаимоотношения были успешными.

- Договариваетесь ли вы с вашим SI без посредников?

+1, если вы сказали «да». Если в этом процессе участвует еще одна сторона, например ваша команда по снабжению или внешний поставщик, то весьма вероятно, что диалог будет вестись по схеме «испорченного телефона». И нет гарантии, что ваши команды имеют представления о наилучших практиках DevOps для работы с поставщиками. Обсуждаете ли вы потенциальное наличие помех для составления контракта с вашим SI?

0–2 балла: у вас весьма формальные взаимоотношения с вашим SI, и вам стоит подумать о том, чтобы познакомиться с ним получше и улучшить ваши взаимоотношения. *3–4 балла:* вы неплохо справляетесь, но у вас есть куда расти, поэтому вам стоило бы провести практикум со своим партнером и обратить внимание на новые стороны развития. *5–6 баллов:* у вас по-настоящему партнерские отношения, которые вас будут вдохновлять в течение всего процесса трансформации. Прекрасная работа!

Заключение части А

Итак, в части А мы поговорили о создании мотивирующей экосистемы для обеспечения хороших результатов ИТ-поставки. Материал этой части имеет стратегическую ценность: изменения в описанные области будут вноситься только с течением времени, и для этого потребуются усилия всей вашей организации. Не пытайтесь изменить все в одночасье – я бы предпочел, чтобы вы усвоили изложенные мною идеи, проделали некоторые упражнения, а затем составили план на следующий год, следующий квартал, следующий месяц. Начните с проработки терминов, которые для вас новы. Это тоже не дело одного дня – вникайте в терминологию постепенно. В следующей части речь пойдет о ваших сотрудниках. Собственно, работу делают люди, поэтому, чтобы достичь успеха, вам необходимо оказывать им поддержку.

ЧАСТЬ Б

Люди и организация процессов

Во второй части этой книги я хотел бы обратить внимание на центральную составляющую всего, что мы делаем: на людей. Без них не обходится ни одна организация. Главная проблема, связанная с человеческим фактором, – страсти людей к шаблонным способам действий. Если у вас есть старые приложения, одни люди будут на них жаловаться, а другие – говорить, что от добра добра не ищут. Так как же все-таки переменить отношение сотрудников к устоявшимся принципам работы? И как структурировать организацию, чтобы такой образ действий привел к созданию хороших продуктов? Во второй части книги мы рассмотрим различные аспекты устоявшегося мышления, которое вам необходимо улучшить или сменить.

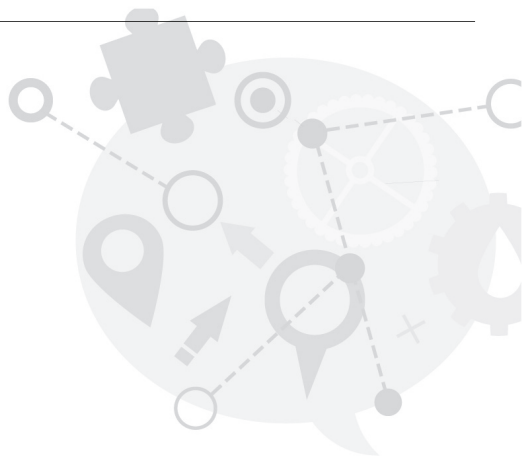
Берри Шварц на конференции TED talk в марте 2014 года высказал прекрасную мысль о том, что создаваемые нами системы сами по себе создадут работников, которые наилучшим образом будут с ними управляться [1]. Если мы создадим структуру, для которой требуется примитивная, постоянно повторяющаяся деятельность, то получим таких же примитивных сотрудников, которые только и могут совершать рутинные действия, как рабочие на сборочном конвейере. Я считаю, что нам нужно создать ИТ-организации, в которых реализуются процессы мышления, подобно тому как Дэн Пинк раскрывал в своем исследовании то, что мотивирует людей: автономия, совершенствование и цель [2]. Людям нужна автономия для того, чтобы делать собственный выбор, нужно совершенствование навыков, чтобы четко понимать, что они делают, и нужна цель, чтобы знать, зачем они это делают. Со временем все люди, работающие в организации, начнут делать все более значимую и стоящую работу, а при таком раскладе все будут в выигрыше. На протяжении второй части книги мы будем вновь и вновь возвращаться к этой идее.

Мы обсудим, как предоставить вашим сотрудникам правильное окружение для принятия решений, какая структура команды вам нужна, для того чтобы задействовать автономию и целеустремленность, как преодолеть инертное

мышление, которое загубило множество проектов по автоматизации, и как лучше управлять вашими людьми в постиндустриальном мире.

Кто-то однажды сказал мне, что жить было бы намного легче, если бы нам не приходилось иметь дело с другими людьми. Смеею предположить, что это не вариант, если, конечно, вы не можете приобрести во владение целый остров, поэтому давайте поразмыслим, как облегчить общение с сотрудниками, создавая для них адекватные условия работы.

ГЛАВА 5



Контекст во главе угла

Мудрость – это разум, который учитывает контекст.

Рахил Фарук

Одной из целей Lean-практик является избавление от балласта. Но, как мы уже обсуждали, компоненты и результаты традиционного производства более осязаемы, чем в ИТ, что означает, что на производстве выявить нечто лишнее получится легче, чем в мире ИТ. На производстве мы можем физически увидеть отходы, посмотреть на продукты производства, которые хранятся на складе, посчитать количество производящихся в данный момент экземпляров, а также легко заметим, где машина простаивает. В ИТ мы имеем дело с нематериальными результатами, что заметно осложняет наблюдение за процессом. И если сотрудник в ИТ не занят своей непосредственной работой, мы не всегда это заметим. Вспомним закон Паркинсона: «Работа занимает столько времени, сколько на нее отведено».

Наилучший способ вовлечения всех ИТ-работников в такую деятельность, которая исключает ненужные шаги или простои, – дать им понять контекст их работы. Это позволит им проявлять инициативу, вместо того чтобы уныло ожидать чьей-то отмашки. Это позволит им принимать правильные решения, а также избегать пустой траты сил. Все это очень хорошо соотносится с факторами мотивации Дэна Пинка: контекст позволит вашим сотрудникам действовать самостоятельно и понимать цель своей работы.

В нашей организации, придерживающейся устоявшихся принципов, мы верили в производственный подход к поставке, согласно которому передача продукта от машины к машине не будет препятствовать получению результатов в том случае, если они являются частью отлаженного процесса. Машинам или рабочим на сборочном конвейере не нужно знать, почему надо вкрутить винт

в металлическую плиту именно в этом месте. Здесь вообще нет альтернативных решений для размещения винта, поэтому контекст не так важен.

В ИТ среда имеет значение, так как успешно реализовать специфичную функциональность получится только в случае, если ты понимаешь контекст, в котором функция будет использоваться. Я сам был разработчиком и знаю: когда ты ограничен техническим проектом без описания среды, то не можешь полноценно решать возникающие проблемы. Но если ты понимаешь контекст, то для решения всех проблем придумаешь хоть что-то, пускай и не вполне идеальное.

Когда компании запускают проект, они тратят много времени на разработку идеи, выстраивание бизнес-целей и во многих случаях – на их доработку, перед тем как непосредственно начать работу по проекту. Уже создан большой объем контекста, но во многих организациях этот контекст передается проектной команде лишь в виде документации. Более того, проектная команда имеет свойство меняться, и когда на проект приходят новые тестировщики, они смогут изучить контекст только по устаревшей документации и по «испорченному телефону».

К тому же важно заметить, что вместе с передачей будет теряться часть контекста. К сожалению, никакое количество комментариев и документации не в состоянии описать весь контекст. Я испытал это на себе, еще будучи специалистом по функциональному тестированию, когда при заведении дефекта мне присылали код, неспособный решить проблему, с которой я столкнулся.

Но все же важно передавать контекст информации, даже если часть его будет потеряна в процессе. Люди принимают решения, основываясь на контексте и мотивации. Редко какой вовлеченный в проект сотрудник будет злонамеренно принимать неудачные решения. Обычно это происходит из-за того, что имеющийся контекст не был учтен. Так как же мы можем создать распределенный контекст, который поможет принимать правильные решения?

Опыт участия в успешных Agile-проектах/программах/инициативах подсказывает мне, что фаза исследования может решить эту проблему. Общее ознакомление с проектом, или функциональностью, или каким бы то ни было элементом со временем окупится. Я буду использовать пример ограниченного Agile-проекта, который работает на протяжении нескольких релизов, но вы можете адаптировать его под любой размер.

Практика ознакомления может занять от нескольких часов до множества недель, поэтому ее лучше разделить на несколько фаз:

- понимание бизнес-проблемы;
- нахождение жизнеспособного решения проблемы;
- планирование поставки и подготовка.

Понимание бизнес-проблемы

В первую очередь при ознакомлении с проектом нужно добиться того, чтобы команда и заинтересованные стороны говорили об одном и том же. Чтобы

этого достичь, вам нужно собрать вместе как можно больше людей, которые будут участвовать в создании продукта. Если команда поставки невелика, она должна присутствовать на обсуждении в полном составе. Я вел некоторые Agile-инициативы, для которых требовалось наличие нескольких десятков людей в команде поставки; в таких случаях я приглашаю представителей каждой команды и специализации (например, разработчиков, бизнес-аналитиков, тестировщиков, специалистов из команды обслуживания мейнфреймов, из Java-команды). Вы запросто можете начать сессию с тридцатью присутствующими в зале. (SAFe даже предлагает механизмы для приглашения большего количества людей при помощи церемонии планирования программного инкремента.) Цель начальной стадии ознакомления с проектом – понимание того, какое решение будет искать вся команда.

Учитывая, что почти всем инициативам в организации нужно иметь финансируемую бизнес-проблему, то с бизнес-проблемы неплохо бы и начать. Спонсор представляет проблему команде, так чтобы каждый знал, что ожидается и как будет измеряться успех. Так как каждое из открытий для команды связано со специфичным контекстом, я предлагаю вам некоторые общие практики, которые помогут определить этот контекст и получить целостное понимание бизнес-проблемы:

- текущий и ожидаемый опыт заказчика / заинтересованного лица. Это поможет объяснить, какое влияние инициатива будет оказывать на наиболее важных людей – ваших клиентов. Для этого могут использоваться проектирование процессов, схемы воздействия, пути клиента или составление цепочки ценностей (если вам незнакомы эти техники, обратитесь к Google, он много об этом знает);
- персонажи. Некоторые команды могут более живо представить себе клиента при помощи создания персонажей, которых можно использовать во всей фазе поставки для написания пользовательских историй. Иные из моих команд невероятно активно пользовались персонажами – вплоть до того, что представляли, будто персонаж является частью команды;
- краткая презентация. Вам нужно создать некоторую краткую презентацию или формулировку ценностей, которые позволят команде сосредоточиться на том, чего вы желаете достичь. Они могут изменяться со временем, но останутся точкой опоры, к которой вы постоянно будете возвращаться;
- списки элементов, которые будут или не будут включены в проект. Некоторые элементы важны в Agile, так как они присутствуют в традиционной поставке. Не забывайте четко определять, что должно входить в проект, а что (еще важнее!) не должно входить;
- риски и проблемы. Обговорите возможные риски, постарайтесь выявить и устранить проблемы;
- зависимости. Продумайте изначальные зависимости внутри вашей организации и вне ее;

- обхождение с заинтересованными сторонами. Заинтересованные стороны являются ключевыми составляющими любого проекта. Вы можете создать идеальное решение, но если заинтересованные стороны останутся недовольными, считайте, что это провал. В связи с этим я люблю устраивать тренинги по переговорам с заинтересованными сторонами. В ходе этих тренингов команда определяет, на кого из них повлияет проект и как нужно с ними общаться. В Agile существуют более действенные каналы взаимодействия, чем в традиционных проектах. Подобные тренинги позволяют наладить коммуникацию, ответив на ряд важных вопросов:

- Кто будет приглашен на презентации и совещания по планированию?

- Кто будет принимать участие в сессиях по доработке бэклога?

- Кому мы будем передавать записи демонстраций?

Делайте обдуманый выбор, так как собрания могут превратиться в бардак, если в них будет принимать участие слишком большое количество заинтересованных сторон. В частности, на презентации некоторые могут отвлекать всеобщее внимание на «хорошие идеи», которые расширяют элементы, включенные в проект, или изменяют их;

- приоритизация и критерии успеха. Больше всего мне нравится на встречах по ознакомлению с проектом вести обсуждение о приоритизации и критериях успеха. В Agile все элементы проекта приоритизируются. Это позволяет избежать проблемы, при которой 90 % элементов являются обязательными к исполнению. Обсуждение четких критериев, по которым будут расставляться приоритеты, с представителями бизнеса и заинтересованными сторонами может даваться не так легко. Но именно на них вы будете опираться во время поставки, для того чтобы люди могли говорить об одном и том же и принимали более объективные решения. Очень часто проекты заходят в тупик из-за неполноценных требований от ключевых заинтересованных сторон, основанных на субъективных предпочтениях, а не на объективных результатах. Это же касается и критериев успеха: чем будет руководствоваться организация после выхода на рынок в оценке успешности проекта? Постарайтесь воздержаться от желания использовать подход «Узнаю, когда вижу»¹. Вам нужно найти хотя бы пару измеряемых признаков успеха, а само измерение и определение основных признаков должно стать частью проекта. К сожалению, сегодняшняя ИТ-реальность такова, что слишком малый ряд проектов проходит оценку успешности после выхода на рынок. Ситуация облегчается, если команды потом продолжают обслуживать проект – не просто существуют для выпуска проекта, а имеют долю собственности в продукте или сервисе.

¹ https://ru.wikipedia.org/wiki/%D0%A3%D0%B7%D0%BD%D0%B0%D1%8E_%D0%BA%D0%BE%D0%B3%D0%B4%D0%B0_%D0%B2%D0%B8%D0%B6%D1%83. – *Прим. перев.*

Поиски жизнеспособного решения проблемы

Теперь, когда команда понимает контекст проекта, мы можем погрузиться в поиски решения проблемы. К тому же вы выполнили часть этой задачи при создании бизнес-кейса (в конце концов, вам ведь нужно было определить тех, кто будет участвовать в ознакомительных сессиях). Скорее всего, у вас уже есть хорошее представление о том, какие приложения будут затронуты, и мысленно вы продумали высокоуровневое решение, на котором будет основываться бизнес-кейс.

Эта стадия ознакомления может быть немного хаотичной, так как в ней есть много места для исследований. Вам хочется, чтобы все принимали участие в поисках наиболее подходящего решения проблемы. Для этого вы захотите совершить некоторое предварительное проектирование и составить техническую архитектуру решения. При необходимости вы будете погружаться в составляющие некоторых процессов или в специфичные технологии. Это прекрасный способ определения рисков и подтверждения представлений о том, что технология способна предоставить вам. Там, где еще присутствуют остаточные проблемы, вы можете выявить возможности, которые в дальнейшем захотите использовать на стадии поставки.

Вам придется найти для своей организации правильное соотношение между подробным документированием и совершенным отсутствием документации. При этом надо учитывать, что слишком большой объем документации потребует слишком много усилий и времени, в то время как ее отсутствие повлечет появление трудностей при реализации выбранного решения. Я рекомендую для начала составлять диаграммы на досках, в презентациях PowerPoint или в Visio. Высокоуровневая архитектурная схема и ее описание легко умещаются на доске и в памяти людей.

Совещания по процессам проектирования и технической архитектуре будут итеративно совершенствоваться по мере того, как вы будете их пересматривать, потому как решение для проекта со временем тоже будет меняться. Вы создали насыщенный контекст в первой части стадии ознакомления. Старайтесь периодически к нему возвращаться, чтобы убедиться, что вы учитываете рамки проекта и все, что было определено ранее, а важные детали остаются в фокусе. В некоторых случаях вы захотите преобразовать выводы, составленные в первой части, – это нормально. Прюделав это несколько раз, вы сами удивитесь тому, как выводы первой части позволяют привести дискуссию к плодотворному результату. Небольшая подсказка: разместите выводы, сделанные на стадии ознакомления, на доске, чтобы их всегда было видно.

Вы также можете начать записывать планируемые функции решения, которые могут быть размещены в связанных эпиках (крупных кусках функционала). Этот список уже может быть исчерпывающим, или вы можете оставить себе возможность в дальнейшем определить дополнительные функции. Что вам нужно определить в любом случае, так это минимально жизнеспособный

продукт (англ. *minimum viable product*, сокр. MVP). Какой минимальный объем работ нужно покрыть, чтобы выйти на рынок? В дальнейшем это будет очень важно при планировании релиза. Но существует тенденция к раздуванию MVP, поэтому будьте избирательными при составлении объема работ, чтобы он действительно был минимальным. В случае крупных организаций со сложной архитектурой я придерживаюсь правила: MVP должен быть готов через три месяца. В вашем случае срок может отличаться.

Но подождите, разве вы не говорили, что Agile должен быть гибким? Почему мы определяем решение на стадии исследования, а не просто позволяем ему развиваться по мере итераций? По опыту работы в крупных организациях могу сказать, что вам пригодятся некоторые рамки. Я видел, как проекты затягивались на месяцы, когда после трех итераций заинтересованные стороны решали переместить функциональность из CRM-системы в ERP-систему. Структуру команды приходилось поменять, также это влияло на работу маркетинга, на стратегии тестирования и на многое другое. Универсальная идея гибкости – это не то, что способна реализовать инициатива. Думайте о стадии исследования как об эскизе к большой картине, который вы будете его дополнять деталями на этапе поставки. Ваша задача – не сформировать абстрактный образ, а нарисовать портрет прекрасной леди.



Рис. 5.1. Исследование и поставка.

Исследование – эскиз картины, поставка наполняет ее деталями

Планирование стадии поставки и подготовка к ней

После определения контекста и нахождения жизнеспособного решения завершающим этапом на стадии исследования будет подготовка к стадии поставки. Это очень важный этап, и он, скорее всего, займет некоторое время, так как подразумевает мобилизацию команд, настройку рабочего места, предварительную оценку работы и планирование графика релиза. В этот этап вовле-

чены не столько заинтересованные стороны из бизнес-сектора, сколько ИТ-команда поставки.

В зависимости от того, как ваша организация относится к Agile и DevOps, в первую очередь стоит выстроить привязку к терминологии, методологии и практикам, используемым в проекте. Лично я предпочитаю применять широко распространенные в индустрии фреймворки, такие как масштабируемый гибкий фреймворк (англ. *Scaled Agile Framework*, сокр. SAFe), поскольку он позволяет с самого начала пользоваться общепринятыми терминологией и практиками. И конечно же, вы можете применять свою собственную методологию или разработать новую. Небольшое предостережение: если вы решите заменить термин только потому, что вам не нравится, как он звучит (например, «скрам-мастер» на «координатор поставки», как я делал для клиента), то не сможете пользоваться поддержкой сообщества. В итоге вы не сможете найти такой термин в Google, и люди вне вашей компании не смогут понять, о чем речь. Еще один аспект, о котором стоит побеспокоиться, – общая структура иерархии работы. Я могу показать вам, что происходит, если у вас ее нет. Если вы используете:

- история > функциональность > задача;
- элемент бэклога (PBI) > задача > тема;
- история > тема > задача

в одной и той же организации, рано или поздно это приведет к недопониманию. Это уже будет гибкость ради гибкости, достигаемая ценой эффективности организации. В конечном счете начнется путаница в терминологии, поэтому просто выберите один набор терминов и придерживайтесь его. Не будьте пристрастны, это всего лишь слова; последовательность в работе намного важнее, чем личные предпочтения. Вы также можете проводить обучающие сессии для команды, владельца продукта и любых других ключевых ролей в период планирования этапа поставки.

Есть и другие важные вещи, на которые нужно обратить внимание перед началом работы, а именно:

- изначальная структура команды;
- технические практики (например, непрерывная интеграция или непрерывная поставка);
- идеальная структура релиза (ежемесячная, еженедельная, ежедневная...);
- как выглядит ваша техническая экосистема.

Техническая экосистема особенно важна в организации с большим количеством устаревших приложений.

Среды, как правило, ограничены, и вы должны координировать свои действия с другими подразделениями организации, поэтому понимание доступных ресурсов становится критически важным элементом успеха.

Также это подходящее время для того, чтобы провести начальную оценку объема работ по проекту. Для этого вы можете использовать покер планирования

или какую-либо другую Agile-практику для подготовки бэклога. Вам нужно будет стимулировать процесс, чтобы уже к началу первых итераций был определен объем работ, соответствующий представлениям команды о готовности: это поспособствует эффективности и успешности ее работы. В дальнейшем будет проводиться подготовка бэклога – исходя из моего опыта, потребуется время для того, чтобы скорость подготовки начала соответствовать скорости поставки. Я встречал много команд, у которых иссякал объем работ на стадии поставки, а затем команда становилась рыхлой и неэффективной. Это происходило потому, что члены команды начинали брать на себя неподготовленные задачи, искать задачи далее по бэклогу или еще хуже – топтаться на месте. Команде обычно достаточно двух-трех завершенных итераций, чтобы привести скорость подготовки бэклога в соответствие скорости поставки.

Стадия исследования завершается с выполнением двух больших задач, требующих подготовки, – *презентации результатов исследования* и планирования дальнейших действий (PI-планирование, если вы следуете SAFe). На презентации со всей организацией обсуждаются выводы стадии ознакомления. Она обычно представляет из себя одно- или двухчасовую сессию, на которой представляются результаты, полученные на стадии исследования. На планировании собираются команда, ответственная за поставку, и заинтересованные стороны для составления планов на несколько месяцев вперед. Акцент ставится на зависимостях между командами, установке базовых целей для каждой итерации, а также управлении релизами и совместными рисками (руководства по PI-планированию на сайте SAFe стоят вашего внимания). Вам нужно убедиться в том, что ваша организация готова и на уровне бизнеса, и на уровне ИТ. Вы хотите убедиться в том, что содержание для PI-планирования подготовлено и что у вас достаточно инструментов для проведения сессии планирования, особенно если требуется технология взаимодействия участников планирования, находящихся в различных местах [1]. Некоторым людям может быть знаком термин *big room planning* из практики бережливой разработки: он предполагает то же самое, только когда команды ведут планирование все вместе в большой комнате, что способствует сотрудничеству в рамках организации [2].

Когда вы завершите стадию исследования, команда, отвечающая за поставку решения, будет обладать насыщенным контекстом для работы. Это позволит команде и каждому ее члену в отдельности принимать решения, которые с высокой долей вероятности окажутся правильными. Возвращаясь к мотивирующим принципам Дэна Пинка, можно сказать, что мы предоставили командам автономию, включив их в процесс принятия решений на стадии исследования (особенно во время планирования и оценки, от которых они чаще отстранены при традиционных подходах), мы наделили их целью, когда наладили взаимодействие с бизнесом и заинтересованными сторонами и выделили время на понимание бизнес-проблемы и воздействия на клиентов. Контекст также важен для последнего аспекта: самосовершенствования.

Для самосовершенствования необходимы контекст и понимание области, в которой следует улучшать навыки. Одним из препятствий может стать так

называемый эффект Даннинга–Крюгера, который иногда называют эффектом ложного превосходства [3]. Эффект Даннинга–Крюгера возникает, когда вам неизвестно, как выглядит хороший результат (например, у вас нет правильного контекста для задания), но вы думаете, что довольно хорошо справляетесь. Этот эффект объясняет, почему мы порой слишком рано празднуем победу. Взгляните на организации, которые, как им кажется, стремительно развивают свою гибкость, но сколько стикеров с заметками висит в их офисах! При оценке зрелости я часто сталкиваюсь с тем, как команды с наименьшими показателями зрелости с воодушевлением рассказывают о выполнении задач, которых они в полной мере не понимают. При этом команды с наивысшими показателями зрелости видят множество возможных улучшений и оценивают себя как незрелые.

Я узнал об эффекте Даннинга–Крюгера методом проб и ошибок. Будучи консультантом, я часто просил провести оценку зрелости. При этом обычно полагаешься на результаты опросов, и при такой оценке можно проследить эффект Даннинга–Крюгера. Вот как это обычно происходит:

Я: Вы используете непрерывную интеграцию?

Разработчик: Да, используем.

Я [про себя: ладно, могу поставить тут галочку, но сначала проверю]: Как именно вы используете непрерывную интеграцию?

Разработчик: У нас есть Jenkins-сервер.

Я: И что вы делаете при помощи Jenkins?

Разработчик: Мы собираем наши приложения.

Я: Как часто Jenkins-сервер собирает ваши приложения?

Разработчик: Ну... он запускается раз в неделю, на выходных.

Я [ох!]: Ладно, здесь нужно еще немного разузнать до того, как будет возможна какая-то оценка.

Вместе с одним из моих клиентов мы поняли, что самостоятельное оценивание не предоставит нам нужных результатов из-за эффекта Даннинга–Крюгера, и разработали другой подход. Студентом я часами просиживал за игрой под названием *Civilisation*, и отсюда мы взяли идею и дерево технологий. Это дерево описывает различные технологии и последовательность, в которой они могут быть изучены (например, вам нужно изучить астрономию, прежде чем вам можно будет доверять ориентировку по звездам) [4].

В нашем дереве технологий непрерывной поставки мы предоставили контекст для команд, который описывает зависимости между практиками (например, непрерывная интеграция нуждается в автоматической сборке, а сборки запускаются после проверки и автоматизированного модульного тестирования). Это, в свою очередь, позволило командам охватывать взглядом все дерево технологий; следуя дереву, становилось намного легче совершенствоваться.

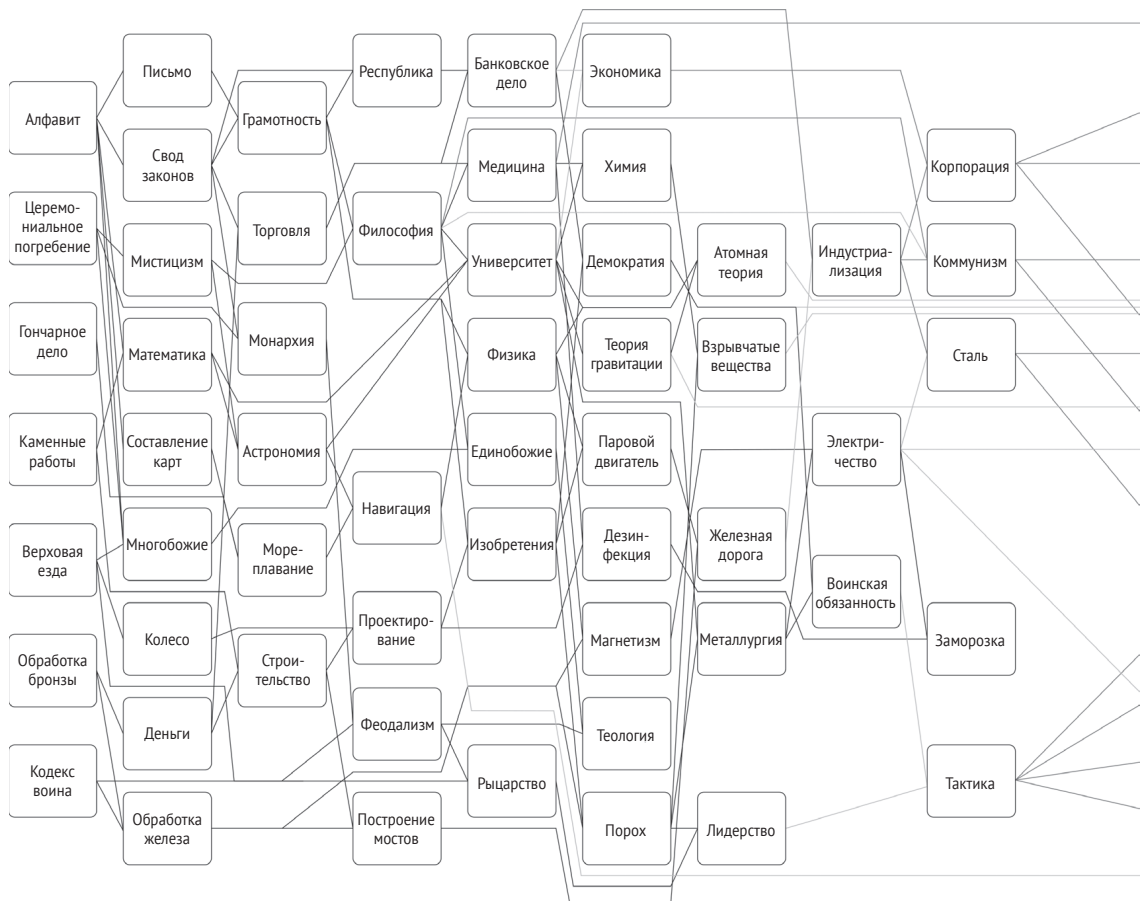


Рис. 5.2а. Дерево технологий: пример, демонстрирующий зависимости между технологиями

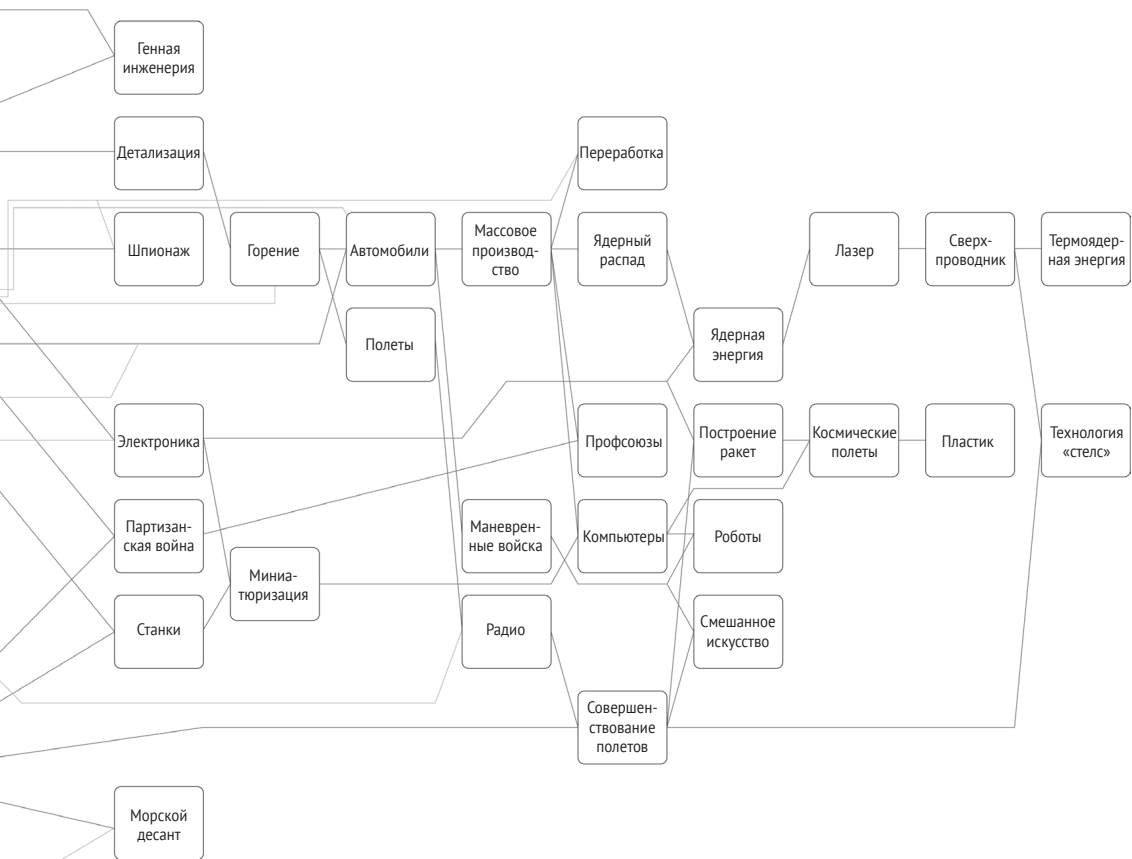
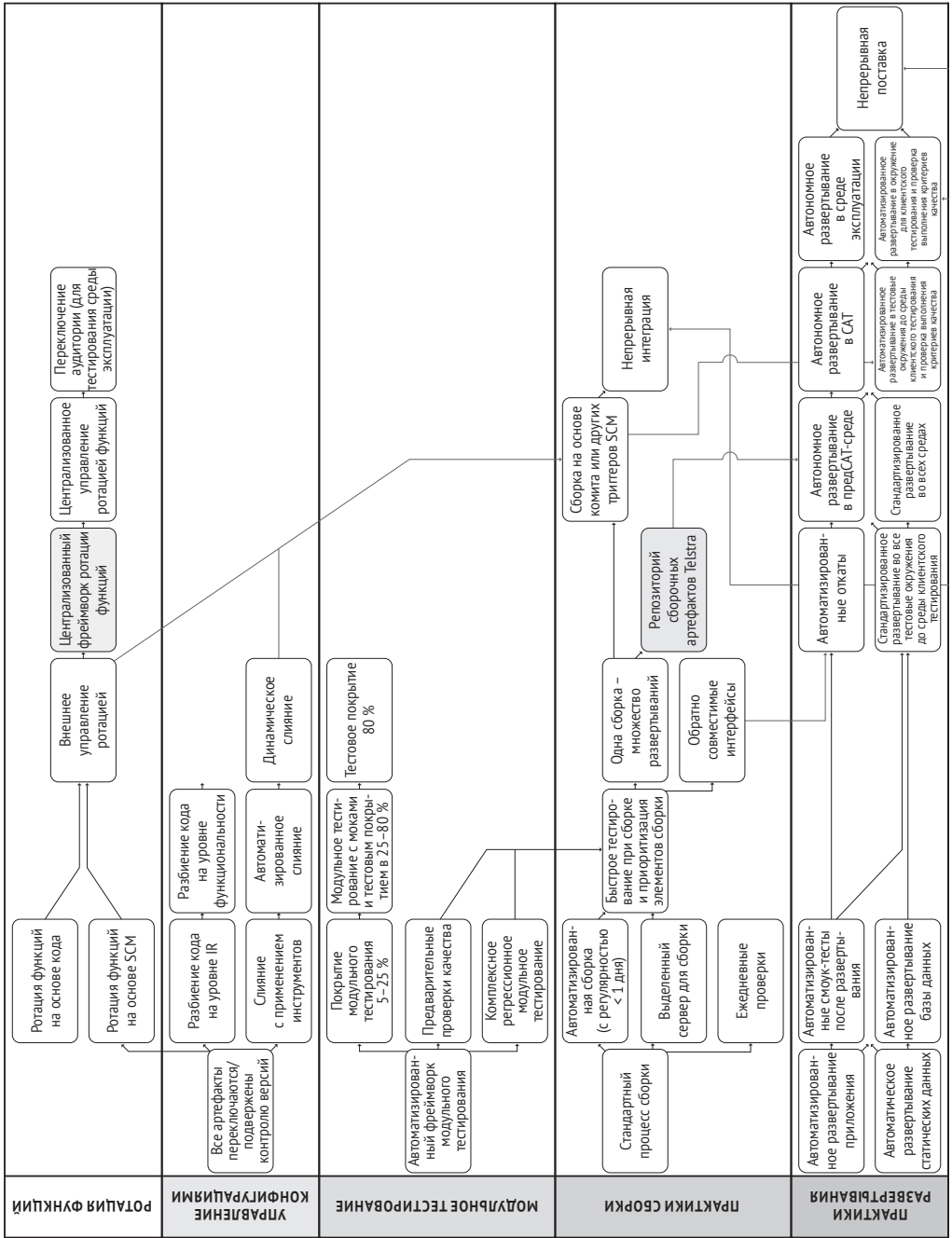


Рис. 5.2а (продолжение)



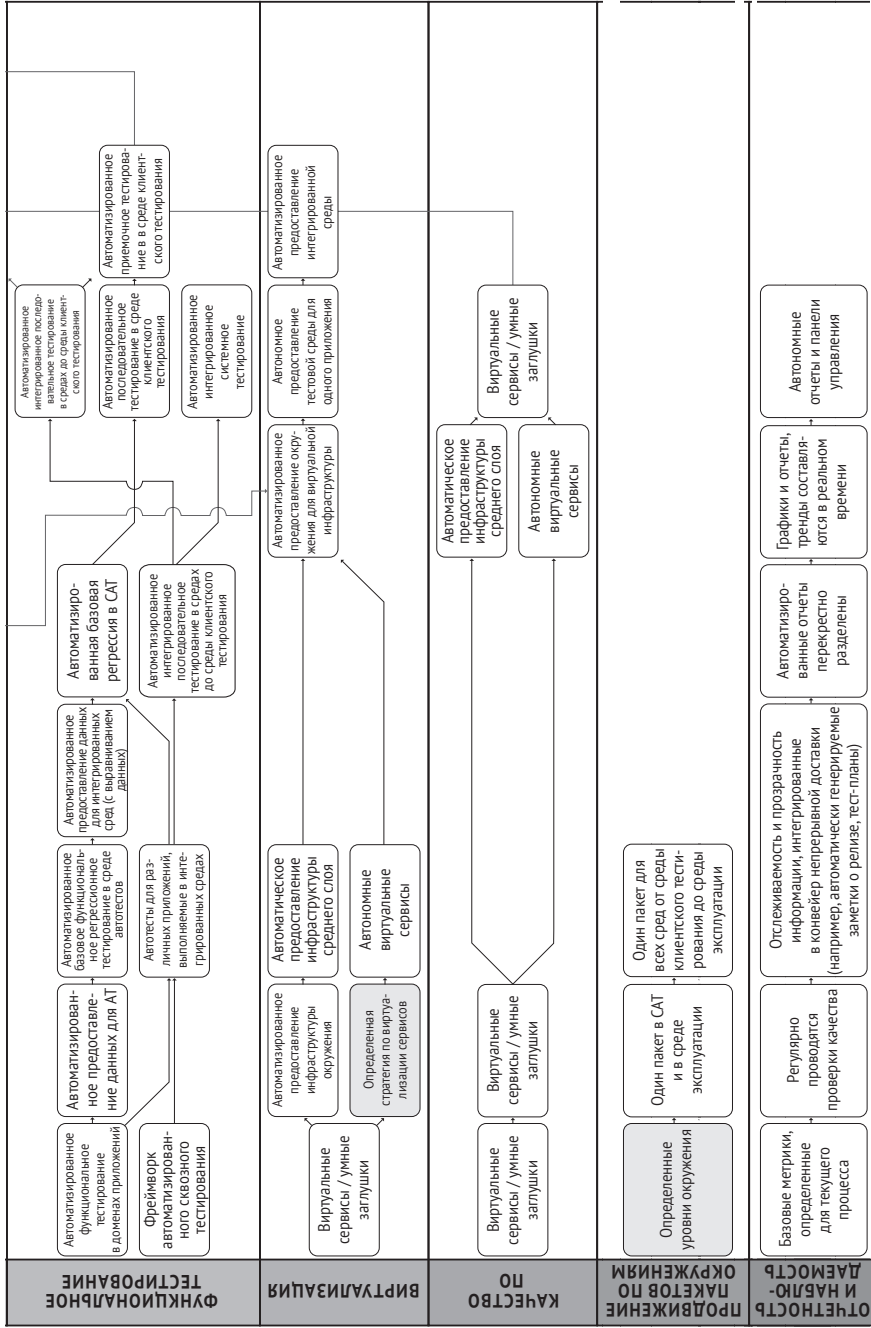


Рис. 5.26. Дерево зависимостей DevOps-технологий

Первые шаги вашей организации

Осуществляйте стадию исследования в рамках вашей инициативы

Я подробно описал стадию исследования в этой главе и рекомендую вам проводить такие сессии в вашей организации. Вот некоторая программа для двухнедельной стадии исследования, которую вы можете адаптировать для работы с крупными или малыми инициативами. Эти виды деятельности указаны для примера; существует множество других занятий, которые вы можете использовать в ваших сессиях исследования, чтобы усилить восприятие.

Часть I: изучение бизнес-проблемы (два дня)

- Брифинг от спонсора инициативы (с максимальным вовлечением в бизнес-проблему)
- Текущий опыт заказчика / заинтересованной стороны
- Представление проблемы глазами заказчика
- Формулировка миссии
- Определение критерия успеха
- Определение элементов, включенных и не включенных в проект
- Ознакомление с работой с заинтересованными сторонами
- Обсуждение схемы приоритизации
- Определение и смягчение рисков, проблем и зависимостей

Часть II: составление решений (три дня)

- Высокоуровневое предварительное проектирование
- Высокоуровневое составление технической архитектуры в поддержку предварительному проектированию
- Разделение объема работ на отдельные функции
- Определение минимально жизнеспособного продукта (MVP)
- Избирательные погружения в технологии и процессы

Часть III: планирование стадии поставки (пять дней)

- Обучение Agile (при необходимости)
- Определение структуры команды
- Оценка объема работы
- Высокоуровневое планирование
- Техническая подготовка (стратегии управления окружением, качеством и конфигурацией)
- Настройка управления доставкой
- Общественный договор
- Предварительное составление бэклога
- Представление стадии исследования организации
- Совещания по планированию (PI-планирование при помощи SAFe)

ГЛАВА 6



Структура, приносящая успех

Никому еще не удавалось решить проблему с помощью реструктуризации.

Анонимный автор

Несмотря на то что я очень люблю высказывание, вынесенное в эпиграф (хотя так много организаций, кажется, игнорируют этот посыл!), я думаю, что плохая организационная структура может оказать значительное влияние на вашу эффективность в рамках организации.

В наших устаревших организациях большая часть команды структурировалась по принципу функционального разграничения: команда бизнес-анализа, офис управления проектами, центр тестирования, команда разработки и команда администраторов. В вашей организации, возможно, к этому добавляется что-то еще. Тем не менее такой подход не идеален – отчасти согласно закону Конвея, который говорит о том, что в архитектуре вашего приложения будет отражаться структура вашей организации, или, если коротко, «если у вас четыре группы работают над компилятором, то вы получите четырехпроходный компилятор» [1].

На заре Agile мы узнали о силе колокации и о том, как помочь кросс-функциональным командам работать быстрее и более гибко. Agile подразумевает, что в идеальной команде есть все работники, чей вклад необходим для общего успеха, начиная со стадии бизнес-анализа до релиза в среду эксплуатации и последующей поддержки. Звучит, конечно, здорово, но, честно говоря, я никогда такого не видел на практике. Я работаю в крупных организациях, где это маловероятно – вам придется арендовать целый выставочный зал, чтобы уместить в одном помещении всех необходимых участников! Тем не менее существуют некоторые способы определить структуру организации, которая будет стремиться к идеальной кросс-функциональной команде, и ее может добиться любая организация независимо от масштаба.

Бережливое и Agile-мышление также показали нам ценность постоянных команд. В мире, управляемом проектами, мы запускаем проекты, которые являются конечными по определению и имеют конкретную цель. Как правило, в устаревших организациях по завершении проекта команда распускается, а ее участники переходят в другие проекты. В этих новых проектах новые участники команд изучают новый проект и предварительно готовятся, прежде чем смогут приносить пользу на новом фронте работ. Мы можем избежать задержек, задействуя постоянные команды, поддерживающие продукт или сервис. С помощью такого изменения можно сократить «выстраивание команд вокруг работы» до «передачи работы в руки существующих команд».

Такая перемена в подходе потребует внесения некоторых организационных изменений, самое тяжелое из которых связано с тем, что финансирование зачастую привязано не к командам, а к проектам. Так как же нам перейти от финансирования проектов к финансированию команд? Простого ответа здесь, к сожалению, найти не получится, решение будет даваться тяжело, и контекст специфический. Вот несколько напутствий, которые помогут вам на этом пути:

- финансируйте команды, основываясь на их потоке создания ценности. SAFe может предоставить структуру, в которой команды будут финансироваться исходя из их потока создания ценности;
- договоритесь с бизнесом о финансировании команды согласно циклу бюджета. Я работал с лидерами, которые вели с заинтересованными сторонами разговор в защиту долгосрочного финансирования команды;
- придержите некоторую долю средств для покрытия пробелов финансирования. Некоторые ИТ-лидеры, с которыми я работал, просили несколько завышенную оплату, чтобы подстраховаться на те времена, когда команда не будет полностью финансироваться проектами;
- применяйте творческий подход к наращиванию финансирования, исходя из работы, совершаемой командой. Самые вовлеченные владельцы продукта в итоге начинают ловко находить дополнительные источники финансирования в организации, выполняя работу для нескольких заинтересованных сторон и, следовательно, получая доступ к этим средствам.

Не думаю, что вы сможете быстро решить эту проблему, зато вы найдете начальные пути решения, которые помогут двигаться в этом направлении и займут место в вашем списке дел. Внесите показатель продолжительности совместной работы команд (или продолжительности жизни команд) в список изменений. Облегчите возможность командам оставаться вместе и быть продуктивными.

На рис. 6.1 показана организационная структура, которую я рекомендую клиентам для применения в качестве начала для структурирования своих команд. Я называю это «бургерной схемой организации», поскольку визуально она напоминает бургер. В дальнейшем я пройду с низу вверх по этим слоям «бургера» и объясню, как все они могут успешно работать вместе.

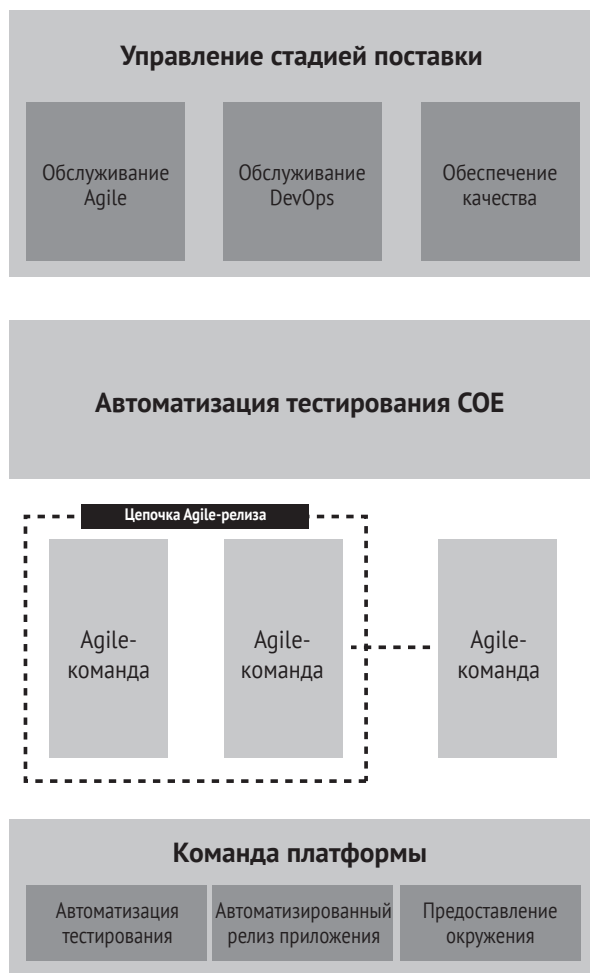


Рис. 6.1. Организационная структура начальной точки: эта многоуровневая структура прекрасно работает в крупных организациях

Команда платформы

Ведутся многочисленные споры о том, стоит ли иметь DevOps-команду. Некоторые дискуссии перерастают в холивары, поэтому я предпочитаю смотреть на результаты, прежде чем принимать решения, а не идеализировать взгляды на мир. Если вы посещаете саммит DevOps-корпораций либо другие Agile- или DevOps-конференции, то заметите, что организации, которые продвигаются в преобразовании своих усилий, чаще пользуются сервисом, выстроенным при помощи практик DevOps, или услугами DevOps-команд, или еще чем-либо подобным. В отчете о состоянии DevOps от 2016 года вы также можете отследить

множество людей, которые называют себя участниками DevOps-команд; соотношение менялось в течение 2015 и 2016 годов [2]. Руан Вильсенах называет создание DevOps-команд антипаттерном [3], поэтому пусть термин «DevOps-команда» вас не смущает, я просто называю это командой для платформы (можете использовать это название в вашей организации – я не обижусь). Команда для платформы ведет вашу разработку и поддерживает платформу для ваших приложений. В реальном мире эта платформа для разработки и запуска будет выступать в роли поставщика услуг, предоставляющего всем вашим командам возможности поддержки для поставки их решений¹.

В рамках команды для платформы вам нужно собрать людей, которые могут предложить весь ряд навыков, необходимых для DevOps. Это означает, что команда должна управлять инфраструктурой, конфигурациями, контролем качества, развертыванием приложения, мониторингом и, кроме того, релиз-менеджментом. Как вы видите, это кросс-функциональная команда экспертов, и мне кажется, что в нее войдут лучшие из ваших инженеров. Многие организации, которые работают с устаревшими системами, создавали структуры для обслуживания технологий (например, Windows-команда, UNIX-команда, Oracle-команда). Новой команде для платформы все же понадобятся навыки работы с этими технологиями, но внимание здесь больше будет уделяться навыкам автоматизации и способности переопределить процессы и архитектуры для текущих нужд. В итоге ваши команды для платформы не будут фокусироваться на какой-либо одной технологии.

Мы работали со страховой компанией, для которой смогли создать каталог услуг при помощи десятка стеков различных технологий (больше сорока услуг, в том числе развертывание и компиляция приложения). По каждой услуге мы позднее могли оценить прогресс, наблюдая за ее скоростью, надежностью и стоимостью. Это оказалось мощным инструментом для обсуждения некоторых технических улучшений с заинтересованными бизнес-сторонами.

Одна из проблем, с которыми я встретился в работе с командами для платформы, состоит в том, что они считают себя больше «стражами» DevOps, чем поставщиками услуг, что, в свою очередь, усложняет адаптацию команды к платформе. Зачастую масштаб перемен, которых требует менеджмент, недооценивается, что не способствует успешной адаптации. Когда платформа не способна предложить командам пути, которые позволят облегчить работу, команды начинают искать альтернативы этой платформе, создавая собственные решения. Сплоченность и гибкость в подходе нужны для того, чтобы команда для платформы могла работать с командами, которым она предоставляет услугу. Платформа должна правильные действия выполнять легче, чем неправильные. Также будет полезно подключить технических наставников

¹ Вы можете ознакомиться с обсуждением возможных организационных структур DevOps в статье блога Мэтью Скелтона «Какая структура команды поспособствует процветанию DevOps?». Структура, которую я здесь представил, подобна типу 4 – DevOps как модель обслуживания – в данном случае для внутренних команд [4].

к такой команде, чтобы они имели возможность работать с командами при возникновении проблем. Вы можете перемещать сотрудников в пределах команд разработки функциональности и команд для платформы или просто одолжить участников команды для платформы команде разработки функциональности: это поможет стирать культурные барьеры, которые в противном случае могут дать о себе знать.

Команда для платформы будет со временем развиваться. В исходном составе она, вероятнее всего, будет выполнять много задач, требующих ручного труда, а значит, это будет довольно большая группа, но она начнет уменьшаться по мере внедрения автоматизации. Чтобы иметь возможность внедрять автоматизацию все в больших масштабах, придется создать достаточный потенциал команды... Иначе будет как в анекдоте: «Мы слишком заняты для того, чтобы позволить себе совершенствоваться».

К обязанностям команды для платформы относятся следующие области в средах разработки, тестирования и эксплуатации:

- управление программными конфигурациями: все, что необходимо для обеспечения контроля версий приложения;
- процесс сборки приложения: скрипты сборки принадлежат команде приложения, но их выполнение и интеграция в цепочку автоматизированных инструментов входят в обязанности команды для платформы. Скрипты сборки часто создаются совместными усилиями, с тем чтобы они отражали требования обеих команд;
- интеграция с автоматизированным тестированием: подобным образом тестовые скрипты создаются командами приложения, но их выполнение запускается командой для платформы. Результаты представляет команда платформы во время запланированных запусков;
- предоставление окружения: команды вместе создают новые окружения и устанавливают необходимые программные пакеты;
- развертывание приложения: развертывание последней версии или пакета приложения тоже осуществляется совместными усилиями;
- мониторинг: текущий мониторинг инфраструктуры и приложений надлежит вести во всех средах;
- управление конфигурациями среды: требуется следить за тем, чтобы среды существовали в согласованной конфигурации, выявлять различия и вносить корректировки при необходимости;
- отчетность: включает в себя предоставление информации о состоянии платформы поставки и ее производительности.

Вы видите, что для того, чтобы полностью автоматизировать платформу поставки, нужно время, и управление текущим развитием команды платформы является ключевым аспектом вашего преобразования. Сомневаюсь, что проект получится осуществить очень быстро, так как еще не встречал никого, кто заранее знал все неизвестные факторы и точно оценивал изменения, связан-

ные с инструментами и технологиями. Структурированная карта и постоянное совершенствование помогут создать наилучшую платформу поставки для вашей организации.

Еще одна подсказка: команду для платформы необходимо обеспечивать возможностью управления изменениями. Технические специалисты склонны считать, что если однажды выбрать «правильные» инструменты, то все начнет следовать «правильному» процессу. Такой метод далеко не всегда работает. Вам нужен кто-то, кто будет способен создавать тренинги, вести обучение и общаться с пользователями платформы, чтобы получать «обратную связь» в ее отношении. У меня был один клиент, который после тренинга сказал, что ему больше не нужна помощь с DevOps-трансформацией, так как у них уже установлены все необходимые инструменты, и все, что нужно, – это чтобы сотрудники ими пользовались. Конечно же, этот клиент позвонил мне несколькими месяцами позднее, чтобы обсудить, почему трансформация застопорилась! Примите мой совет: наймите сотрудников для управления изменениями для команды для платформы. Инженерам это понравится, так как они смогут получить помощь и необходимую документацию, которой им так или иначе пришлось бы заниматься самим.

Agile-команды

Самое интересное – это Agile-команды, которые проделывают большую часть работы. Я опущу то соображение, что некоторые команды поставки будут приверженцами методологии водопада и продолжают работать традиционным способом (существует множество литературы о том, как поставлять при помощи традиционных команд). Вместо этого сосредоточу внимание на Agile-командах поставки: для такого пути DevOps-трансформации потребуются провести определенные изменения в вашей организации.

Давайте начнем с обсуждения состава этих команд. Мы уже много раз упоминали кросс-функциональные команды и отмечали, что специалисты по эксплуатации должны вовлекаться в команду, чтобы достичь DevOps, в результате чего все больше специалистов будет появляться в постоянно растущей команде. На мой взгляд, непрерывное расширение команды – слишком простой подход, так как его не получится масштабировать в сложной среде, в которой требуется множество различных навыков в пределах Dev и Ops, необходимых для достижения результата. Вместо того чтобы раздувать команду, нужно сосредоточиться на выстраивании продукта и, в рамках этого процесса, на использовании теми услугами других команд, которые являются неотъемлемой частью стадии поставки, такой как развертывание приложения. В Agile-командах должны присутствовать владелец продукта, бизнес-аналитик, скрам-мастер, разработчики, специалисты по качеству, тестировщики в соотношении, оптимальном для проектирования, сборки и тестирования системы. Со временем каждый участник команды должен будет нарастить навыки в различных направлени-

ях, чтобы выстроить T-образный профиль навыков¹. Мы доверим команде для платформы то, как приложение будет разворачиваться, и то, как должна выглядеть среда, чтобы приложение хорошо на ней работало. Agile-команды будут взаимодействовать с командой для платформы, но им не обязательно иметь в своем составе DevOps-инженера, когда понадобится большая поддержка; такого сотрудника можно позаимствовать из команды для платформы, на полную или частичную занятость.

Более того, в большинстве организаций в поддержке более поздних фаз тестирования будет участвовать внешняя команда по тестированию. Agile-команды должны будут привести систему к состоянию, наиболее близкому к релизу. Для того чтобы это происходило эффективно, Agile-команды будут пользоваться критериями готовности, чтобы определить, когда пользовательская история окажется готова к стадии поставки и будет достаточно детализирована, чтобы занести ее в бэклог спринта. Здесь используется критерий готовности (ready), позволяющий определить, когда можно завершить всю деятельность вместе с завершением спринта/итерации. Вот ряд типичных критериев готовности: история была измерена, рамки были обговорены, критерии приемки и тестовые случаи – определены. Критерии завершенности (done) включают как минимум следующее: код был разработан, функциональность задокументирована, история протестирована на модульном и системном уровнях, владелец продукта или представитель владельца просмотрели и приняли истории.

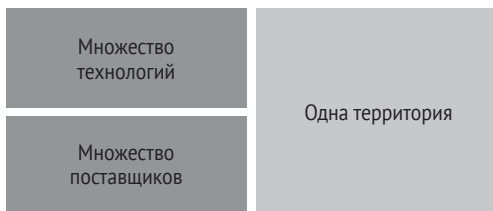
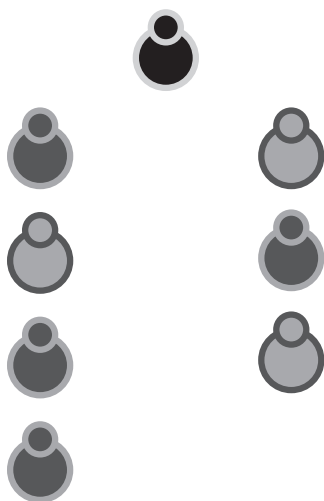
С позиции DevOps Agile-команды должны отвечать не только за поставку новой функциональности, но еще и за устранение любых дефектов в среде эксплуатации или за внесение мелких изменений в среду эксплуатации. Команды отвечают за приложение, которое они создают, а не просто передают его какой-то другой «команде по эксплуатации» или «команде по устранению проблем». Это мотивирует к созданию хорошего кода и значительно улучшает поддерживаемость приложения.

Данная перемена в пользу комплексных обязательств позволит Agile-командам более осмысленно подходить к бизнес-процессам. Лучше всего этого достигать за счет содержания Agile-команд, которые будут вести потоки ценности для бизнеса. Крупным организациям потребуется больше одной Agile-команды, и тут уже применяется концепция *цепочки релизов SAFe* для составления групп Agile-команд и управления ими с целью обслуживания потока ценностей². В рамках этой группы Agile-команд необходимо уделить внимание ее технической композиции.

¹ T-образные навыки предполагают знания и навыки во многих областях, притом что специалист более глубоко разбирается в одной из областей (в отличие от I-образных навыков, когда имеются знания лишь в одной из областей). Подробнее об этом говорится в приложении.

² Более подробная информация о цепочках релизов приводится на сайте [ScaledAgile-Framework.com](https://ScaledAgileFramework.com).

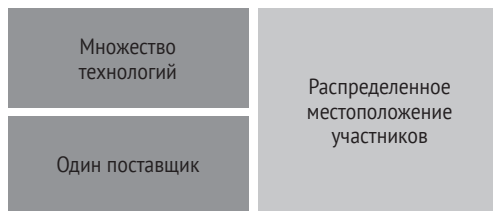
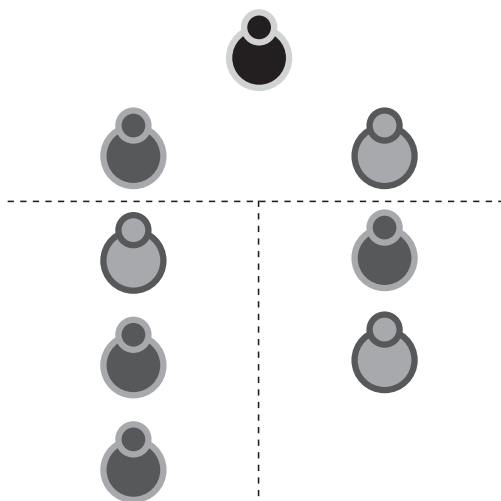
Сценарий 1
Команда на одной территории



Работайте локально с близкими или отдаленными поставщиками, когда множество поставщиков могут работать на одной территории

Рис. 6.2а. Сценарий 1 Agile-команды: Agile-команды по функциональности, находящиеся на одной территории, могут работать под началом различных поставщиков, а также со множеством технологий

Сценарий 1
Команда одной функции



Если приводить команду к работе с одной функцией и способствовать привлечению множества технологий, то вы сможете воспользоваться услугами одного поставщика, который будет отвечать за реализацию всех необходимых технологий

Рис. 6.2б. Сценарий 2 Agile-команды: распределенные Agile-команды по функциональности состоят только из участников одной организации-поставщика

Идеальным положением для вас будет то, что эти Agile-команды будут иметь возможность поставлять функциональность автономно. В Agile-командах по функциональности будут разработчики всех затронутых приложений, которые могут вести разработку, выходя за пределы одной системы. Данный принцип замечательно работает, когда разработчики работают в одной и той же организации, в одной и той же местности. Когда вы начнете проводить интеграцию из множества различных мест, я полагаю, что эта модель перестанет быть эффективной, так как для ее реализации потребуется усложнение организации

процессов, протекающих в пределах одной Agile-команды по функциональности, а распределенность команды усложнит создание культуры сотрудничества среди участников.

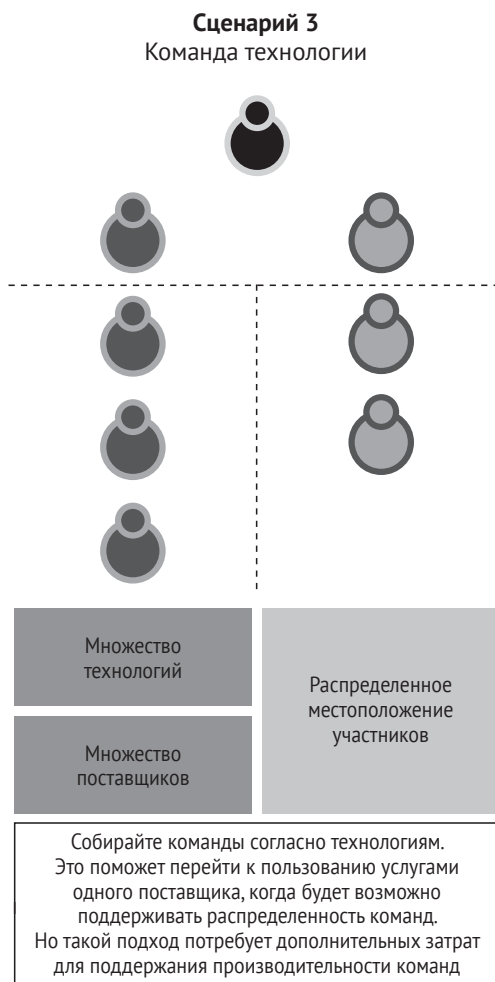


Рис. 6.2в. Сценарий 3 Agile-команды: Agile-команды по компонентам работают по сценарию наличия множества поставщиков и местоположений

При работе со множеством поставщиков вы вполне сможете воспользоваться подходом с Agile-командами по функциональности, если справитесь с тем, чтобы разместить всех участников команды в одном здании с поставщиками; близкое соседство (колокация) со временем сотрет культурные разногласия. Или можете попробовать обратную модель: просить ваших поставщиков ра-

ботать на вашей территории и под вашим руководством, что даст вам больше возможностей контролировать методы работы и культуру взаимодействия в среде команды продукта.

Если вы работаете только с одним поставщиком, который, в свою очередь, является вашим стратегическим партнером, то сможете с успехом создать распределенную многофункциональную Agile-команду, так как здесь будет присутствовать некоторая сплоченность благодаря организационным процессам, осуществляемым в пределах этих двух организаций. Вести работу со многими поставщиками, одновременно обслуживая множество технологий в распределенной Agile-команде по функциональности, кажется мне невероятно сложной задачей.

Альтернативной моделью выстраивания команд может послужить введение Agile-команд по работе с компонентами, которые будут осуществлять реализацию в пределах приложения или технологии. Для этого понадобится приложить больше усилий по управлению множеством команд, но этого можно достичь за счет общего планирования и синхронизации событий, например применяя PI-планирование, презентацию систем в SAFe. Это пока что не идеальная модель, исходя из моего опыта, но ею намного проще управлять в условиях работы со множеством поставщиков и из разных местоположений.

И последнее замечание насчет структуры команды, прежде чем мы перейдем к автоматизации тестирования. Рассматривать колокацию и распределенность, по моему мнению, необходимо с учетом того, чтобы найти оптимальный баланс между гибкостью/скоростью (в случае колокации команд) работы и ее стоимостью (в случае распределенных команд). Вам придется решать, что для вашей организации важнее. Обслуживание распределенных команд обойдется дороже, и поставка будет осуществляться медленнее, но существуют и высокопроизводительные распределенные команды, которые по обоим показателям объективно лучше, чем средняя команда, работающая в колокации. Здесь вам стоит руководствоваться имеющимся контекстом и вашими представлениями о командах.

Центр автоматизации тестирования

Автоматизация тестирования входит в состав жизненного цикла DevOps и, по моим наблюдениям, чаще других инициатив выдает неудовлетворительные результаты. Тем не менее автоматизированное тестирование выступает предпосылкой многих достижений, которые в перспективе сулят отменные результаты. В рамках высокоуровневой организационной структуры я представляю центр автоматизации тестирования в качестве переходной стадии. Думаю, большинству организаций потребуется такой центр, для того чтобы ряд специалистов сосредоточился на работе над автоматизацией тестирования и на создании цельного фреймворка автоматизации тестирования. Это входит в список обязанностей центра автоматизации тестирования.

ния, в котором работают тест-архитекторы и инженеры по автоматизации тестирования, ведущие разработку этого фреймворка автоматизации тестирования. Со временем данная обязанность и команда будут распределяться, и автоматизация тестирования станет поддерживаться тест-инженерами и архитекторами из команды самого приложения. Они будут поддерживаться живым практикующим сообществом, в котором фреймворк автоматизации тестирования обслуживается в стиле open-source. И конечно же, организация может решить, что эта команда должна присутствовать на постоянной основе. Учитывая, что такие команды зачастую намного меньше в сравнении с персоналом центра тестирования, их содержание может оказаться относительно недорогим.

Команды по обслуживанию и обучению

Я уже ранее говорил об определении процессов бережливого управления в организации, которые основываются на объективных показателях, а не на субъективных концепциях. И естественно, такое управление должно иметь свою «обитель», воплощенную в виде команд по управлению и обучению. В самом начале трансформации, когда изменения в вашей команде будут происходить довольно часто, такие команды будут большими: ведь в их составе будут ваши организационные тренеры, тренеры по Agile и те, кто обслуживает процессы трансформации. Количество этих сотрудников будет сокращаться, по мере того как уменьшается частота изменений. Давайте поговорим о различных аспектах управления, с которыми такая команда должна иметь дело.

Обслуживание архитектуры

Совершенно очевидно, что архитектура вашего приложения будет непосредственно влиять на то, насколько быстро ваша команда сможет осуществлять поставку. Поэтому в рамках обслуживания архитектуры мы будем преследовать три цели:

- 1) убедитесь, что каждая инициатива все больше изолирует элементы архитектуры приложения, отчего оно становится более гибким, когда создаются более гибкие интерфейсы между приложениями и когда разработка приложения следует модулярному принципу построения архитектуры;
- 2) убедитесь, что каждая новая инициатива устраняет все больше технических недоработок в системах;
- 3) наблюдайте за эволюцией архитектуры приложения, следите за тем, чтобы она развивалась в соответствии с видением компании, и за тем, чтобы приложение продолжало соответствовать потребностям бизнеса. (Мы вернемся к этому, когда будем обсуждать сценарии, по которым может развиваться архитектура.)

Важно заметить, что обслуживание архитектуры нужно осуществлять в тесном взаимодействии с командами приложения, чтобы избежать разработки подходов, которые затруднительно реализовать.

Обслуживание методов

Существует множество различных методов поставки, которыми сегодня могут пользоваться организации. Подходы к обслуживанию методов помогут убедиться в том, что для каждой инициативы используется оптимальный метод. Также это подразумевает, что команды должны учиться применять соответствующие методы и поддерживать актуальность методов внутри компании, чтобы этот фреймворк люди могли использовать массово. На личном опыте я понял, что разрастание терминологии и практик при отсутствии общего фреймворка приводит к появлению неровностей в работе, когда вы начинаете перенимать и разворачивать методы Agile.

Обслуживание качества поставки

Ускорение выхода на рынок – наша основная цель, но мы все так же должны преследовать ее, не подвергая рискам качество продукта. Обслуживание качества поставки ориентируется на показатели жизненного цикла разработки, чтобы выявить проблемы с качеством и улучшить общее качество продукта. При этом в длительной перспективе не должно оказываться воздействие на скорость или стоимость поставки.

Обслуживание непрерывного совершенствования

Как я упоминал ранее, эффективное управление непрерывным совершенствованием является ключевым элементом трансформации в целом. В отношении каждой из крупных инициатив это обеспечит необходимые критерии успеха, основания этих критериев и последующую оценку успеха. Владелец или менеджер, ответственный за финансирование непрерывного совершенствования, сможет поддерживать наиболее многообещающие инициативы, следуя подходу WSJF (Weighted Shortest Job First). Согласно WSJF-приоритизации, инициативы, схожие по уровню окупаемости, приоритизируются по их масштабности. Чем меньше инициативы, тем выше их приоритет, что ускоряет циклы обратной связи [5].

Но как же проектные менеджеры?

Вы могли бы спросить, почему в моей организационной структуре нет отдела проектного менеджмента и почему я не упоминаю проектных менеджеров, говоря о команде. Я не сторонник мнения о том, что проектный менеджмент – пережиток прошлого. Полагаю, что для присутствия менеджеров

на проекте имеется масса причин. Тем не менее для описываемой структуры постоянных команд проектные менеджеры не совсем подходят. По определению, проект существует ограниченный период времени, в течение которого он должен достичь определенной цели. Таким образом, проектные менеджеры будут отвечать за обслуживание поставки продуктов, пользуясь данной структурой команды. В конце концов проектов должно становиться меньше, так как работа в командах продвигается вместе с рабочими элементами Agile (эпиками, функциональностями или историями), а в таком случае будет меньше проектных менеджеров. Но для ведения больших и сложных проектов вам может понадобиться нанять проектных менеджеров, чтобы они обслуживали поставку в рамках всех команд и составляли отчетность по всей работе, связанной с проектом, – это то, что сложно было бы осуществить силами команд поставки, которые больше сосредоточены на работе с бэклогом. Соответственно, проектный менеджер будет активно вовлечен в процессы, выходящие за рамки проектного планирования и подразумевающие внесение вклада в Agile-планирование от лица заинтересованных лиц.

Первые шаги вашей организации

Определите один из потоков ценностей и команду, работа которой будет связана с ним

Мы уже говорили о создании схемы потока ценностей ранее (в главе 2). Здесь мы рассматриваем описание потока ценностей с точки зрения бизнеса. Как только вы опишете поток ценностей, следующим шагом будет определение систем, которые будут обслуживать поток ценностей.

Вглядываясь в свой бэклог работы или в портфолио инициатив, определите, насколько работа повлияет на системы, обслуживающие поток ценностей. Основываясь на этой информации, вы сможете создать структуру команды, которая сможет заниматься потоком ценностей. Она не будет идеальной, и со временем вы ее отладите, но это дает вам отправную точку. Согласно терминологии SAFe, на данный момент вы определили цепочку релиза Agile и теперь можете продолжить поставлять работу при помощи такой структуры команды, обслуживающей поток ценностей. Со временем вы смените модель финансирования, чтобы больше поддерживать команды, как было показано выше в этой главе.

Определите команды, которые будут затронуты при переходе к команде платформы

Команда платформы – это концепция, подразумевающая множество преобразований, и необходимые изменения зачастую недооценивают. Чтобы помочь вам ориентироваться в этих изменениях, предлагаю вам обозначить команды, выполняющие на данный момент функции, которые будут выполнять команды платформы или на которые повлияет работа команд

платформы (например, команды инфраструктуры, команды по тестированию, администраторы баз данных [DBA]). Пригласите этих сотрудников на общий тренинг, чтобы поговорить о том, как должна выглядеть платформа поставки в вашей организации с функциональной точки зрения. Когда у вас будет достигнута договоренность, обсудите, как должна обслуживаться платформа поставки. К счастью, команда платформы развивается по мере появления договоренностей внутри команды. После этого договоритесь о последующих шагах, чтобы еще больше приблизиться к конечному общему видению.



ГЛАВА 7

Из тестировщиков в инженеры по качеству

Хорошие тестировщики смотрят в обе стороны, перед тем как переходить дорогу с односторонним движением.

Из жизненного опыта тестировщиков

В предыдущей главе я говорил об организационной структуре вашей ИТ-трансформации, и в моей команде присутствовали аспекты тестирования. Почему я посвятил еще одну главу тестированию? По моему опыту, организационные перемены, связанные с тестированием, зачастую невероятно важны и одновременно трудоемки для организации. Изменения же для тестировщиков куда более масштабны – работа, которая была сосредоточена на выполнении тестовых скриптов, вылилась либо в очень технологичное проектирование, либо в оценку рисков и выстраивание стратегии проектирования, учитывающей эти риски. Каждый день я встречаюсь с клиентами, которые все еще предпочитают иметь отдельные отделы тестирования, сосредоточенные на традиционном тестировании вручную (которое выполняется в недостаточной мере и отвечает лишь требованиям по оптимизации стоимости, а не скорости работы или рисков), и мне бы хотелось, чтобы мы могли это исправить. Довольно часто я наблюдаю неудачные или непродуманные решения автоматизации тестирования у клиентов, которые являются приверженцами отделов тестирования и менеджеров тестирования. Переход от обычного тестирования к QE качественной инженерии потребует изменений в мышлении людей, занятых в тестировании. Не все смогут справиться с этим переходом. И хотя эта глава описывает организационные моменты, я раскрою и некоторые технические темы, важные в данном отношении.

Организация обеспечения качества

Качество – это важная область, которая находит отражение во всех частях организации. На рис. 6.1, на уровне обслуживания, определяются стандарты и принципы, которые служат обеспечению качества. Вы также будете ежедневно оценивать процессы обеспечения качества продукта, и наблюдение должно стать частью процесса управления. Это значит, что показатель качества и итоги ретроспективы и ревью нужно обсуждать для того, чтобы определить, как улучшить процессы обеспечения качества и где стоит отредактировать стандарты.

Изначально команды по автоматизации тестирования требовались для установки фреймворка автоматизированного тестирования; кроме того, они работали с командой платформы при выстраивании правильной интеграции, которая позволяла бы выполнять целенаправленное автоматизированное тестирование (например, тестирование только изменяемой функциональности). Главная задача команды состояла в том, чтобы, подключив всех инженеров по тестированию, успешно масштабировать фреймворк автоматизированного тестирования; следовательно, для ознакомления с фреймворком командам требовалось достаточно много времени уделять наставничеству и парному программированию. Команде также необходимо создать некоторый каркас, чтобы автоматизация тестирования со временем не пришла в упадок. Этот каркас поможет убедиться в том, что выполнение тестирования не будет занимать слишком много времени и не потребует слишком много ресурсов (яркий пример – усугубление обеих проблем при длительном ведении автоматизированного тестирования). Этим каркасом могут выступать стандарты написания кода, общие библиотеки, регулярное peer-review рецензирование или другая техническая документация либо процессы обслуживания. На ранней стадии все будет протекать довольно интенсивно, особенно по мере того, как фреймворк автоматизированного тестирования будет развивать поддержку всех потоков данных. Позднее команда сможет сократить размеры, когда инженеры по тестированию уже ознакомятся с фреймворком и им больше не понадобится серьезная поддержка. И хотя мои клиенты стараются оставить команды по автоматизированному тестированию в качестве постоянной составляющей, я вполне могу себе представить, что такая функция перестанет существовать в виде отдельной команды и будет переложена на ряд наиболее опытных инженеров по тестированию.

Выше мы уже говорили о командах платформы. Просто напоминаю, что эта команда будет интегрировать скрипты, чтобы весь конвейер обеспечивал адекватное поведение и выводил результаты. Команда платформы также работает с инженерами по тестированию для согласования стандартов, которые обеспечат должную работу скриптов в платформе (например, переменные окружения).

А затем, конечно же, инженеры по тестированию в командах поставки будут иметь скрипты автоматизированного тестирования и обеспечивать покрытие всех функциональных областей. Они работают со всеми остальными командами – так они всецело отвечают за качество сервиса.

Процесс обеспечения качества

Давайте обсудим распространенное ложное представление об автоматизации: мол, это просто автоматизация тестов, которые вы так или иначе выполняли бы вручную. Это не так! И возможно, не в последнюю очередь по этой причине инициативы по автоматизации оказываются неудачными: в них пытаются автоматизировать лишь ручные тесты. В редких случаях это может сработать, но в большинстве случаев такой подход заводит в тупик. Мне больше нравится термин QE («качественная инженерия»), чем «автоматизация тестирования», потому что в нем не упоминается слово «тест», которое может ассоциироваться с отчаянной попыткой найти все баги в конце жизненного цикла разработки. Проектирование качества связано с комплексным аспектом автоматизации, который обеспечивает качество конечного продукта. Это означает, что человек или команда, отвечающие за обеспечение качества, должны взглянуть на весь жизненный цикл, не только на фазу тестирования – а это довольно сложная задача. Автоматизация тестирования (например, автоматизированное выполнение тестовых скриптов) – деятельность, связанная с обеспечением качества.

Традиционный центр тестирования развивался как противоположность команде поставки; он контролировал качество продукта, прибегая к массовым проверкам. Это вызвало нарушение нормального функционирования, были упущены возможности для улучшения качества, и зачастую команды спорили о том, кто должен нести ответственность за упущенные проблемы качества (тестировщики, не обнаружившие проблем, или же создавшие их разработчики). Можно стать на сторону разработчика и сказать: «Ничего страшного, что здесь проблема: на то и есть тестировщики, чтобы ее решать, это их работа». С другой же стороны, тестировщик мог бы сказать: «Я не должен принимать это близко к сердцу, так как хороший разработчик не создает проблемы намеренно». Вам нужно изменить такое отношение и сделать качество общей целью. Деминг говорил, что «качество произрастает не из всеобъемлющих проверок, а из постоянного улучшения качества процесса производства» [1]. Это значит, что тестер, который небезразличен к проблемам, сможет вносить больший вклад в процесс поставки – не как соперник, а как член команды.

Также проблемы существуют и в измерении качества: многие организации пользуются дефектами или частотой возникновения дефектов как средством измерения качества¹. Нет оснований считать, что качество улучшилось, основны-

¹ Я довольно скептически отношусь к измерению качества продукта по количеству дефектов. Мне привелось общаться с представителями компании в США, которая проходила программу ИТ-совершенствования по причине того, что у них было много дефектов в цикле разработки. После того как они сообщили ИТ-отделу, что количество дефектов будет выступать показателем качества, оно вдруг резко сократилось. Когда дефектов стало совсем немного, организация посчитала, что наступило время для снижения темпов тестирования. Но еще до того, как это решение было принято, количество дефектов снова начало расти. Лид по процессу преобразования позвал команды поставки и тестирования к себе в кабинет, чтобы ему объяснили, что происходит. Ответ нашелся в ретроспективе: когда дефекты являлись основным крите-

ваясь только на количестве дефектов. Я надеюсь, вы согласитесь со мной в том, что нам нужны более подходящие способы улучшения качества, поэтому давайте обсудим, что можно осуществить и как мы можем это измерить.

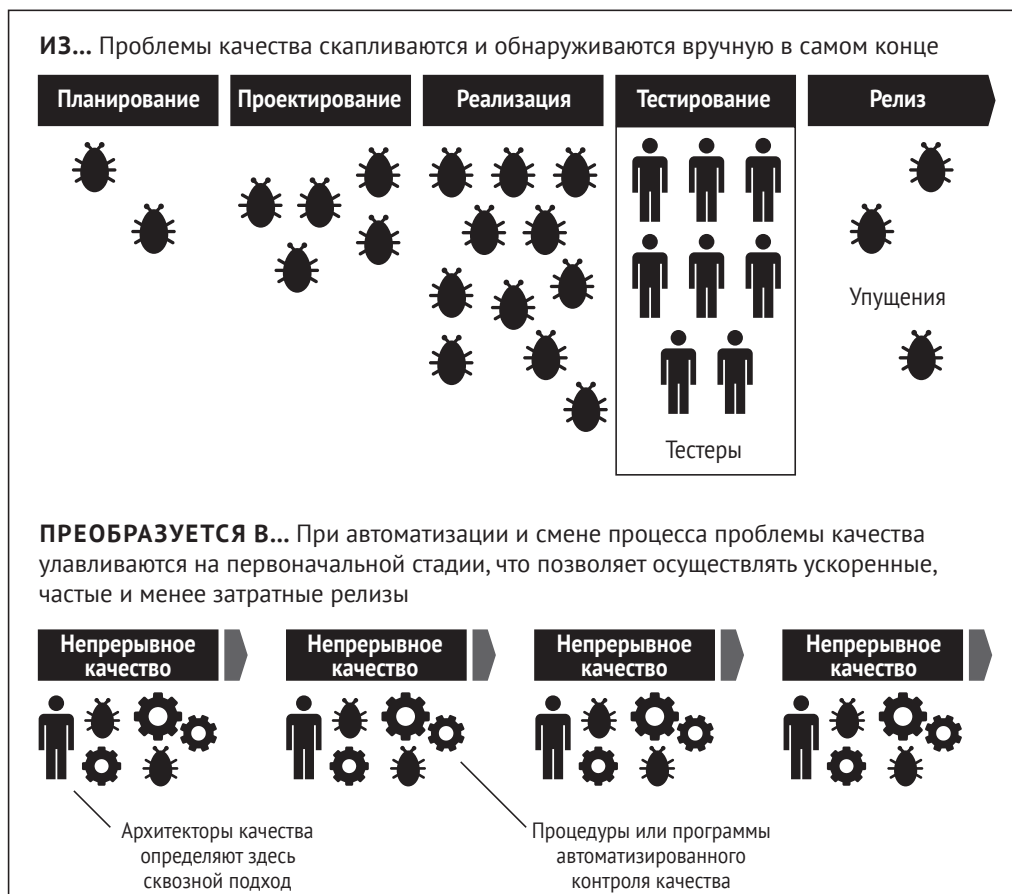


Рис. 7.1. Процесс обеспечения качества: при переходе от тестирования к обеспечению качества процесс сосредотачивается на всем жизненном цикле продукта

рием успехов в разработке, команда разработки тесно сотрудничала с командой по тестированию и вся функциональность проходила «предварительные тесты» перед формальным тестом, а любые проблемы быстро исправлялись. Даже был заведен новый тип тикета в трекинговой системе: «предварительный запрос о дефекте». Когда сотрудники отдела тестирования услышали о том, что их будут сокращать при понижении уровня качества, они начали отчитываться о большем количестве дефектов и меньше о «предварительных запросах». Лид ИТ-трансформации сказал мне, что на данный момент качество процесса поставки вовсе не поменялось в процессе прохождения, и все изменения касались лишь процесса поддержки.

За процессом обеспечения качества (QE) стоит идея о том, что вам нужно обеспечить качество во всем, что вы делаете, и искать способы проведения дополнительного тестирования, не подразумевающего дополнительных затрат (как средств, так и времени). Фреймворки наподобие SAFe и строгой Agile-поставки (англ. *disciplined Agile delivery*, сокр. DAD) переняли эти принципы. Но что это означает на практике? Давайте разделим процесс на пять фаз:

- 1) требования, проектирование и архитектура;
- 2) написание кода;
- 3) Agile-тестирование;
- 4) стабилизация;
- 5) выпуск в среду эксплуатации.

Требования, проектирование и архитектура

Качество начинается с истоков, поэтому нам нужно иметь подход к качеству уже на ранних фазах проектов (Agile в том числе), чтобы осуществлять последующую оценку масштаба работ. На данном этапе мы можем предпринять несколько действий. Многим проектам недостает качественно написанных требований / пользовательских историй, и это архитектура на ближайший период. Однако с этим можно справиться. Конечно, здесь можно обнаружить области, касающиеся бизнеса и требующие вовлечения в работу экспертов, но остальное можно охватить при наличии хороших инструментов.

В компании Accenture используется инструмент, который анализирует требования и пользовательские истории и выявляет неточности в формулировке. Неоднозначные предложения выделяются цветом, например: «Время отклика должно быть *коротким*», «Должна быть обеспечена *легкая* навигация по экрану» или «Необходима поддержка *нескольких* различных способов оплаты». Вы можете создать свой инструмент или поискать бесплатное решение и научить вашу платформу распознавать неоднозначную речь. С внедрением все больших объемов искусственного интеллекта в жизненный цикл ИТ вы все больше будете замечать продукты, способные не только распознавать ключевые слова.

С точки зрения архитектуры, здесь присутствует качественная сторона, которая при проектировании должна учитываться. Вы должны быть уверены в том, что каждая инициатива (изменение) делает вашу архитектуру лучше. *Разделение систем* и модулей должно быть одним из ключевых элементов, к которым стремятся эти изменения. Как обсуждалось ранее, не существует законченной архитектуры, которую архитекторы должны придумать и попытаться воплотить; сегодня их задача в том, чтобы архитектура была подвижной и гибкой, для того чтобы в будущем ее можно было бы постоянно развивать, прикладывая все меньше усилий.

При традиционных подходах накапливался технический долг в архитектуре, и вносить изменения становилось все тяжелее. Следовательно, производительность ваших архитекторов необходимо оценивать по тому, насколько

гибкой становится архитектура. Например, как архитекторы поймут, что ваша архитектура выдержит испытания будущего? Я приведу несколько показателей архитектуры, которые можно измерить, и настоятельно рекомендую это сделать, чтобы у вас была какая-то опора, которая поможет вам стремиться к правильным процессам. Например, стоит обратить внимание на количество запросов на доступ к базе данных, объем данных, передаваемых по интерфейсам, *вызовы без состояния* и *вызовы с сохранением состояния*, количество вызовов ко внешним системам, ответы и время центрального процессора. Как правило, с течением времени это начнет поставлять вам интересную и полезную информацию о степени зрелости вашей архитектуры.

Важной составляющей обслуживания архитектуры выступает наличие ряда четко определенных архитектурных принципов. Каждый в организации должен знать, какое значение архитектура имеет в вашем контексте. Вам не обязательно этим увлекаться, как в Amazon (где, как ходит анекдот, Джефф Безос обязал всех ориентироваться в работе на потребности сервиса под угрозой увольнения [2]), но все же наличие возможности выбора из нескольких вариантов при принятии решений поможет соединить все подвижные компоненты. Как вы видите, мы пытаемся создать культуру сотрудничества и отслеживаемую среду для всего жизненного цикла стадии поставки; мы проводим разделение функциональных частей, не перестраивая при этом меры контроля, а накладывая их друг на друга.

Написание кода

Качественные аспекты написания кода обычно недооценивают. Я разговаривал со многими организациями, и немногие из них знали или беспокоились о том, какие еще меры обеспечения качества можно применять к фазе написания кода, и полагались только на фазу тестирования. При работе с интеграцией систем часто возникают разногласия по поводу мер обеспечения качества при написании кода. Среди них есть те, которые обязательно должны присутствовать: статический анализ кода, автоматизированное модульное тестирование и проверка кода коллегами. У вас должен быть фреймворк автоматизированного модульного тестирования, который будет использоваться для тестирования модулей непосредственно разработчиком в автоматизированной манере. Такие фреймворки были разработаны для многих технологий, например JUnit для Java или NUnit для .NET, – и нет оправдания таким случаям, когда они не используются и разработчики не могут снизить некоторую нагрузку от ручного тестирования. В дополнение к этому статический анализ кода реализуется довольно просто, даже для технологий в роде COTS-пакетов. Ваши стандарты написания кода, по большому счету, можно систематизировать и распространять таким образом.

Ручной просмотр кода коллегой, применяемый во многих организациях (хотя зачастую невероятно неэффективно), должен осуществляться только после автоматизированного статического анализа кода и модульного тестирования. Не

нужно проводить ручные проверки, тем более что это дорого и долго, – делу поможет автоматизация. Проверки кода коллегами должны сосредоточиться на архитектуре и концепции кода, а также должно проверяться соответствие его назначению (например, решает ли этот фрагмент кода проблему?).

Я был в некоторых организациях, которые с течением времени добавляли в список проверок кода коллегами новые пункты при обнаружении каких-либо проблем. А это привело к тому, что в какой-то момент список проверок разросся до 150 пунктов. И знаете что? Никто в самом деле не следовал этому списку, потому как он был слишком длинным и с каждым днем в нем находилось слишком много несоответствий. Создайте простой и компактный список проверок, который будет выступать в качестве руководства, и объясните сотрудникам, что искать, разбивая их на пары с одним более опытным разработчиком на время проверки.

Также вы можете группировать разработчиков для осуществления дружеских проверок ряда изменений на постоянной основе, чтобы они могли учиться друг у друга и придерживаться стиля написания кода, принятого в команде. Постарайтесь не делать процесс проверки коллегой более утомительным, поручая коллеге найти изменения самостоятельно и предоставить отзыв в таблице Excel. Это никому не облегчит работу. Лучше попросите оставить отзыв непосредственно в контексте пользовательской истории в той же системе управления работой, которой пользуется вся команда.

Agile-тестирование

Независимо от того, используете вы формально метод Agile или нет, функциональное тестирование осуществляется наилучшим образом, когда тестировщики и разработчики сидят вместе. Проектировщики тестов должны писать код для автоматизации тестирования одновременно с написанием функционального кода разработчиками. Когда те и другие работают вместе, им намного легче писать тестируемый код, проверку которого можно автоматизировать. Это один из важнейших приемов, позволяющих сделать автоматизацию тестирования более успешной и доступной по стоимости.

Если у вас есть команда автоматизации, которая владеет фреймворком, то тестировщики выгодно им воспользуются во время разработки, предоставляя обратную связь команде фреймворка. К тому же тестировщики будут работать с командой платформы с целью интеграции нужных тестовых скриптов, чтобы во время автоматизированных процессов сборки и развертывания выполнялись только необходимые скрипты. Больше всего нам здесь нужна быстрая обратная связь, а не полное покрытие. Мы можем выполнять полный ход проверок в нерабочее время: на выходных или ночью.

Во время разработки надлежит, помимо прочего, проверять производительность и безопасность. И хотя они могут быть не такими же, как в среде эксплуатации или в предшествующих средах из-за ограничений, мы можем принимать быстроту реакции за показатель. На самом деле мы предпочитаем скорость, а не

точность. Если мы находим дефекты 70 % времени на ранних стадиях жизненного цикла и на более поздних стадиях 30 % времени потратим на оставшиеся дефекты, это нормально. Помните: мы автоматизируем все аспекты проверок качества, поэтому сможем выполнять их намного чаще. Что касается производительности, мы можем не получить здесь точных результатов, но если выполнение действия со временем замедляется, мы знаем, что у нас есть нечто, на что стоит взглянуть и что может привести к дальнейшим проблемам.

Быстрая обратная связь позволяет разработчикам пробовать различные подходы улучшения производительности, все еще оперируя контекстом, вместо того чтобы заниматься этим неделями позднее, когда тестирование производительности проходит неуспешную проверку, а разработчик уже выстроил целое решение, основанное на первоначальной идее проекта. То же самое применимо к тестированию безопасности: добывайте обратную связь по возможности раньше.

Стабилизация

Как бы я ни хотел, чтобы весь процесс тестирования производился Agile-командой, это зачастую невозможно осуществить по ряду причин. Поэтому мы используем стадию стабилизации для выполнения тестов, которые связаны со внешними системами, занимают много времени или выполняются третьей стороной для проверки безопасности. Эта фаза стабилизации происходит прямо перед передачей в среду эксплуатации. Лично я считаю, что не мешало бы провести тестирование бизнес-сценариев и в рамках тестирования критериев приемки, а это не получится автоматизировать. Вам не нужно, чтобы ваши заинтересованные лица проводили тестирование по уже пройденным тест-кейсам; вместо этого нужна оценка удобства пользования и соответствия назначению.

Выпуск в среду эксплуатации

Сейчас я скажу самое основное, так как о поддержании работоспособности системы речь пойдет ниже, а пока достаточно отметить, что некоторые процессы обеспечения качества должны иметь место и в среде эксплуатации. Вам нужно не только отслеживать ваши серверы и сервисы, но и добиваться надлежащей производительности, доступности и функциональной точности в среде эксплуатации. Все это обязано стать частью полноценного плана по обеспечению качества.

Пара слов об автоматизации функционального тестирования

Как я говорил ранее, автоматизация тестирования является одним из видов деятельности, связанных с DevOps, который зачастую оборачивается для орга-

низации существенным испытанием, требуя от непосредственных участников принципиально другого образа мысли. Но все же я встречал некоторые общие признаки неудачной автоматизации тестирования и перечислю их, чтобы вы избежали соответствующих недочетов в своей работе.

Не надо недооценивать влияние инфраструктуры и экосистемы

Существует физическое ограничение тому, какое давление некоторое количество мануальных тестировщиков способно оказать на ваши системы; автоматизация применяет совершенно другой подход для тестирования вашей системы. То, что вы ранее делали вручную раз в неделю, теперь благодаря автоматизации можно делать сотню раз в день. Если прибавить к этому интегрированную среду, то вашим внешним системам понадобится еще и быстрее реагировать. Поэтому стоит обдумать два важных вопроса: может ли инфраструктура в ваших средах поддерживать объем тестирования, в сотню раз больший, чем сейчас, и настроены ли внешние системы на поддержку такого объема? Вы, конечно, всегда можете сократить нагрузку на внешние системы, ограничивая текущие операции взаимодействия и блокируя некоторый процент операций, или же воспользоваться виртуальными сервисами.

Не надо недооценивать недостаток данных

Очень часто автоматизированные тестовые скрипты используются в той же среде, в которой проводится и мануальное тестирование. Автоматизация тестирования нуждается в данных – они требуются при каждом запуске тестирования; и помните, такие запуски происходят намного чаще, чем при мануальном тестировании. Поэтому у вас не получится с легкостью обновлять все тестовые данные в любой момент, чтобы запустить скрипты автоматизации, пока ручное тестирование достигнет логической точки обновления. Такое положение дел нежелательно по ряду причин; вам вместо этого нужно быть готовым к запуску автоматизированного тестирования в любой момент. К счастью, существует несколько различных стратегий, которые вы можете использовать в подобной ситуации (и, вероятнее всего, вы будете их комбинировать):

- по завершении тестирования возвращайте данным их прежнее состояние;
- создавайте данные в рамках процесса выполнения тестирования;
- определяйте частичные наборы данных во всех затронутых приложениях, которые вы можете каждый раз безопасно менять;
- накапливайте базу наборов данных, передаваемых в автоматизацию, пока не будет достигнута следующая логическая точка обновления.

Принимайте во внимание всю систему, а не одно приложение

Организация автоматизированного тестирования часто превращается в упражнение на координацию взаимодействия, так как в рамках тестирования бизнес-процессы нередко затрагивают несколько приложений. Если многие системы опираются на некоторые шаги, выполняемые вручную, то ваша автоматизация будет зависеть от того, как вы скоординируете взаимодействие с ними. Создавая автоматизацию лишь для одной системы, вы рискуете зайти в тупик, когда понадобится, чтобы ваше решение могло взаимодействовать с другими. К тому же *инструменты для изолированного автоматизированного тестирования* могут не сработаться вместе, поэтому сначала подумайте о вашей системе приложений и о бизнес-процессах в целом, прежде чем активно инвестировать в одно специфичное решение для одного приложения.

Звучит как призыв

«Не следуйте пирамиде автоматизации тестирования»

Автоматизация тестирования должна следовать принципам пирамиды (рис. 7.2). Большинство тестов должны представлять собой модульные тесты, быстро выполняемые на уровне компонента. Самая тяжелая работа сосредоточена в сервисе или на функциональном уровне, где мы тестируем через API и лишь некоторые тесты выполняются из пользовательского интерфейса (UI). Когда мы говорим о ручном тестировании, то обычно подразумеваем работу через UI. Многие подходы к автоматизации тестирования пытаются имитировать поведение ручного тестировщика, когда автоматизируются тест-кейсы, выполнявшиеся до этого из UI. Но горькая правда в том, что UI слишком медлительный и ненадежный. Вам нужно перепроектировать ваш подход к тестированию таким образом, чтобы извлечь пользу из уровня сервиса; иначе вам придется терпеть увеличение количества поправок, вносимых в скрипты автоматизации.

Автоматизация тестирования для устаревших приложений – довольно неоднозначное занятие. Вам необходимо покрыть большую долю функциональности, и дело это неэкономное, если охватывать все сразу. Я советую начинать с небольшого количества регрессионных тестов для устаревших приложений, чтобы вы могли убедиться в качестве приложения, прежде чем переходить к приоритетной функциональности. Затем, основываясь на изменениях, внесенных в приложение, или на областях, для которых вы осуществляете перепроектирование, создайте дополнительные тест-кейсы. При добавлении новой функциональности создавайте новые тест-кейсы на основе нововведений в коде. В случае перепроектирования приложения сначала создайте тест-кейс,

убедитесь, что он работает и проходит проверку в текущей версии приложения, а затем, после перепроектирования, убедитесь, что все работает¹.



Рис. 7.2. Пирамида автоматизации тестирования.
Чем медлительнее уровень, тем меньше мы будем его использовать при автоматизации

Управление качеством и показатели качества

Как я уже говорил, вам придется найти общие способы измерения показателей для формирования выводов о качестве и о процессе его обеспечения. Измеряйте, как хорошо ваш процесс работает с автоматическим выявлением проблем, связанных с качеством, и насколько быстро и точно это происходит. Работа зачастую останавливается из-за неудовлетворительной поддержки автоматизации; показатели помогут вам следить за этим. Обращайте внимание на такие показатели, как длительность проведения вашей регрессии и количество ложноположительных результатов автоматизированного тестирования. Показатель качества результатов должен быть основан на инцидентах среды эксплуатации и, возможно, на дефектах, обнаруженных на фазе стабилизации. Не измеряйте дефекты, которые команда поставки обнаружила самостоятельно: задача команды – обнаружить как можно больше дефектов. Документирование и измерение дефектов, которые находит команда поставки, здесь принесет не очень много пользы; позвольте команде сосредоточиться на выявлении и передаче. Только в том случае, если дефекты перейдут от коман-

¹ На форуме DevOps Enterprise в 2015 году группа создала руководство по автоматизации тестирования для устаревших приложений. Рекомендую изучить работу *Tactics for Implementing Test Automation for Legacy Code*, если вам нужно больше подробностей [3].

ды поставки в другие фазы, вам понадобится документация, чтобы управлять их передачей от команды к команде.

Для того чтобы внедрить это в ваши команды, вам пригодится применение дифференцированной терминологии для различения фаз, в которых была обнаружена проблема. Мне нравится использовать слова *баг*, *дефект* и *инцидент*. Баг – это то, что обнаруживают Agile-команды и что не позволит владельцу продукта принять историю. В таком случае не будет составляться формальная документация; вместо этого тестировщик предоставит как можно больше информации для разработчика, чтобы тот исправил проблему. Как только баг будет исправлен, история заново будет проходить проверку, и процесс будет повторяться до тех пор, пока владелец продукта не примет наконец историю. Мы не измеряем баги каким-либо формальным способом. Когда в работе задействуется другая команда, например команда стабилизации, мы называем проблемы дефектами и управляем ими по жизненному циклу дефекта; мы можем измерить, как много дефектов ускользнуло от Agile-команды. Эти дефекты можно использовать для обдумывания того, какие ограничения мешают Agile-команде находить их самостоятельно; также они помогают продумывать ответные меры. В среде эксплуатации мы обозначаем дефекты кодом «инцидент», и это уже тот показатель обеспечения качества, который мы хотим измерить, так как он оказывает влияние на клиентов. Инциденты являются замечательным показателем качества продукта или сервиса.

Также существуют различные показатели работы в среде эксплуатации, например длительность работы и функциональная доступность, но про это мы поговорим в главе 11, посвященной обслуживанию приложения.

Первые шаги вашей организации

Оценка процесса обеспечения качества в вашей организации

Эта деятельность в некотором роде подобна процессу систематизации потока ценностей из главы 1. Здесь мы опять же должны приготовить доску или еще как-нибудь использовать настенное пространство, а также запастись офисным пластилином и картами системы.

Сначала воссоздайте высокоуровневый рабочий процесс на доске, демонстрируя требования к процессам изготовления, включая все связанные с этим шаги, представленные на картах. Затем возьмите карты другого цвета или ручку, перечислите все виды деятельности для обеспечения качества и покажите, где находится их место в жизненном цикле разработки.

Для дополнения картины спросите себя, все ли области вы покрыли: производительность, безопасность, доступность и т. д. Ничего страшного, если у вас появятся области, которые не были включены в список; просто расскажите о них между делом.

Теперь вашей команде необходимо подумать об автоматизации: что можно автоматизировать, а следовательно, проверять намного чаще? По-

думайте о том, как разделить виды деятельности на автоматизированную часть, которую можно выполнять раньше и чаще, и часть, которую все еще нужно выполнять вручную. Помните, что автоматизированные действия не потребуют больших усилий, поэтому частое их выполнение не повлечет за собой повышения стоимости проверки.

Теперь вам необходимо определить возможности, чтобы проводить проверки качества как можно раньше; это исследование нужно выполнять вручную. По каждому виду деятельности составьте возможные пути, для того чтобы как можно раньше обеспечить полное или хотя бы частичное покрытие.

И наконец, создайте бэклог, с помощью которого ваша команда сможет перейти к обеспечению качества, а затем начните переход.

Оценка качества

Как обсуждалось в этой главе, измерять качество не так-то легко. Многие показатели актуальны только на протяжении определенного времени, когда вы обращаетесь со специфичными областями. Соберитесь с вашими лидами по качеству и тестированию и на листе бумаги перечислите все метрики и показатели, которые вы используете для оценки качества. Затем определите, какие из них являются объективными и автоматизированными.

Если у вас получится хороший набор автоматизированных и объективных метрик, проработайте его вместе, чтобы сократить этот список. Я думаю, что здесь вполне естественно представить себе два показателя: длительность успешного выполнения регрессионного тестирования и инциденты, выявленные в среде эксплуатации за определенный период. Эти два показателя достаточно непротиворечивы и применимы во всякого рода компаниях, но у вас все еще остается необходимость определить несколько дополнительных метрик, связанных со стороной бизнеса.

ГЛАВА 8

Управляйте людьми, а не «ресурсами»

Управлять командами было бы легко, если бы в них не было людей.

*Анонимный автор
(мой первый куратор)*

Некотрые болезненно реагируют на то, что людей называют ресурсом и применяют в их отношении термин «управление ресурсами». И я отчасти с этим согласен. Ресурс – нечто, чем можно распоряжаться без индивидуального подхода; вы можете обращаться с мешком песка точно так же, как с другим мешком песка, когда речь идет о постройке плотины. С людьми это не пройдет. Наверняка, работая над проектами, вы создавали план, который включает в себя некоторое количество неопределенных штатных единиц (full-time equivalents, FTE). Позднее вы начинаете подставлять имена и понимаете, что вам нужно больше или меньше ресурса, исходя из оценки работы людей, которые заняты в данном проекте. Один Java-разработчик не похож на другого; и если честно, ни один из нас не обрадовался бы, узнав, что к нему относятся как к ресурсу: мол, не можешь работать – заменим тебя кем-то, кто справится не хуже! Может быть, мы лишь воображаем, что можем управлять людьми как безликими «штатными единицами»?

Пожалуй, ранее на производстве заменить рабочего было намного легче, чем Java-разработчика в современной компании. В этой главе я расскажу о том, как

гуманно осуществлять управление людьми¹. Ценность этих советов в том, что они применимы на всех иерархических уровнях, от менеджеров низшего звена до СЮ. В конце концов, от того, как руководители относятся к управлению сотрудниками, зависит культура в организации. Если все сделать правильно, подать людям пример и вдохновить их, вы почувствуете разницу.

Когда я после окончания университета только-только начал работать, я наблюдал в своей организации кое-что очень непривлекательное. Мой руководитель, человек открытый и с широким кругозором, выслушав меня, дал мне один из важнейших советов в моей жизни: «Мирко, ты не сможешь изменить всю организацию, но ты можешь изменить свой участок работы. Если ты менеджер, управляй своими командами так, как хотел бы, чтобы обходились с тобой, а затем пожинай результаты. По мере карьерного роста твое влияние будет все заметнее и за тобой будут подтягиваться остальные. Будет нелегко, но кто его знает... однажды ты можешь оказаться на самой вершине и в том, что корпоративная культура где-то провисает, будешь винить только себя» [1]. Сегодня я все еще далек от карьерных вершин, но это наставление не забываю и по сей день.

В этой главе я расскажу, как лично я пытаюсь управлять. Те, кто работал или все еще работает на меня, знают, что я не идеален, но при любой возможности стараюсь применять данные практики. Оттачивать навыки управления людьми можно всю жизнь.

Личные встречи

Первая из практик, которую я вам настоятельно рекомендую (если вы еще к ней не прибегали), – это регулярное проведение переговоров с глазу на глаз. Довольно тяжело управлять человеком, который представляет собой некую виртуальную фигуру, о которой вы можете судить лишь по продукту, над которым этот сотрудник работает. И нет, открытая политика – не то же самое, что проведение личных встреч! При открытой политике ваши собеседники могут почувствовать, что вы проводите встречи из принуждения, и поэтому встреча может оказаться менее результативной, чем вам хотелось бы. Тот факт, что вы предпочли пообщаться один на один, говорит людям, что вы не жалеете для них свое время.

Получасовых встреч раз в неделю или две вполне достаточно. Вам нужно пользоваться этой возможностью, чтобы со временем больше узнать о человеке, не чувствуя неловкости от того, что вы вторгаетесь в его личную сферу. Всегда давайте собеседнику возможность рассказать или спросить о том, что его

¹ Если вы слышали о Марке Хорстмане и Майкле Озанне из Manager-Tools.com, то легко убедитесь, что значительная доля материала для этой главы написана под впечатлением от их работы. Их подкасты и конференции (которые они сами называют тренингами) – одни из лучших руководств, которые там есть. Подкасты бесплатные, а конференции стоят недорого и доступны по всему миру. Очень советую послушать!

волнует, а затем поделитесь своими мыслями и информацией, которая может оказаться для него важной. После проведения ряда личных встреч вы обнаружите, что они становятся все более содержательными и к тому же вам все реже предлагают проводить внеплановые совещания. Общение с глазу на глаз – не только шанс получше узнать человека; для вас это шаг к тому, чтобы развить свои управленческие навыки и больше сосредоточиться на своей работе. А все потому, что те, кто на вас работает, больше не будут беспокоить вас каждую неделю по несрочным вопросам, если у них будет возможность регулярно общаться с вами.

По моему опыту, нельзя откладывать более четверти (25 %) личных встреч, чтобы они воспринимались как значимые и положительно влияли на ваши отношения с сотрудниками и на их работу. Все, кого я знаю, через непродолжительное время полюбили такой формат работы, так что попрактикуйте такие мини-совещания пару месяцев, прежде чем сделать вывод, нужны ли они вам¹. Многие люди, с которыми я проводил встречи, потом сами затевали нечто подобное в своих командах. А значит, дело стоит того.

Обратная связь

Все, кого я встречал, желали получать больше отзывов от своих руководителей, в то время как руководители не очень-то горели желанием предоставлять обратную связь (особенно если речь идет о критической оценке, которую надо тактично преподнести; с положительной оценкой как-то попроще). Если вдуматься, конструктивная критика может быть очень полезна, но преподнести ее нелегко. К тому же есть удачные и неудачные способы изложить ваше мнение. Снова возвращаясь к «совершенствованию, автономии и целям» Дэна Пинка [2], хочу сказать, что вам нужно поощрить сотрудника к самосовершенствованию, придерживаясь всех трех аспектов.

Прежде всего сосредоточьтесь на конкретных ситуациях – не допускайте обобщений типа «вечно ты опаздываешь» или «ваш рабочий продукт оставляет желать лучшего». Объясните, что именно в поведении сотрудника вас не устраивает, и попросите изменить отношение к делу. Например: «Когда ты заранее не докладываешь, о чем пойдет речь на совещании, как произошло сегодня с поставщиком, мы тратим много времени на пустую болтовню и в результате упускаем главное. Не мог бы ты учесть это на будущее?»

Как вы видите, в этом примере оценивается недавнее событие (совещание, проведенное утром того же дня), объясняется, чего вы хотите (таким образом вы учитесь четко формулировать запросы!), а сотруднику предоставляется возможность самому решить, как исправиться в дальнейшем. Конечно же, со-

¹ На сайте Manager Tools есть много материала о личных встречах, включая вводные материалы и ряд подкастов на тему управления такими встречами. Если вы столкнетесь с особенными трудностями, опять же загляните в Manager Tools: там есть много советов о том, как использовать личные встречи в особых обстоятельствах.

трудник может попросить вас конкретизировать ваши пожелания, но эта простая модель обратной связи прекрасно работает с мотиваторами Дэна Пинка.

Я пользуюсь следующим примером, который помогает мне сосредоточиться на ключевых элементах отзыва (поведение, последствия и необходимость перемены): когда ты делаешь *x*, происходит *y*, что для нас не вполне приемлемо. Не мог бы ты действовать по другой схеме в следующий раз?

Вы можете использовать подобный пример и для положительной оценки. В таком случае вы не предлагаете перемены, а просите продолжать в том же духе. Такой тип положительного отзыва в большей степени соответствует трем мотиваторам, чем просто «молодец» или «ты хорошо справился».

Делегирование обязанностей

В самом начале моей менеджерской карьеры меня смущала мысль о передаче другим сотрудникам той работы, которую я мог сделать сам или которая не вызывала энтузиазма (например, заполнение документов). Послушав подкаст *Manager Tools*, я узнал о концепции под названием «Экономика управления 101» [3], которая подразумевает, что если за счет делегирования задачи можно выполнить ее с меньшими затратами, то не передать ее будет неэкономично. Эта концепция изменила мой подход к управлению: я больше не комплексовал, передоверяя задания тем, кто на меня работает. С другой стороны, я вспоминал, как в свое время напрягалась моя начальница, стесняясь переложить часть работы на меня. Когда я сам предложил ей помощь, она очень обрадовалась. Если вы примете это к сведению, то со временем сможете пользоваться большим доверием своего руководителя.

Чтобы сотрудник оценил ваше доверие, используйте три мотиватора. Объясните, как возлагаемые на сотрудника обязательства помогут научиться чему-то новому, как он разгрузит вас, и наконец дайте сотруднику самому определить, как достичь ожидаемого результата.

Например: «Майкл, ты не мог бы мне помочь с еженедельным отчетом? Если ты сможешь сделать его вместо меня, я успею хорошенько подготовиться к предстоящему совещанию и доложить о ходе работ по проекту заинтересованным лицам. Отчеты необходимо составить по нашему стандартному образцу. Я тебе с удовольствием покажу, как я это делал, но если ты найдешь способ лучше, действуй по своему усмотрению. Первые отчеты можем для удобства составить вместе. Если есть вопросы, давай обсудим».

Создание «культуры без обвинений»

Будучи руководителем, вы должны защищать участников команды, когда у кого-то возникают претензии к ним. Если в команде появилась проблема, вам придется разбираться с ней, не пытаясь найти и наказать виноватого. И команда это оценит. А вот если хотите отметить хорошую работу, не купи-

тесь на похвалы в адрес конкретного человека: чем больше вы хвалите представителей вашей команды перед всем коллективом, тем больше вас ценят. Такое поведение поощряет людей выполнять свою работу наилучшим образом. И в организации в целом вы приобретете хорошую репутацию, если команда работает успешно. Чрезмерная суровость и нежелание отмечать выдающиеся достижения – весьма неэффективная тактика.

В итоге вы формируете в команде так называемую «культуру без обвинений». Если вы вспомните мое замечание о системе, которая влияет на поведение людей, то становится ясно, что в любой ошибке прежде всего стоит винить систему, а не отдельного сотрудника. В Etsy существует практика, которая состоит в том, что новому инженеру позволяют проводить развертывание в среде эксплуатации прямо в первый день работы. Если новичок сможет испортить что-то в среде эксплуатации, это значит, что система чересчур уязвима и не справляется с простыми ошибками [4]. Поэтому, какие бы проблемы вас ни ожидали, ваше дело – не выискивать, кто виноват, а пытаться понять, как нужно изменить систему, чтобы на будущее избежать повторения старых ошибок. Если выстраивать модель поведения для реагирования на инциденты и предотвращать взаимные обвинения, то в вашей команде наметится сдвиг к более позитивной и воодушевляющей культуре, которая поощрит сотрудников добиваться наилучших результатов для организации. Но как вы можете измерять эту культуру, чтобы наглядно видеть улучшения?

Оценка культуры вашей организации

Существует несколько способов измерения показателей культуры. Один из них мы раскрыли в работе по DevOps-метрике «Измерение производительности, эффективности и культуры для оптимизации DevOps-трансформации», в исследовательских средствах Westrum:

- в моей команде ведется активный поиск информации;
- в моей команде проблемы рассматриваются как возможность роста, а тех, кто сообщает о проблеме, не наказывают;
- в моей команде разделяют ответственность;
- в моей команде поощряется и вознаграждается кросс-функциональное сотрудничество;
- в моей команде провал служит стимулом к исследованию проблемы;
- в моей команде приветствуются новые идеи.

Лично я предпочитаю использовать слегка упрощенную версию внутреннего показателя лояльности потребителей (Net Promoter Score, NPS), который был заимствован из общего NPS, используемого для измерения удовлетворенности клиентов. Я использую следующие четыре утверждения в одном из своих проектов, в котором каждый член команды должен оценить, насколько они соответствуют реальности:

- я порекомендовал бы команду друзьям, так как это хорошее место работы;
- у меня есть инструменты и ресурсы для надлежащего выполнения моих обязанностей;
- я редко думаю об уходе из команды или из компании;
- моя роль в проекте дает мне возможность полноценно использовать свои навыки и способности.

Вы можете использовать любые из этих утверждений, при желании добавляя другие, но важно, чтобы вы не искали абсолютную ценность: ваша задача – постоянно отслеживать тенденции. Думайте, улучшаете ли вы положение в вашей части организации. Запомните совет моего старого руководителя: вы можете контролировать лишь свой фронт работ. Следовательно, если ваша команда непривлекательна для потенциального соискателя, то это ваша вина. Четко оценивать культуру команды очень важно, иначе вы не сможете понять, улучшается ситуация или нет.

В список занятий в этой главе я добавил одно, касающееся измерения того, насколько хорошо менеджеры управляют со своими командами. Я в шоке от того, что почти всегда, задавая директорам вопрос, как они анализируют качество управления людьми в их командах, я слышу, что они об этом и не помышляют. Неудивительно, что потом они встают перед фактом, что управление не улучшается и смена культуры замедляется! Не совершайте ту же ошибку, внесите измерение показателей культуры в список ключевых показателей производительности (Key Performance Indicators, KPI). Пользуйтесь общими средствами измерения, приведенными здесь, в качестве показателя KPI и передайте его в пользование вашим менеджерам.

В этой главе я рассказал, как управление ролями меняется, когда вы отстраиваетесь от устаревшей модели управления, и предложил вам некоторые инструменты управления работниками умственного труда. Помните, что мы не работаем на фабрике со сборочной линией, мы имеем дело с интеллектуальной ценностью и креативными начинаниями! А кроме того, мы работаем с технологией, поэтому настало время перейти к последней части книги и обсудить технологические аспекты трансформации.

Первые шаги вашей организации

Проводите личные встречи

Очень важно выкраивать в рабочем расписании время для каждого из ваших сотрудников – для начала не реже, чем раз в две недели, а затем иметь возможность проводить регулярные еженедельные встречи. Пусть они длятся по 30 минут: сначала 15 минут для сотрудника, а затем 15 минут для вас. Зачастую сотрудники превышают ограничение в 15 минут, и это не страшно. Вы всегда сможете найти время на неделе, для того чтобы вы-

сказать то, что не успели сообщить в прошлый раз. Я также настоятельно рекомендую записывать важные моменты и отсматривать записи с прошлой недели, чтобы собрать объемную информацию, когда дело дойдет до рассуждений о производительности, которые предоставят вам показатели для вашего отчета о сотруднике.

*Составьте список показателей KPI
для ваших менеджеров*

Вы, вероятно, слышали поговорку «что измеряешь, то и получаешь» (you get what you measure). И хотя культура с трудом поддается замерам, кое-что можно сделать и здесь:

- пользуйтесь внутренними показателями NPS, о которых я говорил в этой главе, и приспособливайте их для работы с командой в качестве высокоуровневого показателя;
- измеряйте эффективность личных встреч, которые проводят ваши менеджеры. Это позволит вам точнее понять, эффективные ли взаимоотношения выстраивает ваш менеджер;
- точно проверяйте прочность отношений ваших менеджеров. Ненавязчиво интересуйтесь такими деталями, касающимися сотрудников, о которых руководитель должен знать, чтобы понимать, положительно ли развиваются отношения. Например, знает ли он имена детей и партнеров своих подчиненных? А что может сказать об их увлечениях?

И да, конечно же, вы должны начать с себя, чтобы ни один менеджер не мог упрекнуть вас в том, что вы видите соломинку в чужом глазу, не замечая бревна в своем.

Заключение части Б

Мы подошли к завершению второй части книги, рассказывающей о людях и организации процессов в современных ИТ-организациях. Мы рассмотрели различные способы обеспечения ваших сотрудников организационной структурой, бизнес-контекстом и необходимой обратной связью, чтобы добиться применения трех мотиваторов, описанных Дэном Пинком: автономии, совершенствования и цели. Мы потратили дополнительное время на погружение в изменения, которым подвергаются организация и люди и с которыми сражаются в процессе трансформации; переход от тестирования к обеспечению качества, где нашли пример того, как укрепить автономию, совершенствование и цели посредством организации и проектирования процессов. Успех или провал трансформации будет напрямую зависеть от ваших сотрудников, поэтому уделите им достаточно времени. В следующей части мы поговорим о технической стороне. Технологии сегодня находятся в самой середине всех бизнес-идей, поэтому нам нужно управиться с ними, чтобы добиться успеха.

ЧАСТЬ В

Технологические и архитектурные аспекты

За последние годы мне довелось поучаствовать в дискуссиях о DevOps со многими организациями. Обычно в центре обсуждения были инструменты, практики и культура. Вы поймете, почему это так, если прочтаете популярные материалы по DevOps. Если размышлять о том, что может повлиять на время вывода продукта на рынок, то мне думается, что есть место для небольшой хитрости: архитектура играет огромную роль в том, какой конечный результат вы получите после внедрения DevOps. Хотя архитектуру тяжелее менять и о ней не настолько интересно разговаривать. Ориентироваться на автоматизацию и развивать культуру – это правильно. Но есть и третий элемент, о котором мало кто говорит, – архитектура трансформации. Если вы работаете с большими монолитными legacy-приложениями, то вскоре достигнете предела возможностей. Поэтому инструменты, методы и процессы также играют важную роль.

В третьей части этой книги будет рассказываться про то, что вряд ли будет долгое время сохранять актуальность. Рекомендации из первых двух частей вы сможете применять на практике еще долго. Материал третьей части будет устаревать быстрее. Идеи развивались с течением времени, их становилось все легче использовать с появлением новых инструментов и технологий. Мне не терпится увидеть, как все это будет развиваться дальше. К примеру, бессерверные архитектуры, такие как Amazon Lambda, еще только маячат на горизонте, а через пару лет вынудят меня переписать всю третью часть этой книги. Однако я убежден в том, что основные идеи, изложенные ниже, выдержат проверку временем. Поэтому я добавил в книгу раздел о технологиях, отчетливо осознавая, что многое из сказанного мной скоро утратит значимость.

В этой части книги мы рассмотрим:

- правильные способы выбора DevOps-инструментов;
- какую DevOps-архитектуру можно считать хорошей;

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- как развивать архитектуру вашего приложения;
 - как использовать связи между DevOps и облачными вычислениями;
 - как выглядит каждая из моделей доставки ИТ-продукта и как эти модели могут повлиять на вашу организацию.

ГЛАВА 9



Различные модели доставки продукта

Господа, мы собираемся неустанно преследовать идеал, заведомо зная, что нам его не достичь, так как идеального не существует. Но мы будем его преследовать, так как в процессе его преследования мы сможем достичь совершенства.

*Винс Ломбарди,
цитата из «Игры всей моей жизни»
Чака Карлсона*

В этой главе я опишу три различные модели, которые на данный момент используются для успешной доставки ИТ-продукта. Также речь пойдет о том, что заставит эти модели работать. Но, как я уже несколько раз упоминал, задача выходит за рамки одного только технического совершенствования. Она зависит от организации – провести грамотные преобразования в самой организации, чтобы обеспечить поддержку модели доставки.

Обзор моделей поставки продукта

Я встречал три модели, которыми активно пользовались или к которым стремились в крупных организациях. Они позволяли иметь дело с устаревшими приложениями и с современными цифровыми технологиями одновременно.

1. Непрерывная поставка (такой тип описан Джемом Хамблом и Дэвидом Фарли в книге о непрерывной поставке) позволяет вам автоматически развертывать приложения во всех средах, начиная со среды разработки и заканчи-

вая средой эксплуатации, а также автоматически тестировать их. Эта модель основана на постоянной среде для развертывания.

2. Облачная доставка: популяризована Netflix. Согласно этой модели, каждый раз создается новая среда, а старая уничтожается тогда, когда новая докажет свою работоспособность. Это модель, которая подразумевает отсутствие потерь времени при развертывании.
3. Доставка с поддержкой контейнеров: получила распространение с увеличением популярности Docker как технологии контейнеризации, поддерживающей микросервисную архитектуру.

Существует и четвертая модель, которая на данный момент еще только начала развиваться. Она основана на бессерверных технологиях, таких как Amazon Lambda. На момент написания я еще не успел поработать с клиентами над тем, чтобы выстроить модель доставки для бессерверных технологий, и даже не сформировал таковой в принципе. Возможно, в следующем издании я уже смогу дополнить главу описанием четвертой модели доставки.

Вероятнее всего, вы будете заинтересованы в ускоренной доставке продукта, поэтому будете использовать комбинацию вышеназванных моделей. Когда я буду говорить об этих моделях в контексте трансформации, нужно иметь в виду, что они не применяются ко всему и сразу, но внедряются постепенно, по мере того как вы преобразуете свои приложения и технологии в соответствии с этими моделями доставки.

Модель А: непрерывная доставка

Эта модель, вероятно, самая известная, и она существует уже довольно продолжительное время, хотя многие компании пока только пытаются ее достойно реализовать. Непрерывная доставка подразумевает, что вы потенциально можете развертывать в продуктивной среде каждую сборку, благо все необходимые для этого шаги автоматизированы. Слово «потенциально» нужно понимать так же, как его употребляют в мире Agile: оно означает, что важность состоит в возможности осуществить это, а не в фактическом осуществлении. Вы также легко можете предпочесть не развертывать это автоматически в продуктивную среду – например, прибегнуть к ручному тестированию или дальнейшему совершенствованию системы. Можно использовать эту модель доставки и для облачных, и для локальных окружений.

Самый распространенный шаблон среды для развертывания – это постоянные среды (например, среды, в которых не один раз разворачивалось ПО). Шаблон часто необходим для работы с legacy-приложениями, для которых требуется специфичная конфигурация среды. Вот почему применение этой модели здесь прекрасно подходит. Преимущество замены модели, подразумевающей ручную работу, данной моделью состоит в том, что увеличится скорость доставки, уменьшится риск для вашего процесса доставки за счет того, что больше не будет шагов, осуществляемых вручную, увеличится частота прове-

рок и получения обратной связи, а также сократится количество бесполезного шума в процессе доставки благодаря достижению прозрачности во всем жизненном цикле доставки продукта.

Описание возможностей

Для успешной работы с непрерывной доставкой вам необходимы четыре возможности. Я лишь кратко опишу основы, а остальное вы при необходимости почерпнете из других источников, коих несметное множество.

1. Создание приложения – одна из основных возможностей, следствие которой: нет приложения – нет и всей остальной деятельности. Она подразумевает управление исходным кодом, обеспечение качества со стороны разработки (статический анализ кода, дружеские проверки, unit-тесты), управление рабочими процессами разработки (возможность отслеживания всех изменений, внесенных требованиями к этим процессам), процессы компиляции, сборки и упаковки, а также менеджмент пакетов. Освоение данной возможности крайне важно для реализации всего остального. И хотя существует множество успешных шаблонов, которые можно применять в отношении разных технологий (например, пользоваться возможностями Google или качать конфигурацию Jenkins для сборки Java-приложений), ваши возможности продолжают расти и будут меняться вместе с контекстом каждой из используемых вами технологий.

В идеальном случае вы со временем добьетесь непрерывной интеграции (CI), когда ваши приложения собираются по принципу прохождения последовательности шагов, чем вы можете воспользоваться в работе со всеми своими приложениями и технологиями; но зачастую вы будете встречаться с технологиями, для которых это может оказаться нецелесообразным. Например, когда мы работали с Siebel, компиляция занимала более двух часов, что уже слишком долго для CI. Тем не менее автоматизация этой возможности дается легче, чем все остальное. Частота компиляций может отличаться, но главное – преследовать цель уменьшения ручного вмешательства в создание программного пакета из кода, переданного системой управления конфигурациями (SCM). Я занимался автоматизацией для Siebel, мейнфреймов и многих других технологий. И это не всегда давалось легко, но было возможно.

2. Развертывание приложения – осуществляется уже немного сложнее. В целом это означает, что мы будем брать программный пакет из системы управления пакетами и разворачивать его в существующей среде. Подобная тактика прекрасно подходит и для полной автоматизации. Чтобы ее реализовать, вам стоит кое о чем подумать.

- Осведомленность о среде: для успешного развертывания вам нужно знать, куда вы будете разворачивать приложение. Весьма вероятно, что у вас будет топология сред с различиями на разных уровнях (мульти-

арендность в низших уровнях и избыточное количество компонентов ближе к выводу в продуктивную среду), поэтому необходимо знать, на каком сервере будут разворачиваться ваши компоненты. Также во время развертывания необходимо знать специфичные для сред настройки (в частности, IP-адреса, имена серверов, значения, присвоенные соединениям) и, в случае инкрементальных развертываний, последнюю развернутую версию.

- Сохранение независимости среды программных пакетов: поскольку в процессе создания пакета вы не знаете, где он будет разворачиваться, все специфичные для среды настройки нужно абстрагировать. Вы можете осуществить это в виде конфигурационного файла или при помощи переменных, которые используются либо во время развертывания, либо во время исполнения.
- Полное или инкрементальное развертывание: при полном развертывании будет произведена полная замена приложения в окружении, а следовательно, вам ни о чем не придется беспокоиться. Сначала вы удаля-



Модель А – непрерывная доставка

Согласно модели А, приложения автоматически развертываются в постоянную среду (облачную или локальную)

24/7

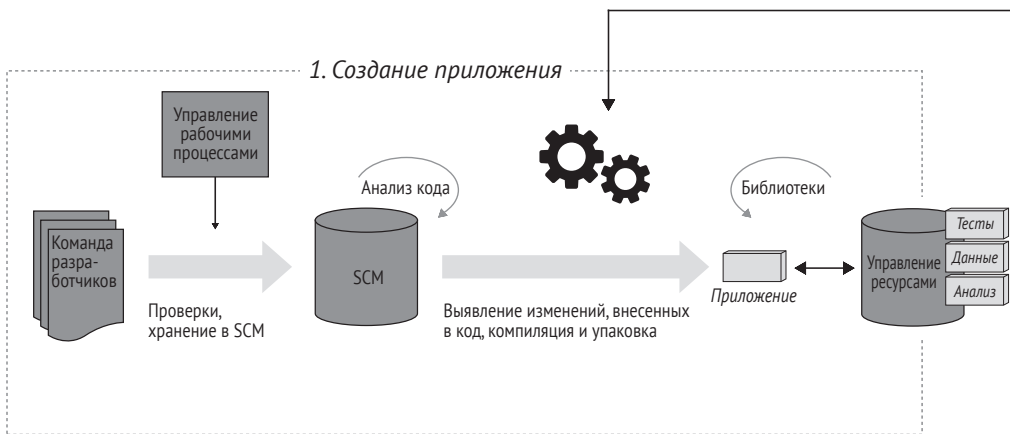


Рис. 9.1. Модель А – непрерывная доставка: при непрерывной доставке автоматизация позволяет добиться постоянной среды

ете все, что связано с предыдущей версией (после создания резервной копии – на случай, если развертывание не будет удачным), а затем развертываете новую версию в окружении. Это полное развертывание автоматизировать намного легче, так как при этом будет осуществляться один и тот же процесс. Инкрементальные развертывания осуществляются быстрее, но потребуют применения более сложных процессов для оптимизации; именно поэтому организации зачастую начинают с полного развертывания, если это поддерживается технологией (например, структурные изменения для транзакционных таблиц всегда осуществляются инкрементально). Для выполнения инкрементального развертывания важно знать последовательность инкрементальных пакетов и какая версия сейчас находится в среде, чтобы можно было правильно определить ряд файлов, которые необходимо изменить. Хорошая практика – автоматизированная проверка того, что среда находится в ожидаемом состоянии, перед началом развертывания: риск того, что что-нибудь пойдет не так, при инкрементальных развертываниях намного выше. Также существует большой риск конфигурационного сдвига из-за изменений, осуществляемых вручную, или неудачных попыток развертывания по причине того, что окружение не было подготовлено перед самим развертыванием.

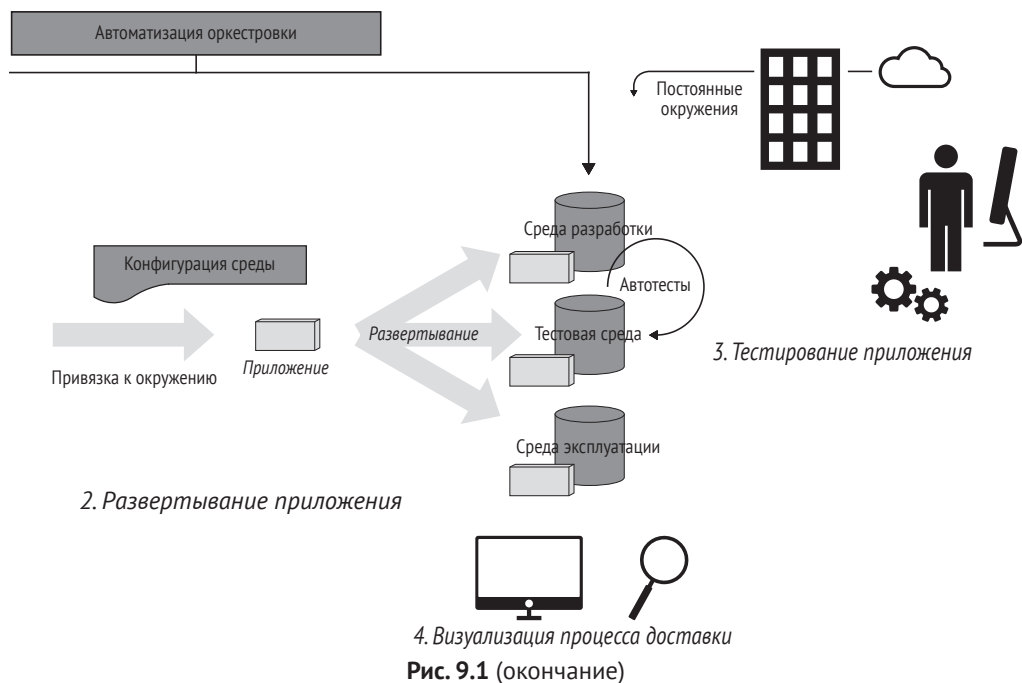


Рис. 9.1 (окончание)

3. Тестирование приложения: нужно автоматизировать как можно большую долю процесса тестирования и отслеживать покрытие тестирования, которое может отличаться от среды к среде. Различные уровни тестирования относятся к данной возможности: тестирование приложения, интеграционные тесты, тестирование производительности, тестирование безопасности, тестирование готовности к эксплуатации, а также все то, что можно автоматизировать. По большому счету, все ручное тестирование и руководства по управлению ручным тестированием также относятся к этому пункту.
4. Визуализация процесса доставки: мне кажется, невозможно улучшить то, чего вы не видите. Модель доставки в целом не является чем-то, что можно просто реализовать, – и все тут, вам придется продолжить ее настраивать и улучшать. По моему опыту, первая реализация занимает от трех до шести месяцев; затем реализация достаточно сильно изменяется в течение следующих шести–двенадцати месяцев, по мере того как вы развиваетесь. Чтобы все шло гладко, вам нужно разработать способ визуализации всего процесса и измерения сообразности и скорости выполняемой работы. Раньше это осуществлялось посредством файлов или Excel-таблиц, как и многие другие процессы в ИТ, но сегодня уже существуют новые инструменты визуализации и открытые программные решения, которые облегчают использование этой возможности. Capital One даже решили выложить свое решение для создания панели наблюдения, соответствующей методологии DevOps, в открытый доступ, и это решение успешно переняли другие организации, что помогло им, в свою очередь, справиться с DevOps-трансформацией [3]. Это не самая сложная из всех возможностей в этой модели доставки, но ее сильно недооценивают. Зачастую организации не уделяют достаточно времени и сил для реализации этой возможности.

Аспекты трансформации и воздействие на организацию

По мере того как вы переходите к непрерывной доставке, вы все чаще задумываетесь о некоторых вещах. Во-первых, управлять конфигурациями крайне важно, без этого вы в действительности не сможете делать все остальное. Управление конфигурациями позволяет вам быстро справляться с эксплуатацией. Весь код (включая тесты и код автоматизации) необходимо содержать в системе управления конфигурациями, чтобы его было легче оценивать и беспрепятственно использовать. Переход к этой модели потребует тесного сотрудничества ваших команд по эксплуатации и инфраструктуре с командой платформы, чтобы можно было реализовать *абстрактную конфигурацию среды* (согласно этой практике в конфигурационных файлах вместо конкретных значений назначаются переменные, к которым значения подставляются во время развертывания, тогда, когда значения становятся известными). И для целей автоматизации вам нужно будет задать верные правила доступа к среде. Для команд администраторов это будет казаться потерей контроля над средой, но

если вы осторожно будете управляться с этим процессом, вовлекая все группы в процесс управления изменениями, то переход пройдет намного легче.

Управление изменениями – также важный аспект для перехода к этой модели доставки, и поначалу я недооценивал важность данного занятия (обучение сотрудников, способствование изменениям в организации, обсуждение изменений и положительных результатов, изменение процесса и описание существующих ролей). В конце концов, если у нас получится создать прекрасное решение, то и все остальные воодушевятся, не правда ли? Не совсем, как оказалось. Я заметил эту проблему еще в первой паре проектов и тогда начал принимать ее в расчет – даже в последующих проектах нанимал отдельных сотрудников, которые занимались управлением изменениями. Вышло так, что управление изменениями оказалось весьма необходимой задачей и помогало всей команде. Разработчики не заинтересованы в создании обучающего материала или документировании проекта, а сотрудники, отвечающие за управление изменениями, знают, как сформировать сопроводительный материал, которым наверняка потребуются воспользоваться. Мне кажется, вы можете составить оценку затрачиваемых усилий и стоимости для этой задачи и удвоить показатели данной оценки; вероятно, в завершение работы вам захочется оглянуться назад и подумать о том, что еще можно было бы сделать.

Организационные изменения, преследующие качественные изменения в образе ведения процессов, о которых мы говорили в главе 7, нужно предусматривать в этой модели, иначе у ваших команд доставки, заточенных под быстрое выполнение задач, и отдельной команды по тестированию будут возникать проблемы при взаимодействии.

Кроме прочего, стоит подумать об инфраструктуре для вспомогательной платформы. Очень часто с ней не обходятся так же, как с системой для продуктивной среды. Но подумайте: если ваша продуктивная среда упала из-за дефекта и ваши SCM и инструменты для автоматизации тоже не функционируют, вам придется несладко! Вам нужно иметь продуктивную среду с вашими инструментами, которую вы сможете использовать для осуществления развертываний во все среды (начиная со среды разработки и заканчивая продуктивной средой), и вам потребуются среда разработки с вашими инструментами, чтобы продолжить тестировать, экспериментировать, а также развивать инструменты. Вам не захочется делать все эти вещи со средой, которую вы будете использовать для следующего развертывания продукта.

Модель Б: облачная доставка

Для облачной модели доставки используются некоторые практики, ставшие популярными после распространения концепции непрерывной доставки. Облачные возможности стали более зрелыми, а системы управления конфигурациями сред, такие как Chef, Puppet и Ansible, изменили наше восприятие процесса создания и управления средами. Использование всего этого и отличает данную модель от предыдущей: мы обходимся со средами и инфраструктурой

как с кодом и, таким образом, можем создать любые дополнительные среды легко и просто. Инфраструктура как код означает, что вся инфраструктура задается при помощи конфигурации, которую можно хранить в файле, с которым, в свою очередь, можно обходиться как с исходным кодом программы.

При такой модели мы заново создаем совершенно новую продуктивную среду, в которую помещаем последнюю версию приложения. Затем можно использовать эту среду для тестирования с использованием производственного трафика, что поможет нам узнать, были ли изменения удачными. В этот момент уже ничто не мешает уничтожить старую продуктивную среду. Это модель доставки с весьма малыми рисками, так как вы можете управлять ими, прибегая к балансированию между тестированием новой среды и моментом перехода на нее.

Описание возможностей

Многие из возможностей схожи друг с другом, но просто используются в разном контексте, в работе с созданием новой среды при каждом развертывании. При этом, например, отпадает необходимость в обслуживании инкрементального развертывания, упомянутого ранее, так как не будет того, что можно развернуть постепенно. Это означает, что вам придется найти другие способы сохранять постоянство между средами (например, как вы передаете



Модель Б – облачная доставка

При модели Б приложения развертываются автоматически после предоставления новой среды из облака или центра обработки данных

Основное отличие от модели А представляют более зрелые практики, применяемые относительно инфраструктуры, – так называемая инфраструктура как код

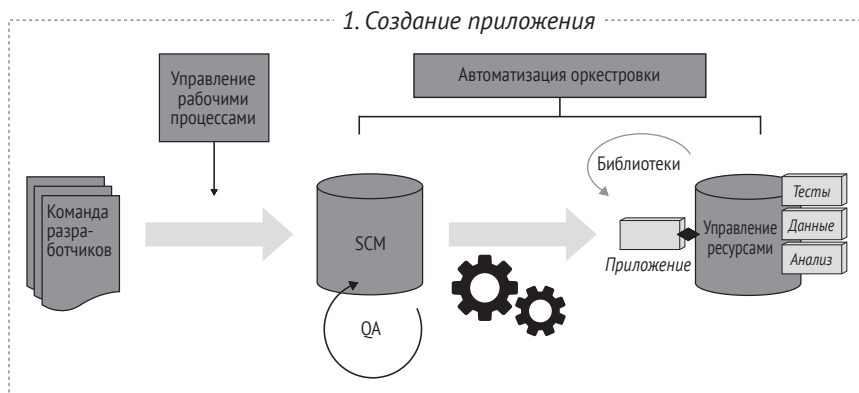


Рис. 9.2. Модель Б – облачная доставка: при каждом развертывании создается новая среда

все транзакционные данные? Или вы храните их в другой неизменной части среды?). Это указывает на ограничения и сложности данной модели доставки, а также на то, почему вы, возможно, не станете использовать ее для всего портфолио ваших приложений.

1. Создание приложения: эта возможность не сильно отличается у разных моделей доставки.
2. Создание окружения: это новая возможность, и, по сути, она подразумевает применение понятия инфраструктуры как код ко всему, что не является кодом приложения, который мы и будем развертывать позднее. Требуемая инфраструктура включает в себя вычислительные среды, сеть, операционную систему и промежуточное программное обеспечение. Потому как нам нужны сведения об инфраструктуре для осуществления процесса развертывания, нам нужно убедиться в том, что вы собрали всю необходимую информацию о конфигурациях. Это очень похоже на то, что вы делаете почти вручную при модели непрерывной доставки для постоянных сред. Здесь же среды постоянно меняются, поэтому необходимо автоматизировать этот процесс. Тут возникает надобность в управлении конфигурациями сред посредством таких инструментов, как Puppet или Chef, в то время как ранее это было необязательно.

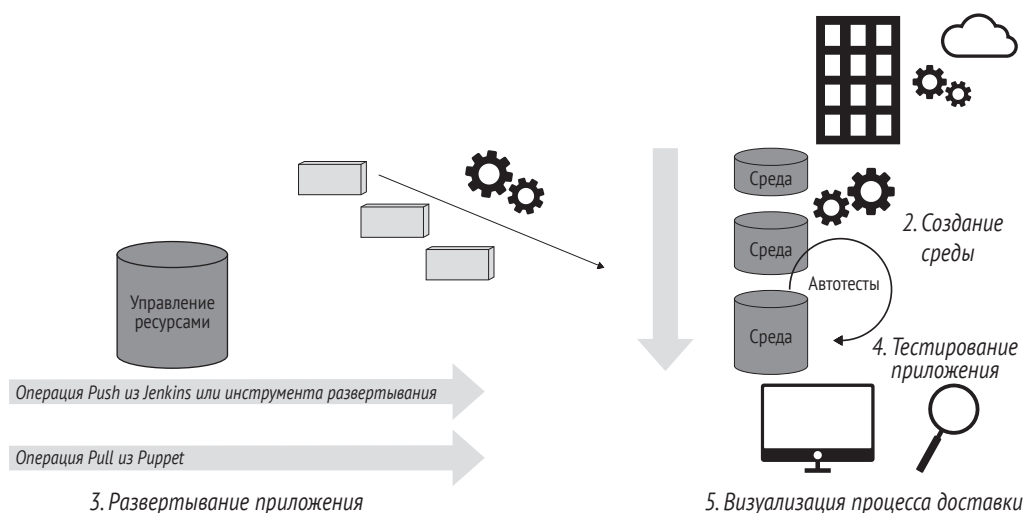


Рис. 9.2 (окончание)

3. Развертывание приложения: при такой модели у нас есть два альтернативных подхода. Мы можем самостоятельно развертывать приложение при каждом создании новой среды или же использовать инструменты для управления конфигурациями сред, чтобы выгрузить необходимую версию приложения. Мне довелось понаблюдать за обеими моделями, и мне кажется, что ваш выбор зависит от ваших предпочтений и контекста. Со временем вы, вероятно, остановитесь на второй модели, потому что она позволяет вам не использовать потенциально дорогостоящие инструменты для развертывания и упростить процесс отладки в целом.
4. Тестирование приложения: эта возможность не сильно отличается от той, что у модели непрерывной доставки, но вы, вероятно, будете выполнять больше тестов, так как инфраструктура часто пересоздается. К тому же набор регрессионных тестов будет больше, так как вам не нужно отключать продуктивную среду для проведения тестов.
5. Визуализация процесса доставки: у вас есть немного больше аспектов, которые нужно визуализировать и оценить, например количество окружений, запущенных на данный момент, и скорость, и безотказность процесса создания новых окружений, но в целом идеи остаются прежними.

Аспекты внедрения и воздействие на организацию

Поскольку инфраструктура не является отдельным объектом для размышлений в контексте платформы, для поддержания этой модели доставки вам придется способствовать взаимодействию ваших команд по обслуживанию инфраструктуры и команд платформы. Все более и более важно, чтобы команды понимали техники автоматизации, нежели разбирались в Windows или UNIX. Вам все еще необходимы эти навыки, но, вместо того чтобы настраивать машины, команда сосредоточивается на концепции инфраструктуры как коде.

Совершенствование навыков в следовании модели непрерывной доставки – первое, что нужно для успешного применения данной модели, так как любые шаги, выполняемые вручную, ослабят преимущества ее использования. В дополнение к этому облачная модель принесет больше выгоды, если вы сможете изменить структуру приложения, для того чтобы можно было пользоваться расширяемостью и гибкостью облака. Мы раскроем эту тему подробнее в главе 12.

Модель В: доставка с поддержкой контейнеров

С ускоренным ростом популярности Docker (который облегчил работу с Linux-контейнерами и превратил работу с контейнерами в господствующую тенденцию) начала развиваться новая модель доставки, которой желают вос-

пользоваться многие организации. Она невероятно хорошо подходит для работы с микросервисной архитектурой благодаря малому объему занимаемой памяти и гибкости контейнеров. Скорость работы такой модели впечатляет, ведь новый контейнер можно создать и развернуть в течение нескольких секунд. В то время как другие модели доставки для этого требуют от семи минут до нескольких часов. Это пока что самая быстрая модель, но при условии, что вы обладаете архитектурой с относительно небольшими контейнерами. (Если вы попытаетесь запустить Siebel или SAP из контейнера, я полагаю, что вы будете разочарованы.) Неизменяемая природа контейнеров (по крайней мере, как она предполагается) поспособствует налаживанию хороших взаимоотношений в организации, так как невозможно вручную изменить контейнеры, после того как они были уже созданы.

Описание возможностей

Как и в случае с предыдущей моделью, здесь возможности наращиваются поверх других, и все возможности, созданные для предыдущих моделей, можно снова и снова использовать; они в некотором роде даже должны присутствовать. В этом случае возможности связаны с созданием и развертыванием контейнеров.

1. Создание приложения: здесь также ничего не поменялось.
2. Создание контейнера приложения: вдобавок к пакету приложения, который хранится в менеджере пакетов, мы создадим еще и контейнеры приложения, которые будут содержать все, что необходимо для запуска автономного приложения.

Некоторые аспекты автоматизированного предоставления среды относятся к этой возможности, например настройка требуемого хранилища данных, которое должно располагаться в контейнере, а не в среде, когда речь идет о развертывании микросервисов. Некоторые для этой цели используют инструменты конфигурирования среды, но благодаря неизменяемости контейнера вы можете применить более упрощенные подходы для обслуживания этой одноразовой сборки. Управление и обслуживание контейнеров стало новой и важной возможностью.

3. Создание VM/OS-узла. Эта возможность очень похожа на возможность создания среды. Вы создаете очень простую среду, содержащую движок для контейнеров, на который будут развертываться образы.
4. Развертывание контейнера: эта возможность позволяет развертывать контейнеры на узле и включать их (например, прибегая к перенаправлению трафика на этот экземпляр и закрепляя его при помощи балансировщика нагрузки). Ранее это приходилось делать самостоятельно, но теперь существуют некоторые инструменты, которые способны вам в этом помочь.
5. Тестирование приложения: здесь все аналогично. Благодаря самой сущности контейнеров весьма вероятно, что при такой модели ваши компоненты

будут небольшими; это значит, что у вас будет не очень много комбинаций конфигураций для осуществления тестирования. Адаптация вашего подхода в качестве к миру сменяющихся конфигураций будет крайне необходимым шагом, для того чтобы данная модель применялась успешно. Помните, что всякое тестирование связано с управлением рисками. Вам придется разработать подходящую стратегию, так как работа с релизами в традиционной манере (когда все изменения со временем все больше связываются друг с другом) не будет практичным подходом в рамках данной модели.

6. Визуализация процесса доставки: теперь вам необходимо визуализировать и оценить чуть больше аспектов, например количество контейнеров и их состояние, а вдобавок и создание новых контейнеров и возможности для развертывания, но в целом идеи остаются прежними.



Модель В – доставка с поддержкой контейнеров

При модели В приложения развертываются как ряд контейнеров на динамически создаваемых сетевых ресурсах

Основным отличием от модели Б выступает зрелость практик применения контейнеров и более модульная архитектура приложения

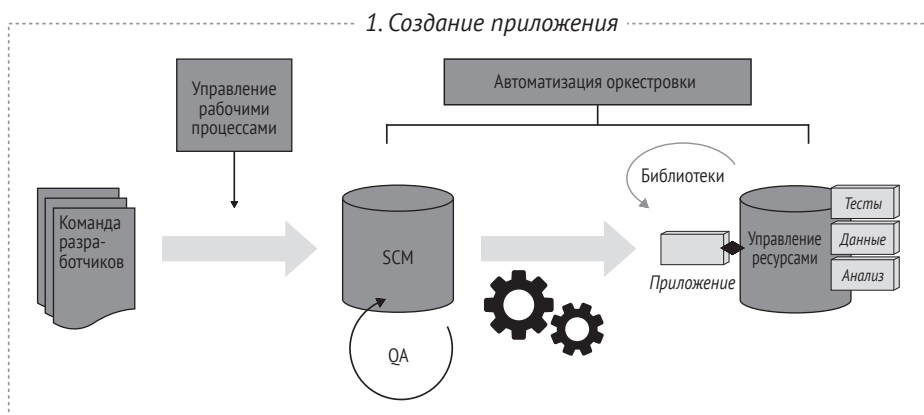


Рис. 9.3. Доставка с поддержкой контейнеров управляет приложением в контейнерах

Аспекты внедрения и воздействие на организацию

Сейчас вы имеете дело с неизменяемыми контейнерами, а стало быть, обслуживание контейнеров становится новой организационной обязанностью. Как вы проверите в случае обнаружения новых уязвимостей, в каком месте вы использовали определенные библиотеки, так чтобы можно было обновить все образы контейнеров? Так как вы выстраиваете контейнеры слоями, то, вероятно, используете старый образ с известными уязвимостями, расположившийся в некоторой цепочке или находящийся в публичном реестре. Вам придется обслуживать некоторые подходы в организации, чтобы вы могли обеспечивать использование ряда разновидностей контейнеров. Понятно, что, используя контейнеры, вы можете применять множество различных технологий одновременно, но организация должна обслуживать ряд допустимых подходов, так

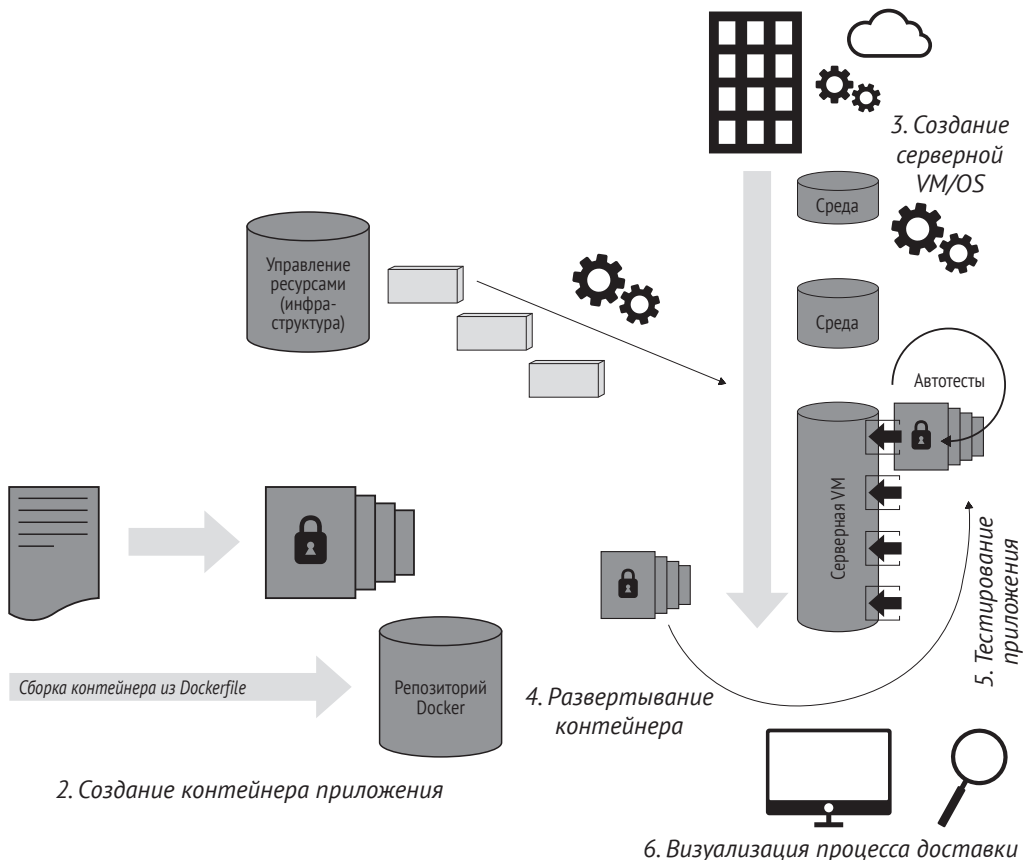


Рис. 9.3 (окончание)

как нужно поддерживать архитектуру, а предпочтения отдельных команд по технологиям могут впоследствии вызвать проблемы. Нахождение золотой середины – вот чем вы будете заниматься, практикуя данный подход в вашей организации.

Подобно облачным технологиям, работа с контейнерами подразумевает, что вам нужно перепроектировать архитектуру существующих приложений, чтобы использовать эту новую парадигму. Если просто поместить существующее приложение в большой контейнер, это не даст возможности в полной мере воспользоваться преимуществами доставки с поддержкой контейнеров. Вместе с этим проектированием необходимо также проводить некоторую реорганизацию, так как весьма неэффективно иметь контейнер приложения, которым занимается не одна команда. В лучшем случае один контейнер приложения должен обслуживаться одной командой. Если приложения действительно небольшие, то одна команда сможет обслуживать множество приложений. Но если контейнер приложения слишком большой для одной команды, то, возможно, он в принципе чересчур велик и его в дальнейшем стоит разбить на несколько частей. Заставьте закон Конвея работать на вас и создайте организационную структуру, которую вы хотели бы видеть в вашей архитектуре.

Оценка модели доставки: бессерверная доставка

Если вы незнакомы с тем, что такое бессерверная архитектура, поясню: это такая модель обслуживания, при которой вы не используете серверы как таковые, но просто пишете функцию, обеспечивающую для вас работу некоторой логики. Когда эта функция вызывается, создается экземпляр, и он существует, пока работает *вызов функции*. Примером такой архитектуры может послужить Amazon Lambda. Хотя некоторые организации, с которыми я работал, пробовали использовать эту архитектурную модель, я еще не наблюдал широкого ее применения. Вам, вероятно, было бы интересно изучить эту архитектуру и поискать модели применения, чтобы попробовать использовать ее в вашей организации.

Схема возможностей

Несмотря на то что всегда в схемах возможностей будут проследиваться расхождения в силу контекстуальных различий, существуют общие приемы совершенствования ваших технических возможностей. Вам понадобится сначала иметь дело с системой управления конфигурациями (SCM) и сборкой приложений, чтобы сократить количество побочного шума, а затем нужно будет продолжить с развертыванием приложений. Если вы будете делать это в обратном порядке, вам придется много чего переделывать в автоматизации раз-

вертывания, так как *артефакты сборки* будут меняться, по мере того как вы будете осваивать автоматизацию процесса.

В идеальном случае стоит управляться с системой управления конфигурациями, сборкой приложений и автоматизацией развертывания одновременно. Для автоматизации тестирования потребуется наличие некоей предсказуемой среды, с которой можно было бы работать (например, в ней не должно быть проблем с конфигурацией или различиями приложений, обнаруживаемыми от развертывания к развертыванию), поэтому выгоду она принесет тогда, когда будут заранее автоматизированы сборка и развертывание приложений. Автоматизация подготовки среды обычно требует много времени на подготовку к реализации, поэтому вы можете начинать осуществлять ее параллельно, чтобы она была уже готова к тому времени, как понадобится. Другие же возможности добавляются после основных. Все это необходимо поддерживать при помощи постепенного выстраивания вашей DevOps-платформы, дабы иметь возможность способствовать вашей деятельности по автоматизации и эксплуатации, например мониторингу.

На рис. 9.4 изображена распространенная схема развития начального ряда возможностей. Заметьте, что необходимо провести некоторую конфигурацию инфраструктуры и организационное проектирование, перед тем как погрузиться в выстраивание подходов к применению различных техник. Этот процесс последует сначала за системой управления конфигурациями и автоматизацией сборки, потом будет автоматизация развертывания, а затем последует шаблон автоматизации тестирования, что, согласно моему опыту, обеспечит самые высокие шансы на успех.

Первые шаги вашей организации

Приспосабливайте ваши модели доставки приложения

Как я уже говорил, нежелательно применять модель доставки с поддержкой контейнеров сразу ко всем вашим приложениям: это будет неэкономично и не вполне реализуемо. В организациях вы наверняка встретитесь с большим количеством legacy-приложений вместе с частью приложений, использующих непрерывную доставку и облачную доставку, а также частью приложений, использующих доставку с поддержкой контейнеров. И это реалистично. Помните, что нам нужно добиться улучшений, и слишком часто мы стремимся к идеалу, не обращая внимания на то, что принесет реальную пользу. Имейте это в виду и проведите практикум, на котором вы пересмотрите приложения и опишете то, что имеется на данный момент, а также идеальную модель доставки для каждого приложения. Вам понадобится для этого пригласить на общее совещание сотрудников, работающих с инфраструктурой, архитектурой и организацией доставки. Затем проанализировать возможности, необходимые для реализации моделей доставки, которые вы выбрали для каждого прило-

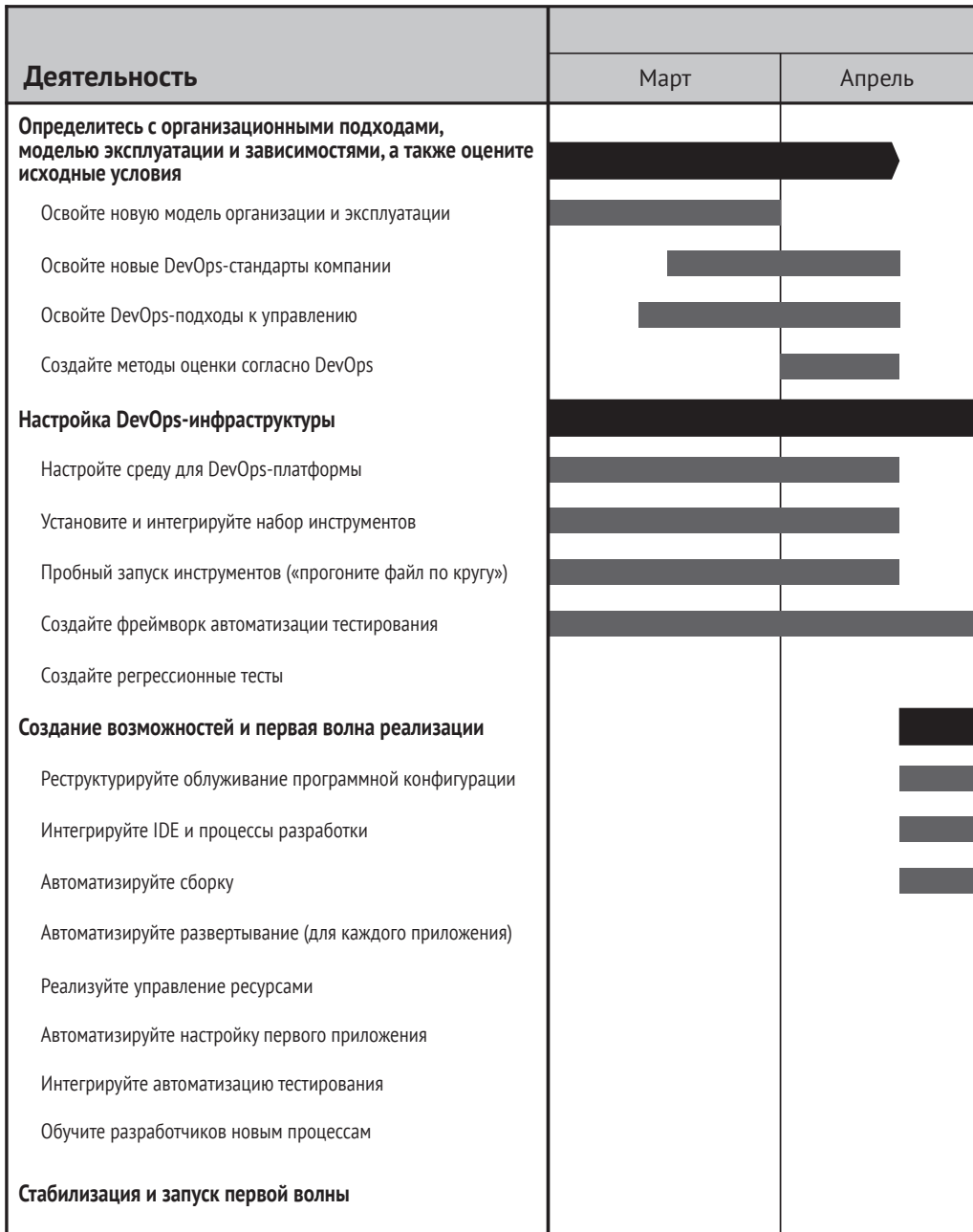


Рис. 9.4. Типовой план для начального набора возможностей: первыми шагами зачастую являются применение контейнеров и настройка инфраструктуры

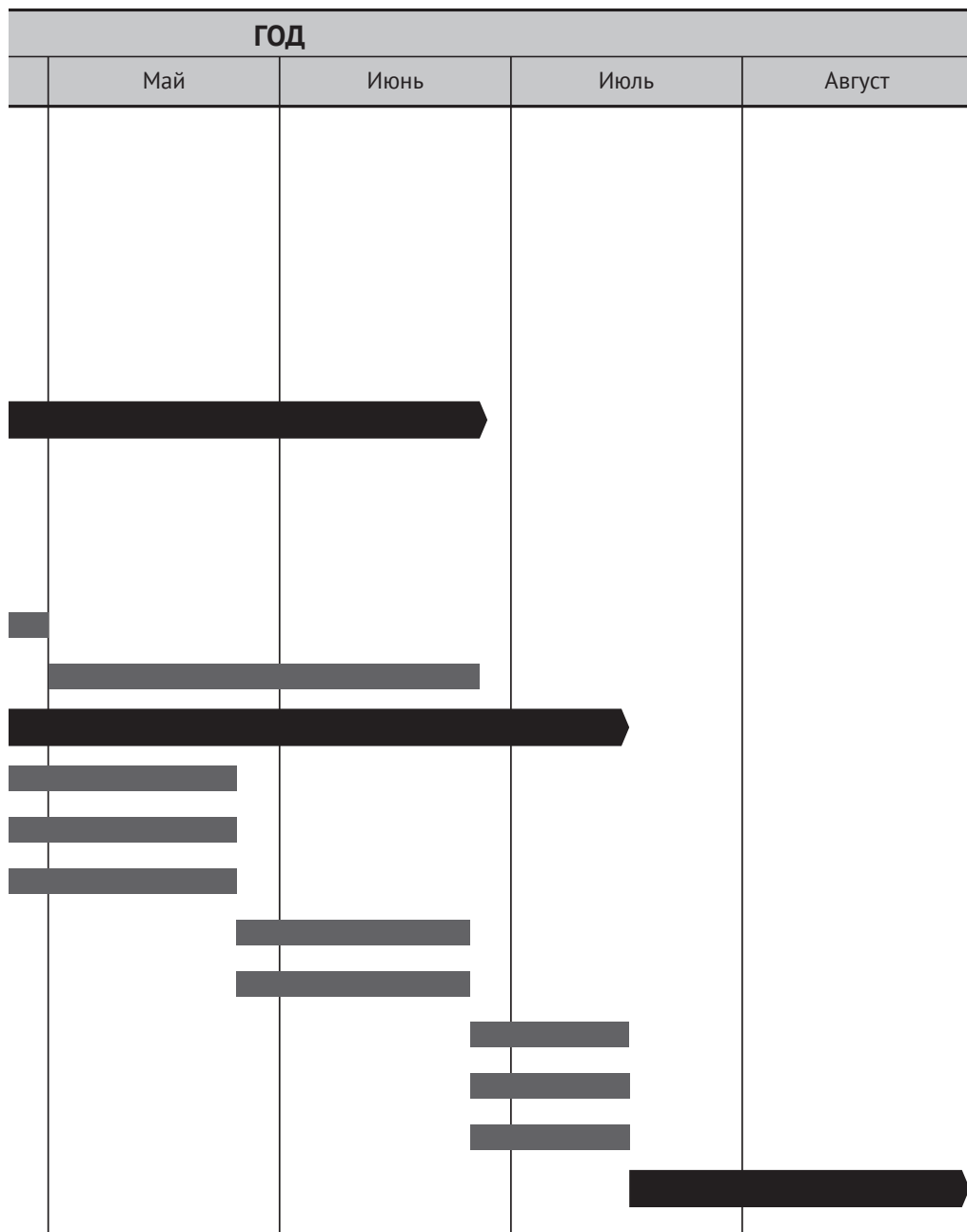


Рис. 9.4 (окончание)

жения. Поразмыслите о ряде инициатив, которые помогли бы достичь недостающих возможностей. Вы сможете заново использовать возможности для приложений одного и того же технологического стека (например, Java-приложений), как только вы создадите их для первого приложения. Определитесь с возможностями, которые подходят для повторного использования. Учитывая все перечисленное, выстройте шестимесячную схему; пересматривайте схему и успех продвижения по ней ежемесячно, чтобы иметь возможность заново приоритизировать задачи, основываясь на полученном ранее опыте.

ГЛАВА 10



Архитектура приложений и микросервисы

Архитектура зависит от времени ее создания.

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Архитектура в последнее время играет все более и более важную роль. Когда я начинал работать в ИТ, архитектура приложения была чем-то статичным, описывала стек технологий и определяла организационную структуру (например, команду по работе с базами данных, Java-команду и интеграционную команду). Взаимодействие между получившимися командами выстраивалось согласно потоку данных в архитектуре, и архитекторы здесь были посредниками, регулирующими конфликты из-за расхождений во мнениях. Проекты архитектуры стремились к тому, чтобы достичь определенного конечного состояния, а выстраиваемые по ним диаграммы были сложными и довольно подробными, достигающими уровня модулей и вызовов функций. Подход довольно сильно изменился за последние несколько лет. Сегодня создание архитектуры основывается на принципах, и она преследует цель не достичь конечного состояния, а обеспечить гибкость, которая поможет приложению развиваться со временем. В идеальном случае она предоставляет командам возможность работать независимо друг от друга по мере внесения функциональных изменений.

В этой книге я много говорил о различных возможностях, которые вам нужно обеспечить в организации, а также о том, какие изменения ей нужны. И все же существует некоторая хитрость для создания архитектуры: архитектура приложения станет для вас основным препятствием, по мере того как вы бу-

дете ускорять темпы доставки. Если вы припомните какой-нибудь типичный проект, то, вероятно, заметите, что скорость осуществления доставки определяется самым медлительным компонентом. Это типичный признак сильно связанной архитектуры. В таких типах архитектур обычно предусматривается некоторое COTS-приложение, которое еще больше замедляет доставку из-за своей монолитности. Я соглашусь со словами Джеза Хамбла о том, что культура и архитектура являются двумя основными препятствиями для достижения высокой производительности [1].

В этой главе я хочу помочь вам рассмотреть свою архитектуру и найти способы ее развития. Согласно концепции *ИТ-изоморфизма бизнеса*, ваша архитектура должна отражать потребности бизнеса, что позволит командам непосредственно поддерживать бизнес, не прибегая к бесконечным переговорам, в которых принимают участие представители разных отделов организации. Очевидно, что это довольно тяжело осуществить и нам не нужно идти настолько далеко, но монолитные приложения нередко выступают наиболее подходящей моделью – опираясь на наши подходы, нам просто нужно найти золотую середину. Эта глава включает три раздела: в одном описываются архитектурные принципы, в другом – эволюция архитектур, а третий посвящен микросервисам (ни одна хорошая книга о DevOps сегодня не обходится без упоминания микросервисов, не так ли?).

Хорошая архитектура дается нелегко

С того времени как я начал работать в ИТ, я серьезно интересовался архитектурой. Мой отец был архитектором «в буквальном смысле», как он любит говорить (он проектирует здания), поэтому я могу продолжить его дело, хоть и в качестве ИТ-архитектора. Как и архитектура в классическом понимании, ИТ-архитектура не обходится без основополагающих принципов, необходимых для создания успешно работающей архитектуры, которая выдержит проверку временем. И подходы к построению архитектуры также развиваются – иногда благодаря моде, иногда из-за того, что мы узнаем нечто новое.

За первые два года моей карьеры в инструменты архитекторов было включено несколько общих принципов построения архитектуры:

- KISS – «Keep it simple, stupid» («Не усложняй, тупица», или, выражаясь деликатнее, «Будь краток и не усложняй»): предостережение от чрезмерного усложнения вашей архитектуры в расчете на ситуации, которые, с большой вероятностью, никогда не возникнут;
- DRY – «Don't repeat yourself» («Не повторяйся»): многократное использование поможет избежать синдрома «мое колесо круглее твоего» – вместо того чтобы 10 раз писать код, который делает одно и то же, нужно написать код, который можно будет использовать 10 раз и более;
- используйте слои: типичная трехуровневая архитектура была стандартом в течение долгого времени (уровень представления, уровень бизнеса, уровень данных);

- инкапсулируйте: исходя из объектно-ориентированных практик, позаботьтесь о том, чтобы клиенту сервиса не было необходимости узнавать, как работает сервис; обеспечьте слабое связывание архитектур.

На заре поры облачных вычислений архитектурные принципы развивались стремительно, пытаясь приспособиться к характеру облачных вычислений. Им приходилось меняться, чтобы извлекать максимальную выгоду из облачных вычислений, – чем и занималось большинство организаций. Для настоящих облачных вычислений используется следующее:

- самообслуживание по требованию. Нам нужно иметь возможность автоматически создавать инфраструктуру для наших сервисов, делая вызовы к API, чтобы предотвратить необходимость ручного вмешательства;
- объединение ресурсов. Причина тому, почему облачные вычисления могут обходиться дешевле, – другие еще используют то, чем мы уже не пользуемся. Выделенные ресурсы можно разместить в облаке, но это может ограничить возможную выгоду от стоимости размещения, если таковая вероятна;
- сетевой доступ. Нам нужно иметь возможность получать доступ к нашим сервисам из любой точки, а также оперировать сервисами с целью сокращения ненужных ресурсов и локализации трафика;
- быстрая растяжимость. Масштабирование с целью поддержки большего количества запросов к сервисам и сворачивание для сокращения стоимости использования должны осуществляться быстро;
- дозированное использование сервиса. Нам хочется платить только за то, что мы используем, иначе облако может обойтись довольно дорого.

К сожалению, существуют некоторые облачные сервисы, которые не поддерживают всех этих возможностей. Однажды я работал с облачным провайдером, который предоставлял в пользование новую машину, после того как вышлешь ему Excel-таблицу. Это кардинально расходится с первой идеей о самообслуживаемости; также это влияет на возможную стоимость, поскольку в таком случае между запросом на изменения и самими изменениями будет происходить задержка. Вы не можете обеспечить растяжимость, если полагаетесь на Excel-таблицы.

Что касается архитектуры, это те характеристики, к которым нам необходимо стремиться, чтобы автоматически предоставлять наши сервисы, – платить лишь за то, что нам нужно касательно инфраструктуры, и предоставлять качественные сервисы благодаря возможности использовать автоматическое масштабирование и сокращение ресурсов.

Ниже представлены некоторые архитектурные принципы, которым должны следовать приложения, работая с облаком:

- автоматизированное развертывание. Если при развертывании вам нужно прибегать к шагам, выполняемым вручную, то ваша автоматизация предоставления среды будет ограничена этими шагами, и, получается, вы просто переместите «бутылочное горлышко» на новое место;

- ограничение потребления ресурсов. Чтобы использовать сервисы дозированно, нам нужно отключить компоненты, которые нам не нужны, и всегда эксплуатировать их в нужном масштабе – не слишком большом и не слишком малом;
- независимость от расположения. С учетом того, что определенные экземпляры приложения могут перемещаться по сети, нашей архитектуре необходимо иметь возможность находить каждый из компонентов. Впоследствии это поможет нам выстраивать устойчивые архитектуры;
- независимость от инфраструктуры и поставщика облачного сервиса. Нам необходимо, чтобы мы не зависели от одного поставщика; это позволит нам следовать более разнообразным моделям сокращения ресурсов и производить поиски поставщика, который предлагает наилучшее соотношение «цена–качество». Заметьте, что в действительности смена провайдеров не всегда выглядит реалистичной; в таком случае вам необходимо максимально выгодно использовать экосистему выбранного вами поставщика;
- событийно-ориентированная архитектура. Взаимодействие должно происходить асинхронно, так как сеть нельзя считать надежным средством, это позволит приложению лучше справляться с сетевыми задержками. Синхронные вызовы потребляют ресурсы в режиме ожидания и могут стать причиной значительных проблем с производительностью;
- устойчивость к задержкам. Исходя из предположения, что мы не можем рассчитывать на гарантированный ответ на запрос, нужно учитывать, что нашим приложениям придется с этим сталкиваться и как-то справляться с воздействием задержек на пользователя;
- горизонтальная расширяемость. Нужно масштабировать архитектуру, предоставляя дополнительные модули. Значит, должна быть возможность распараллеливать наш процесс. Это позволит перенаправлять запросы к любому экземпляру, что, в свою очередь, увеличит устойчивость архитектуры;
- и конечно же, безопасность. Это вашим архитекторам надлежит продумать на всех уровнях архитектуры; нельзя перекладывать такую задачу на плечи поставщика облачного сервиса¹.

Совершенствование вашей архитектуры с течением времени

Большинство организаций на данный момент используют модель архитектуры, основанную на связанной сети систем, которые полагаются на готовые коммерческие продукты (COTS), универсальные технологии или нечто подоб-

¹ Еще один пример хороших принципов построения архитектур – двенадцатифакторные приложения. Их описание вы можете найти на сайте 12Factor.net (см. материал Адама Виггинса).

ное. Поверх этой сети систем располагается *уровень доступа*. Представление некоторой ценности этого уровня доступа для бизнеса сильно зависит от основных систем. В действительности же, перед тем как организация сможет с такой архитектурой внести значительные изменения, ей придется полностью перестроить монолитное приложение. Таково на данный момент положение дел во многих организациях.

Стратегия 1: декомпозиция

Одна из стратегий, используемых нами в работе с публичным сервисом клиента, который активно пользовался мейнфреймами, заключалась в том, чтобы произвести декомпозицию архитектуры и создать *уровень абстракции* между основной системой и уровнем доступа. В нашем случае мы дали задание нашей команде, работающей с мейнфреймами, создать *расходуемые сервисы*, которыми могла бы воспользоваться наша *фронтенд-команда*. Обе команды работали согласно Agile, и мы пользовались общими планировочными событиями (подобно PI-планированию из SAFe), для того чтобы согласовать, какие сервисы все же станут доступны в определенный момент. Фронтенд-команда могла независимо развиваться, в то же время используя сервис, предоставленный приложением мейнфрейма. Когда у нее появлялась необходимость в новом сервисе, эта задача приоритизировалась в бэклоге команды мейнфрейма. По сути, это была *двухскоростная модель доставки*, обеспечиваемая уровнем сервисов, который выступал в качестве связующего между двумя режимами работы команд.

Стратегия 2: переход на диету

Согласно этой стратегии, вы, по сути, обращаетесь к необходимости обеспечить гибкость и быстроту работы, сокращая свой технический долг и наделяя ядро вашей системы большей гибкостью. Стратегия считается весьма консервативной, но в определенном контексте, особенно там, где после массивной адаптации COTS-продуктов их стало трудно поддерживать, она способна предоставить вам пространство для маневра, когда вы будете принимать решения по принятию дальнейших шагов с применением другой стратегии при перестраивании вашей архитектуры.

В работе с одним из моих клиентов мы обратили внимание на состояние одного из Siebel-приложений, используемых нами, и на то, как оно развивалось с течением времени. Нам стало ясно, что мы накопили большой технический долг. Например, некоторые изменения, сделанные нами в этом приложении, уже были интегрированы в продукт в более эффективной реализации. Также множественные адаптации продукта привели к тому, что приложение стало тяжело поддерживать – в отдельных случаях силами одной команды было уже не обойтись. Мы решили избавиться от адаптаций и посадили приложение на диету. Со временем это позволило сократить длительность цикла доставки, стоимость внесения изменений и помогло сделать код более поддерживаемым.

Стратегия 3: давайте заодно это попробуем

Я заметил рост популярности этой стратегии в течение последних нескольких лет. Вместо того чтобы работать над основными системами, создают альтернативную архитектуру, предназначенную для обслуживания определенных бизнес-целей. Эта новая архитектура выстраивается «с нуля» (с самого начала и сразу без legacy-приложений) и понемногу интегрируется со старыми основными системами или старым уровнем доступа. В этой новой системе используются современные архитектурные принципы и технические практики. Зачастую для ее поддержки создаются отдельные организационные структуры (например, цифровые команды).

Один из моих клиентов создал цифровую команду, которая работала принципиально иначе, нежели прежние технологические команды, поддерживавшие работу основных систем. В определенный момент испытанием стала необходимость интегрировать две части бизнес-логики и убедиться в том, что хорошие практики их новой организационной структуры и архитектура были переняты также и для старых основных систем, или же нужно было постепенно добавлять все больше и больше функциональности в новую организационную структуру, согласно паттерну заслонки, пока не появится возможность отказаться от старых систем и организационных структур. В случае с нашим клиентом мы пошли по пути интеграции и использовали проверенные способы работы с применением новой архитектуры, чтобы поддержать работу существующих legacy-приложений и ускорить доставку.

Стратегия 4: разрушайте основные системы при помощи микросервисов

Это самая популярная стратегия на данный момент. Суть в том, что основные системы выводятся из строя создаваемыми микросервисами, которые поддерживают части бизнес-логики таким образом, чтобы все меньше и меньше функциональности обслуживалось основными системами. Мы, опять же, используем шаблон заслонки, чтобы медленно продвигаться к достижению микросервисной архитектуры. Следующий раздел этой главы я посвящу микросервисам, чтобы помочь вам понять, как их стоит использовать.

Знакомство с микросервисами

Как я уже упоминал, микросервисы стали невероятно популярными, хотя само понятие микросервисов часто используется неоднозначно, так как не существует хорошего и точного определения, полноценно характеризующего микросервис. В целом вы можете считать, что микросервисы – это полная противоположность монолитных приложений.

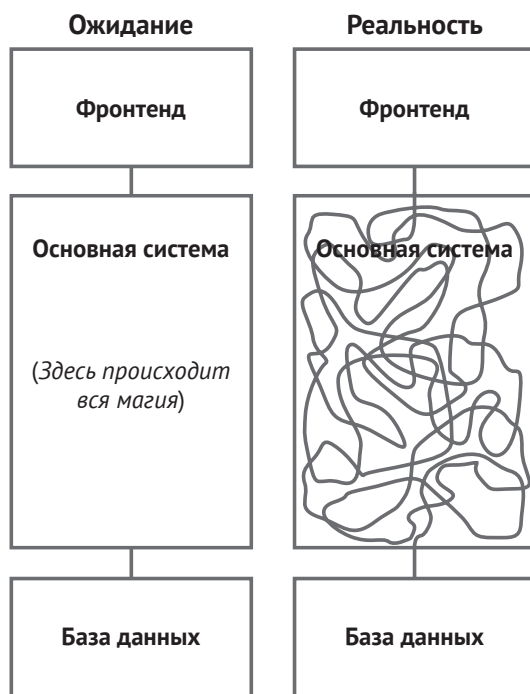


Рис. 10.1. Ожидание и реальность:
простые диаграммы не гарантируют простой архитектуры

Давайте немного поговорим о монолитных приложениях, ведь в некоторых случаях стоит использовать именно их. Если у вас сравнительно простое приложение, применение микросервисов для него будет лишней нагрузкой. В монолитном приложении зачастую легче исправлять дефекты и проводить тестирование, так как у него меньше подвижных частей, которые могут создать проблемы. И давайте признаемся, монолиты намного легче описывать и обслуживать – развивающаяся микросервисная архитектура с сотнями микросервисов, независимо разрабатываемых и развертываемых, принесет многим организациям проблемы с подходами к управлению ими. Если у какого-то компонента не будет необходимости в развитии, вы не сможете оправдывать разбитие его на микросервисы. Стоимость проектирования предсказуемой архитектуры микросервисов больше, чем у монолитного приложения, из-за внедрения дополнительных непостоянных обстоятельств, таких как сетевые задержки, совместимость с предыдущими версиями и поддержание очередности передаваемых сообщений.

С другой стороны, в то время как монолитные приложения снаружи выглядят прекрасно и отлично ведут себя на диаграммах, они часто представляют собой облачко с надписью «здесь происходит магия». Это означает, что вся сложность скрывается в «черном ящике». Я часто встречался с кодом Siebel

и немного SAP, который убедил меня в том, что за кажущейся простотой таются большие сложности. И конечно же, все становится еще сложнее с ростом монолита и вовлечением все большего количества людей в его развитие.

Микросервисы помогают видеть сложность. Как говорил, например, Рэнди Шупа: «Микросервисы есть не что иное, как хорошо сделанное сервис-ориентированное приложение» [2]. По факту, это и есть несколько сокращенное определение хорошего микросервиса: это сервис (приложение), который служит одной цели, он изолированный и независимый, у него четко определенный интерфейс и изолированная среда обслуживания (вплоть до наличия отдельной базы данных для каждого из сервисов).

Ниже приведена полезная аналогия, которую я услышал впервые из речи Джеймса Льюиса:

Это, милорд, фамильный боевой топор. Мы владеем им уже почти девять столетий. Конечно же, иногда приходилось менять лезвие. Иногда нужна была новая рукоять, по-новому спроектированные металлические детали и свежие орнаменты... Но ведь это все тот же фамильный девятисотлетний топор. Именно постольку, поскольку он мало изменился за все эти девять столетий, он все еще остался довольно неплохим топором, знаете ли. Довольно неплохим [3].

Смена деталей топора поспособствовала тому, что по прошествии девяти столетий он все еще остался хорошим топором, и того же вы хотите в отношении архитектуры. Вместо того чтобы каждые несколько лет вести проекты по ИТ-трансформации, которые несут с собой большую долю риска и дезорганизации, вам нужно добиться постоянного развития частей вашей архитектуры, чтобы она естественным образом развивалась сама.

Каковы же преимущества применения микросервисов?

Со временем все в сфере ИТ начали понимать, что не существует конечной архитектуры. Архитектура ваших систем постоянно развивается, и к тому времени, как заканчивается реализация одной архитектуры, уже появляются идеи по поводу новой. Ранее обновление архитектуры до новой версии было нелегким достижением, так как приходилось заменять крупные системы. С приходом микросервисов начали создаваться экосистемы архитектур, которые позволяют вам все время менять малые компоненты и избегать масштабных переходов. Такая гибкость может заметно повысить скорость развития архитектуры. В дополнение структура микросервисов позволяет командам получить больше контроля над их сервисом, и это поможет вашим командам быть более продуктивными и ответственными в процессе разработки сервисов. Развертывание архитектуры и механизм релиза можно будет поддерживать намного легче, вам не придется беспокоиться о зависимостях, которые должны присутствовать при релизе и развертывании сервисов. За этим, конечно, последует усложнение процесса тестирования, так как у вас будет множество

вариантов взаимодействия с сервисом. Здесь важно использовать автоматизацию и разумные подходы к стратегии тестирования.

Почему стоит использовать микросервисы?

Микросервисы стоит применять в областях, в которые компания собирается вкладываться в будущем. Сферы, где важна скорость выхода продукта на рынок, хорошо подходят для начала использования микросервисов, потому как быстрота работы с ними – основное их преимущество. Архитектура, выстроенная на зависимостях, часто застывает в бездействии по ряду причин, начиная с того, что разработчикам нужно время на ознакомление со всеми зависимостями их кода, и заканчивая тем, что релиз компонентов будет откладываться из-за увеличения длительности его цикла. Микросервисам не сопутствуют эти проблемы благодаря их независимости, которая обеспечивается их архитектурой. Конечно, это утверждение верно до тех пор, пока вы пользуетесь хорошими практиками проектирования архитектуры для ваших микросервисов; никто не мешает вам создавать небольшие интегрированные сервисы, которые мы не сможем назвать микросервисами.

Еще одна область, на которую стоит обратить внимание, – приложения, у которых нет возможности вертикального масштабирования по экономическим соображениям. Возможности микросервисов для *горизонтального масштабирования* позволяют найти более экономичное решение для обеспечения расширяемости. Разумеется, стремление к использованию микросервисов потребует вложений, поэтому вам стоит искать области, в которые есть смысл вкладываться и где задачи, упомянутые ранее, обеспечат хороший старт для ваших начинаний.

Чего может стоить успешное применение микросервисов?

Это, конечно, неудивительно, но я все-таки замечу: множество вариаций дополнительной сложности, которая сопутствует независимо развертываемым сервисам, могут присутствовать также и в среде эксплуатации. Следовательно, вам действительно стоит знать, что вы делаете. Здесь я имею в виду то, что вам необходимо иметь зрелые взгляды в ваших практиках проектирования и достаточно хорошо налаженный конвейер развертывания, в котором автоматизировано «все» (непрерывная интеграция, развертывание, тестирование). Иначе усилия и сложность, создаваемые для целей поддержки всей этой конструкции вручную, вскоре перевесят выгоду использования микросервисов. Я работал с клиентом, у которого был небольшой ряд микросервисов (менее десяти), но возможности проектирования его не были настолько зрелыми для того, чтобы обеспечить дальнейшее масштабирование, так как все еще приходилось вручную собирать и тестировать эти микросервисы. Моему клиенту было сложно добиться выгоды от применения микросервисов, пока его команда не смогла улучшить свои практики проектирования.

Закон Конвея гласит: системы подобны той организационной структуре, в которой они создаются [4]. Следовательно, чтобы пользоваться микросервисами, нам необходимо освоить принципы Agile и DevOps о кросс-функциональных командах (и в идеальном случае еще и развивать их соответственно вашим потокам ценностей). Такие команды смогут иметь полноценное управление микросервисами, создаваемыми ими (от начала до конца). Подобный подход имеет смысл, если сервисы сами по себе небольшие и изолированные: если в работу с ними будет вовлекаться множество команд (DBA, .NET-разработчики и т. п.), вы только перегрузите работу с этими маленькими сервисами. Итак, микросервисы представляются мне следующим шагом к совершенствованию возможностей проектирования при помощи практик DevOps и Agile, так как они подразумевают, что организации уже освоили обе методологии (или хотя бы близки к этому).

Как можно начать применять микросервисы?

Если ваша организация уже готова к тому, чтобы начинать применять микросервисы (предпосылками к чему могут служить освоенные практики DevOps и Agile), то вперед: выбирайте пилотный проект и создайте микросервис, отвечающий рассмотренным выше характеристикам (один сервис – одна задача, изолированность, независимость, которая четко задается интерфейсом и изолированным обслуживанием) и несущий реальную ценность для бизнеса (например, нечто часто используемое, с чем нередко сталкивается клиент и что соответствует нашему стеку технологий). Ваш первый пилотный проект не принесет сиюминутного успеха, но этот опыт вам пригодится. Для работы с микросервисами потребуются вложения организации, и изначальная стоимость затеи может оказаться не столь очевидной (например, с самого начала может показаться, что добавление новой функциональности в монолитное приложение не будет требовать много усилий и средств), но в долгосрочной перспективе гибкость, быстрота и устойчивость микросервисной архитектуры изменят ваш ИТ-ландшафт. Окажетесь ли вы в конечном счете обладателем идеальной микросервисной архитектуры? Наверное, нет. Но ваши основные сервисы могли бы просто мигрировать в архитектуру, которая создается и проектируется таким образом, чтобы обеспечивать расширяемость, что пригодится вам в мире постоянно меняющегося рынка.

Первые шаги вашей организации

Определите свою стратегию развития архитектуры

Пригласите архитекторов на совещание о стратегиях создания архитектур. Позвольте им описать существующий план, а также попытайтесь наложить эти представления на стратегии развития архитектур, которые

упоминаются в данной главе: декомпозиция имеющейся архитектуры, сокращение технического долга, создание новой архитектуры на стороне или избавление от старой основы архитектуры. Затем обсудите альтернативные подходы и посмотрите, получится ли прийти к согласованной стратегии, которая со временем обеспечит еще большую декомпозицию сервисов. Убедитесь, учитывая стратегию развития архитектур, что обеспечивается еще и наличие возможностей, необходимых для ее осуществления. Пользуйтесь моделями доставки и необходимыми для них возможностями, чтобы помочь вашим архитекторам говорить не просто о каких-то набросках системы, но о действительной возможности поддержки архитектуры благодаря применению оптимальных методов проектирования.



ГЛАВА 11

Эффективное управление приложениями и применение DevOps-инструментов

Не все, что нужно учитывать, можно сосчитать, равно как не все, что можно сосчитать, нужно учитывать.

*Уильям Брюс Кэмерон,
«Неформальная социология:
Легкое введение в социологическое мышление»*

В предыдущих главах я уже рассказывал про модели доставки и про то, как (по моему опыту) люди тратят уйму времени на аспекты разработки. Притом основное внимание уделялось «Dev»-аспектам в рамках DevOps. В этой главе мы поговорим об эксплуатационных аспектах. Здесь будут затронуты три темы: как выглядит современная эксплуатация приложений (включая мониторинг и поддержку приложения), что подразумевает процесс обслуживания платформы и как DevOps-возможности способствуют уменьшению объема работ для каждой осуществляемой доставки, который экономически целесообразен и сокращает риски, связанные с эксплуатацией.

Современная эксплуатация приложений

В организациях принято считать поддержку приложения в продуктивной среде вынужденным злом, и ее осуществляли с применением устаревшего подхода, заключавшегося в том, чтобы найти поставщика, который согласился бы делать это по низкой цене. В конце концов, вам нужно просто обслуживать приложение – изменений, должно быть, не будет слишком много. Это, к сожалению, плохой подход к поддержке приложений: в таком случае они со временем будут изнашиваться. Вам нужно будет прикладывать больше усилий для их поддержки, и это только поспособствует накоплению технического долга. Однажды я услышал о правиле 50 %, и эта идея мне понравилась: если вы тратите более 50 % усилий команды по эксплуатации на «тушение пожаров» в продуктивной среде, то вы уже проиграли. Теперь вы будете тратить на это все больше и больше времени, а все из-за того, что поленились своевременно отладить автоматизацию и поработать с базой кода приложения для обеспечения поддержки.

Мне кажется, что с развитием веб-сервисов немного сменился центр тяжести, и большая доля поддержки стала важным аспектом для бизнеса. В итоге со временем ведение эксплуатации стали возвращать обратно в руки штатных команд, хотя многие организации, работающие по старинке, все еще усиленно вкладываются в новые возможности без улучшения процессов эксплуатации.

Приложения, работающие в продуктивной среде, ранее обслуживались весьма оперативно: когда появлялась проблема, кому-то на пейджер прилетало сообщение, и проблему начинали решать. В промежутках между такими вызовами велась работа над списком известных проблем, или вообще время, затраченное на решение проблем, восполнялось за счет нерабочего времени. Сейчас в организациях развивается новая культура, заметно отличающаяся от прежней: она рассматривает дефекты в продуктивной среде не как проблемы, а как возможность все больше улучшать работу с продуктивной средой. Продемонстрирую это на примере.

Как-то мы с одним моим другом из DevOps-сообщества сидели в кофейне в Портленде, заказали себе кофе. Пока наш заказ готовился, мой друг получил сообщение о том, что возникла проблема в продуктивной среде. Я ожидал, что он сейчас вскочит и начнет всем названивать, как принято во многих организациях. Но ничего подобного! Когда я осторожно поинтересовался, как дела, друг дал понять, что для начала мы попьем кофе. И не успели мы опорожнить свои чашки, как он получил сообщение о том, что все в норме! Я был впечатлен и сказал ему, что у него, вероятно, прекрасная команда, которая так быстро решает проблемы. Его ответ меня удивил. Напротив, сказал друг, команда довольно медлительная. И медлит она не случайно, а с целью узнать, что же произошло не так. На основе полученной информации сотрудники определяют, какие способы автоматизированного распознавания проблемы можно применить и какие автоматизированные способы смогут решить проблему; только после этого реализуется само решение. В этом случае проблема являлась некой

сущностью, которая автоматически исправлялась системой. Затем мой друг объяснил, что у организаций есть два выбора – «праведный» путь, на котором все больше времени можно использовать для активного совершенствования системы, и порочный путь, на котором вы решаете возникающие проблемы, не предпринимая попыток улучшить систему в целом. Я знаю, о чем говорю, – с тех пор я стал использовать этот подход в своих проектах.

В развитом состоянии системы среды эксплуатации должны обслуживаться таким образом, чтобы вмешательство человека требовалось по минимуму.

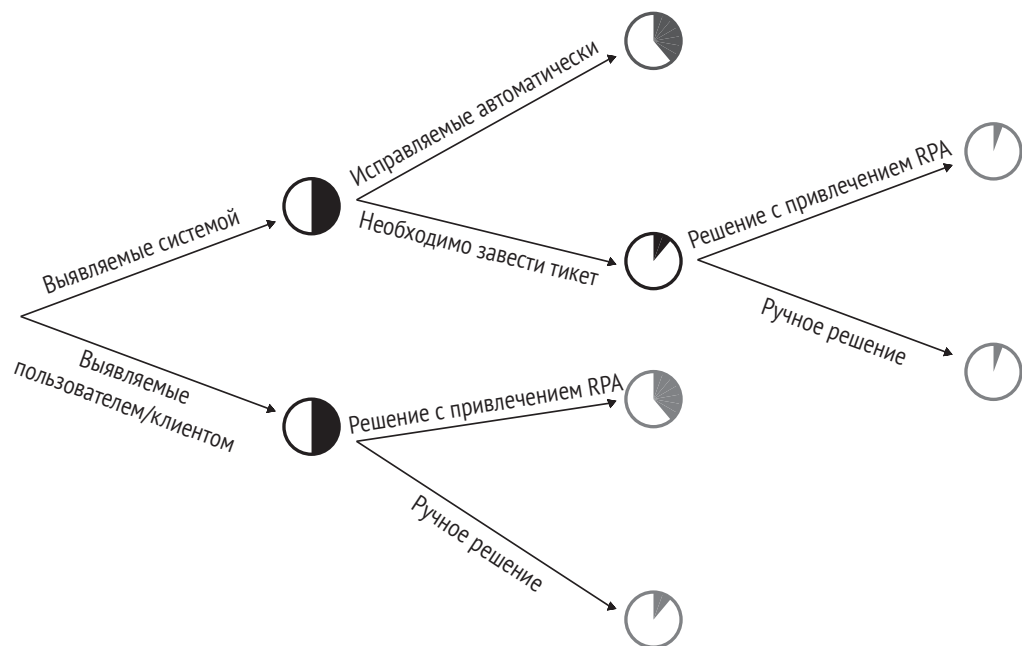


Рис. 11.1. Развитое состояние: современные системы работают по принципу сокращения объемов необходимой работы

Рассмотрим рис. 11.1. При помощи правильных подходов к мониторингу нам нужно достичь возможности самим выявлять только половину проблем посредством работы системы, чтобы эти проблемы не выявлялись в первую очередь пользователями («Выявляемые пользователем/клиентом»). Для большинства из них даже не понадобится заводить тикет – проблема будет переадресована получателем, созданным командой ранее, и разрешена автоматически («Исправляемые автоматически»). Для других проблем, которым мы еще не нашли автоматизированного решения, нужно заводить тикет, который, опять же, можно создавать автоматически. Многие сегодня считают, что мы можем обеспечивать решение этих проблем при помощи таких вещей, как роботизированная автоматизация процессов (решение с привлечением RPA),

чтобы свести к минимуму риск переделывания работы, а также объемы работы, выполняемой вручную (много сил зачастую уходит на выполнение небольшого ряда типовых задач, решение которых можно автоматизировать при помощи RPA).

Проблем, для которых не получится изобрести автоматизированное решение, останется не очень много, и они будут переданы команде специалистов по эксплуатации и будут разрешаться вручную. Что касается проблем, выявляемых пользователями, здесь мы прибегаем к схожей логике: например, пытаемся как можно чаще поддерживать разрешение проблем при помощи RPA и минимизировать количество проблем, для решения которых требуется много ручной работы. Есть еще пара полезных инструментов, которые стоит рассмотреть и использовать. Первый – это функциональность самообслуживания, которая позволяет пользователям осуществлять первую ступень поддержки и, возможно, автоматически запускать процессы напрямую из ресурса для самообслуживания. Второй – совершенствование при помощи искусственного интеллекта. При возникновении и решении проблем создается множество данных, и использование этих данных для глубокого обучения поможет вашим сотрудникам находить первопричины проблем и способы их разрешения. Все это еще находится на начальных этапах развития, но, поглядев, как компании начинают это реализовывать, я ожидаю значительного прогресса в ближайшие годы.

Чтобы воспользоваться подобными преимуществами, вам нужна достойная архитектура для мониторинга: необходимо наблюдать за инфраструктурой, производительностью приложения, а также его функциональностью. Но ведь больший объем мониторинга повлечет за собой и большую ответственность. Таким объемом информации людей можно попросту перегрузить. Обширный мониторинг – это хорошо, так как при этом предоставляются данные, а они лежат в основе всякого анализа и будущей автоматизации. В то же время огромный поток уведомлений осложняет работу. Поэтому настраивайте уведомления гибко, – не будите сотрудников отдела эксплуатации посреди ночи, если недоступность сервера на самом деле не повлияет на взаимодействие пользователя с ресурсом, или если у проблемы найдутся автоматизированные решения¹.

Формирование DevOps-платформы и работа с ней

В работе с DevOps-платформой также стоит учитывать деятельность, связанную с эксплуатацией, с которой нужно обходиться с наименьшей серьезностью. Мне нравится, как Open Group назвала одну из своих моделей ИТ4ИТ (ИТ

¹ Книга Бетси Бейер, Криса Джонса, Дженнифер Петофф и Найала Ричарда Мерфи *Site Reliability Engineering: How Google Runs Production Systems* («Проектирование надежности сайта: Как Google запускает производственные системы») описывает хорошие практики мониторинга, которые помогут вам сделать правильный выбор.

для ИТ) [1], и здесь это название как раз очень подходит. Вы работаете с ИТ-системами, которые поддерживают ИТ-системы бизнеса. Поддержание их в рабочем состоянии не менее важно, чем сама работа систем продуктивной среды, и это не должно осуществляться просто с рабочей машины разработчика или в «песочнице». Представьте себе ситуацию, когда вы сталкиваетесь с инцидентом в продуктивной среде, который требует срочных исправлений. Если в это время будет недоступна или повреждена система управления версиями исходного кода, то у вас будут неприятности! Проектировать DevOps-платформу нужно с учетом этих эксплуатационных сложностей.

Подобно обсуждаемому выше выбору приложений для бизнеса, в выборе инструментов для DevOps у нас такая же проблема¹. Какие инструменты лучше всего подойдут для DevOps? Не буду углубляться в описание конкретных инструментов; вместо этого я расскажу вам, на что обращаю внимание при поисках DevOps-инструментов, кроме предоставляемой ими функциональности. По моему опыту, составлять хорошие наборы DevOps-инструментов можно из любых инструментов, но некоторые инструменты сложнее интегрировать, чем другие.

Очевидно, что DevOps-инструменты должны соответствовать DevOps-практикам и способствовать формированию правильной культуры. Это означает, что инструменты должны работать за пределами своей экосистемы. Очень маловероятно, что компания будет пользоваться инструментами только одного поставщика или экосистемы. Поэтому наиболее важное качество инструмента – возможность интеграции с другими инструментами (а также возможность последующей его замены, что очень важно для выживания на стремительно развивающемся рынке). Получается, в первую очередь при поисках DevOps-инструментов стоит обращать внимание на то, как хорошо поддерживается API. Можете ли вы пользоваться всей функциональностью, предоставленной UI, посредством API (при помощи консоли или языка программирования)?

Мы должны обращаться с нашими инструментами, как и с любым из наших приложений в организации, то есть нам нужно применять к ним контроль версий. Второе, на что стоит обратить внимание, – возможность управлять версиями всех конфигураций инструмента во внешнем конфигурационном файле (не только в самом приложении). Со вторым аспектом связана функциональность для поддержки множества окружений для инструмента (например, разработки и эксплуатации). Насколько легко будет передавать конфигурации по средам? Как можно проводить слияние конфигураций в различных окружениях (или строках кода)? Необходимо, чтобы у всех в компании был один и тот же инструмент. Это уже связано с поисками подходящей модели приобретения лицензии. Конечно же, есть и открытое программное обеспе-

¹ Кажется, что новые DevOps-инструменты появляются на рынке чуть ли не каждый месяц. Это можно объяснить тем, что бывает трудно описать все используемые DevOps-инструменты. Советую обратить внимание на XebiaLabs – один из лучших справочников, своеобразную «периодическую таблицу» DevOps.

чение, которое прекрасно справляется с такой задачей, но как насчет коммерческих решений? Они тоже могут пригодиться! Еще важнее, что они не отталкивают от их использования. Например, для инструментов, которым необходимо пользоваться агентом, не должна выставляться оплата за каждого агента, так как в таком случае будет присутствовать желание не использовать их повсюду. Проводите переговоры о корпоративном решении, чтобы для каждого случая использования не приходилось создавать бизнес-кейс.

Визуализация и аналитика – важные аспекты каждого набора DevOps-инструментов. Чтобы они работали, нам нужно добиться легкого доступа к данным; это значит, что у нас будет необходимость извлекать данные или запрашивать их. Если ваши данные хранятся в непригодной модели данных или если у вас нет способа получения доступа к данным и извлечения их для анализа и визуализации, то потребуются дополнительные время и усилия для получения подходящих данных. Панели управления и отчеты, формируемые самим приложением, не могут послужить достойной заменой, ведь вам наверняка понадобится проводить агрегации и анализ в рамках набора инструментов.

Полагаю, эти критерии уже достаточно очевидны, но, как ни удивительно, немногие инструменты им соответствуют. Инструменты open source зачастую выглядят выгоднее в этом плане, но для работы с ними наверняка понадобятся хорошие технические навыки членов вашей команды, чтобы она могла осуществлять настройку и поддержку. Я надеюсь, что поставщики инструментов начнут понимать: если они хотят предоставлять DevOps-инструменты, нужно прислушиваться к ценностям, принятым в культуре DevOps, иначе они так и будут проигрывать инструментам open source. В то же время подумайте о том, что более всего важно для вас и вашей организации, а затем примите компромиссное решение, поступившись малозначимым критерием. Не существует идеальной архитектуры инструментов.

Но как вы будете управлять постоянно развивающимся пространством DevOps-инструментов? Здесь я бы посоветовал применять практический подход, так как вам нужно будет все стандартизировать и в то же время сохранить гибкость. В общем случае в крупной организации имеет смысл иметь минимальный набор инструментов для поддержки, и тому есть несколько предположений:

- оптимизация стоимости приобретения лицензии;
- навыки сотрудников, которые можно будет использовать по всей организации;
- упрощение интеграции инструментов.

Да, с одной стороны, некоторые инструменты лучше других подходят для специфичного контекста (например, .NET-инструменты могут отличаться от ваших основных инструментов). К тому же постоянно появляются новые инструменты.

В целях сохранения гибкости я реализовал следующий подход:

- начинайте с небольшого набора стандартных инструментов в вашей организации;
- позвольте определенной доле команд постепенно отказываться от использования стандартных инструментов (к примеру, в течение трех-шести месяцев);
- в конце этого «пробного периода» соберите информацию и вынесите решение о том, что делать с данным инструментом:
 - заменить его стандартным;
 - добавить его к ряду инструментов для применения в специфичном контексте;
 - отказаться от использования нового инструмента, а затем перевести команду обратно на стандартный инструмент.

Все, что мы ранее говорили про поддержание работоспособности систем продуктивной среды, применимо и к нашей DevOps-платформе. Об этом я уже вел речь в разделе о моделях доставки; вам нужно определиться с топологией окружений, которая позволит развивать вашу DevOps-платформу вместе с окружениями для разработки и эксплуатации. Как видите, понятие IT4IT от Open Group довольно точно описывает суть дела.

Работа с небольшими партиями изменений

Один из наиболее важных факторов, которые влияют на прикладываемые усилия и риски в среде эксплуатации, – размер поставляемой партии изменений. Ранее партии были довольно большими, так как множество изменений было сведено в ежегодном или ежеквартальном релизе. Так обстояло дело, поскольку верилось в то, что менее рискованно иметь дело с редкими, но крупными изменениями, к тому же действовали экономические мотивы: при таких условиях стоимость этого события была меньше. Оптимальный размер партии определялся по стоимости развертывания партии и по предполагаемой выгоде от удержания завершенной функциональности до наступления времени следующего релиза (см. рис. 11.2). Поскольку стоимость развертывания была высока (в расчет принимались контроль качества, исправление проблем и продуктивная среда после развертывания), объем партии приходилось делать большим, но методы, представленные в третьей части книги, помогут вам сократить операционные расходы и, таким образом, уменьшить стоимость партии изменений (см. рис. 11.2). Это, в свою очередь, увеличит скорость осуществления доставки, упростит внесение каждого изменения, а также уменьшит общую стоимость развертывания и работы с изменениями в среде эксплуатации. Поэтому кроме выгоды для бизнеса, о которой мы говорили выше, малые партии обеспечивают еще и практические преимущества в плане осуществления эксплуатации.

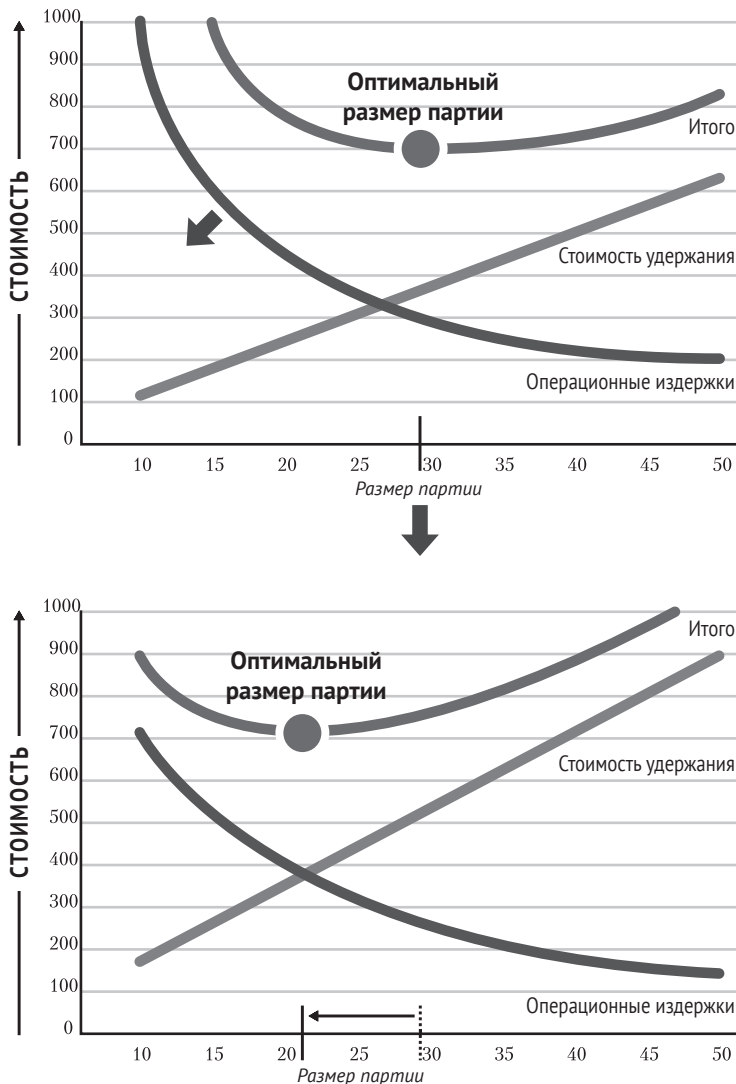


Рис. 11.2. Сокращение операционных издержек способствует уменьшению размеров партий с изменениями

Первые шаги вашей организации

Анализ проблем

В этом упражнении мы рассмотрим способы улучшения администрирования вашего приложения при помощи анализа тикетов с проблемами, чтобы определить, что можно автоматизировать. Как я уже говорил, у вас

есть уйма данных, потенциал которых не используется. Примитесь за эти данные из тикетов о проблемах и проведите несложный их анализ. Удобно будет использовать облако тегов, чтобы разметить общие понятия (например, «перезапуск сервера», «смена пароля», «нет данных»), а затем провести категоризацию на основе этих данных. Разобравшись с этим, пробегитесь по тем категориям, которые упоминались чаще всего, чтобы увидеть, что можно улучшить в системе автоматически или хотя бы с частичным использованием автоматизации. Обычно требуется два-три отборочных цикла перед осуществлением категоризации, основанной на наборе тегов и других метаданных, – этого будет достаточно, чтобы составить относительно точную картину для анализа. Это даст вам начальную точку для создания автоматизированной системы среды эксплуатации, которая со временем сможет сама себя исправлять.

Пересмотрите свои DevOps-инструменты

Подкрепите хорошими принципами выбора DevOps-инструментов (достойный API, конфигурация как код, подходящая модель получения лицензии), посоветуйтесь с архитекторами в вашей организации и составьте список инструментов, которые вы используете для поддержания ваших DevOps-возможностей. Вы удивитесь, как много инструментов у вас есть и сколь многие из них частично перекрываются по функциональности! Проанализируйте эти инструменты на предмет того, как долго они смогут служить (при помощи табл. 11.1, куда вы можете добавить свои критерии, специфичные для вашего контекста), а также выявите слабые места, где ваши инструменты действительно не соответствуют методологии DevOps и тянут вас назад. Сформируйте стратегию замены этих инструментов в будущем.

Таблица 11.1. Обзор DevOps-инструментов: они должны сами соответствовать хорошим практикам DevOps

| Критерий | Инструмент А | Инструмент Б |
|--|--------------|--------------|
| Поддержка API | | |
| Управление конфигурациями | | |
| Множественность окружений / поддержка ветвлений кода | | |
| Модель приобретения лицензии | | |
| Доступ к данным | | |

ГЛАВА 12

Облако

Джей: Оно отправилось! Оно отправилось в облако!

Энни: И ты не можешь спустить его обратно из облака?

Джей: Никто не понимает, как работает облако! Это чертова загадка!

Из фильма «Домашнее видео: только для взрослых»

К сожалению, для многих организаций облако все еще является чем-то загадочным – точнее говоря, не сама концепция облака, а выгода, которую облако может предоставить. В данной главе я хочу приоткрыть завесу тайны и рассказать про некоторые сложности, которые могут возникнуть при переходе к работе с облаком, а также про то, что нужно сделать организации, чтобы в дальнейшем пользоваться преимуществами облака. Итак, ниже мы сосредоточимся на переходе на облачную инфраструктуру и управлении ей. Мы уже обсуждали понятие «программа как сервис» (SaaS) в главе 3, а также говорили об архитектуре приложения в главе 10. Все это поможет вам осмыслить многоплановое применение облачных сервисов.

Данная глава, по большому счету, раскрывает выгоду их использования, но не стоит забывать и о других преимуществах и рисках, связанных с облаком. Из плюсов: легче настраивать сокращение ресурсов, что способствует их устойчивости масштабируемости, а также прочной экосистеме связанных между собой сервисов, которую вам так или иначе пришлось бы выстраивать самостоятельно. Из минусов: зависимость от стороннего поставщика, сложности с принадлежностью данных, а также риск атак в том случае, если вы пользуетесь популярной платформой.

Базовые принципы облачной экономики

Прежде чем мы начнем обсуждать переход на облако, возможно, стоит подробнее ознакомиться с экономической моделью, по которой работает облако. Если вы обратитесь напрямую к сравнению облачных сервисов и локальных решений, то в общем случае облачные решения окажутся более дорогостоящими (например, наличие одного полностью используемого локального сервера обойдется дешевле, чем наличие такого же активно используемого сервиса в облаке). Некоторые даже моделировали соответствующие ситуации, и вы можете поискать исследования подобного рода в интернете. Хотя осуществлять подобное сравнение в принципе проблематично, так как стоимость поддержания экосистемы высчитать сложно. По опыту работы с клиентами могу сказать, что перенос приложений в облако часто не приносит значительного сокращения расходов, пока вы не посвятите время некоторому рефакторингу и перепроектированию архитектуры.

Экономика облака основана на общем использовании ресурсов, чтобы все могли платить только за то, чем они пользуются, а остальные ресурсы могли использоваться кем-то другим. С другой стороны, это означает, что часто меняющиеся сервисы смогут в большей мере воспользоваться преимуществами облачной модели. Преимущества облачной модели зависят от того, насколько быстро сервис способен адаптироваться в соответствии с требуемыми изменениями (см. рис. 12.1).

Важно понимать эту базовую модель гибких возможностей, которые стараются отвечать потребностям приложения, когда вы рассматриваете переход к облаку, а также грамотно прогнозировать, как преимущества этого перехода скажутся на вашей архитектуре.

Рассуждения об облачной архитектуре

Учитывая предыдущие рассуждения, можно понять, что монолитные приложения предоставляют мало возможностей для того, чтобы можно было соответствовать такому уровню изменчивости. Если у какого-либо компонента приложения возрастает нагрузка, то все приложение придется дублировать, и понадобится создавать новый экземпляр. Представьте, что у вас есть несколько каналов для осуществления бизнеса, и только на один из них по выходным приходится нагрузка (пусть, например, это канал, связанный с интернетом). В таком случае вы захотите масштабировать работу только этого канала, а другие пусть работают, потребляя минимальные ресурсы. Если все приложение исполнено как монолит, вам придется обеспечить работу всех каналов, которые будут потреблять одинаковое количество ресурсов, а это обойдется намного дороже.

Но если архитектура позволяет независимо масштабировать отдельные сервисы (как в случае с микросервисами – см. главу об архитектуре), то масштаби-

рование можно проводить более избирательно, а значит, будет легче оптимизировать затраты. Это основное преимущество облака.

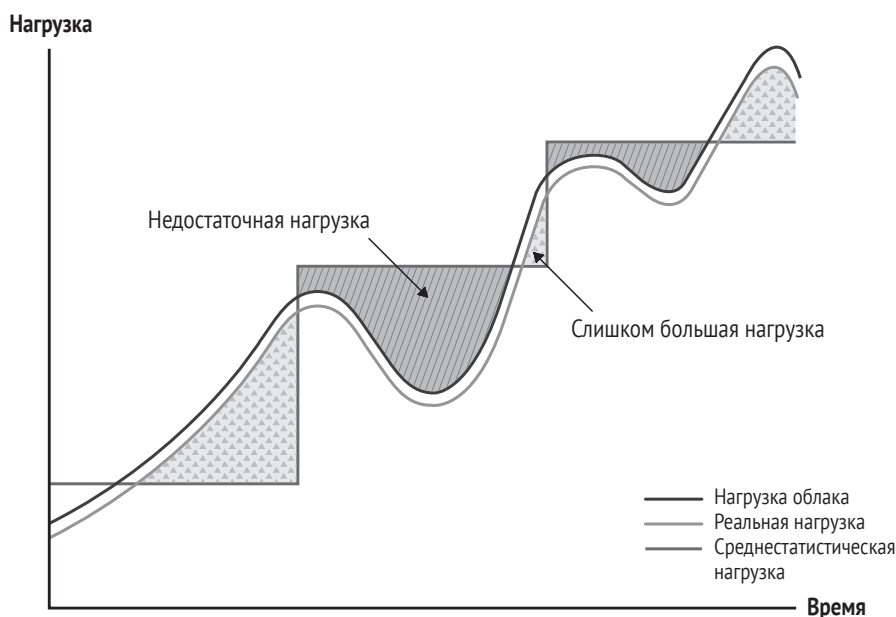


Рис. 12.1. Нагрузка и время:
если все сделать правильно, то нагрузка облака
растет соответственно потребностям

Тем не менее чем больше вы разбиваете элементы архитектуры, чтобы воспользоваться ранее описанными преимуществами, тем больше вам придется иметь дело с подвижными частями архитектуры. При избытке подвижных частей придется совершенствовать возможность управления множеством версий. Вместо того чтобы управлять двадцатью приложениями, вам, возможно, придется управлять 150 сервисами, у каждого из которых к тому же свой собственный ряд версий. Это почти нереально, если не обеспечить достаточный уровень автоматизации – а это подразумевает все, что нужно для автоматизации модели доставки с применением облака.

Другая проблема работы с таким количеством подвижных частей – повышение риска сбоев. С одной стороны, вроде бы ничего страшного, но как все-таки уменьшить список того, что может отказать в нашей архитектуре? Концепция архитектуры, которую мы здесь рассматриваем, называется *элегантной деградацией*. Представьте себе интернет-магазин, например Amazon, который может предоставлять вам персонализированные рекомендации, основанные на ваших предыдущих покупках. Если этот сервис по какой-то причине перестанет работать, сайт не будет выдавать ошибку при загрузке или позволять задержкам в получении ответа на запрос отображаться; вместо этого Amazon

будет всего лишь показывать вам некоторую статичную рекомендацию. Возможно, ваше впечатление от работы сервиса будет слегка подпорчено (хотя многие просто ничего не заметят), но это все же лучше, чем получить сообщение об ошибке или об истечении времени ожидания. Идея элегантной деградации работает во многих контекстах, но не во всех, и обычно представляет более экономную альтернативу поддержания доступности всех ресурсов одновременно.

Облачная архитектура часто подразумевает использование пакетов или шаблонов (например, Docker-шаблонов) из облачных репозиториев, что прекрасно сочетается с перспективой повторного использования. Но это не значит, что вам не нужно обслуживать данные зависимости. Например, очень маленький пакет чуть не оказался причиной крупных перебоев доступности интернета в 2016 году, когда разработчик по имени Азер Коцулу взял пакет из интернета, который использовался во многих других системах, и в итоге нечаянно навредил работе этих систем [1]. Другой риск в том, что в используемых пакетах могут быть уязвимости, о которых вы не знаете. Джош Корман говорил об этом в 2015 году на корпоративном DevOps-саммите, ссылаясь на исследования, которые он провел с целью узнать, сколько open-source и сторонних компонентов находится среди шаблонов Docker (многие из них оказались неизвестными, совсем как в вышеприведенном примере с малыми пакетами). Корман обнаружил, что более чем у 20 шаблонов Docker имеются известные уязвимости. Это подвергает вас множеству рисков [2]. Поэтому недоступность (или смена версии), а также известные уязвимости, скрывающиеся в шаблонах, – это то, что вам приходится активно обслуживать в вашем приложении.

Один из моих клиентов решил на весьма консервативную стратегию, состоящую в создании внутреннего репозитория для каждого используемого компонента. Копия каждой используемой версии скачивается и хранится из публичного облака для каждой из используемых версий, а также активно обслуживаются эти версии. Новые версии не начинают использоваться ими автоматически, им нужно потратить силы, для того чтобы посмотреть, нет ли новых версий, а затем нужно взять их для себя. Но это значит, что они могут предотвратить случаи недоступности и конфликтов версий, а еще у них будет непосредственная возможность проводить анализ на наличие известных уязвимостей. По стоимости это не всегда выгодно, но вы можете оценивать риск, выбирая, насколько активно вы управляете этой частью облачной архитектуры.

Управление облаком

Гибкость, которую обеспечивает облако, – это замечательно. Типичное узкое место проектов (из-за недостатка окружений) исчезает, и освобождаются ресурсы для доставки. Но гибкость таит в себе и новые проблемы. Раньше для выделения средств на развитие вашей инфраструктуры требовалось проведе-

ние детального планирования, и к делу подходили со всей внимательностью. Но в случае с облаком любой разработчик, имея на руках корпоративную кредитную карту, может приобрести услуги облачных сервисов. Один из клиентов, с которым я работал, открыл публичную облачную инфраструктуру для его разработчиков, и бюджет на окружение, рассчитанный на полгода, исчерпался в первый же месяц. Само собой, это послужило хорошим уроком для организации.

В то же время, если от длительного процесса закупок для инфраструктуры вы придете к длительному процессу одобрения использования облачной инфраструктуры, такой переход не даст преимуществ. Главное здесь – найти золотую середину. Вам придется сформировать новую модель управления, которая будет учитывать стоимость и скорость работы, при которых команды смогут принимать правильные решения в процессе обеспечения окружений.

Логическое управление окружением все еще остается обязательным при работе с облаком. При работе с моделью обслуживания локального сервера основная функция заключается в том, чтобы контролировать то, кто может пользоваться окружением и в какой момент, а также то, какая конфигурация используется в данной среде в определенный момент времени. В работе с облаком вам также хочется убедиться в соблюдении определенных стандартов вашей организации и в том, что для этого предоставляются нужные шаблоны. В дополнение нужно убедиться, что у вас есть стратегия использования отдельных окружений и место, в котором вы сможете собрать и протестировать все приложения. В конце концов, вам нужно точно знать, что есть место для тестирования конфигураций приложений, которые будут использоваться в продуктивной среде. Разветвление окружений и связанных с ними конфигураций приложений может значительно усложнить задачу, если никто не будет этого контролировать.

Организации могут как-то справиться с некоторыми из этих задач, пользуясь системой управления облачными ресурсами или системой-посредником, которая будет соответствовать контексту вашей организации в консоли управления. Такая система также обеспечивает следование стандартам безопасности, когда поставляются только одобренные к применению шаблоны и предусмотрены ограничения бюджета. В идеальном случае такая система может определить, какой из поставщиков облачных сервисов может предложить самую низкую цену, и предоставить окружение этого поставщика, но по мере написания этой книги я все больше убеждаюсь, что ситуация смены поставщиков менее реалистична, чем мы думаем. Каждый поставщик предлагает специфичные сервисы, предоставляющие дополнительные преимущества, но вместе с тем до определенной степени закрепляющие вас за ним. Управление такими системами-посредниками, однако же, принесет немало пользы. Наличие облака окажется кстати, если у вас множество подвижных компонентов, и чем больше их будет появляться, тем лучше должны быть подходы к управлению ими. Спросите себя, насколько хорошо вы управляете окружениями и как много их у вас. Теперь представьте, что у вас облачная архитектура, в которой

вы сосредоточили в десятки или сотни больше окружений. Будет ли текущий подход к управлению окружениями по-прежнему работать?

Проектирование надежности сайтов

При работе с облаком традиционные концепции администрирования также необходимо пересмотреть. Понятие, которое зачастую связано с этим переходом, – «проектирование надежности сайтов» (Site reliability engineering, SRE), популяризированное Google.

Исходя из предположения о том, что облачная архитектура работает с малыми компонентами, что прекрасно сочетается с необходимостью сокращать ресурсы, вы вряд ли встретитесь с полной недоступностью ваших ресурсов (хотя для этого сам поставщик должен быть полностью доступен). Это, в свою очередь, означает, что вместо традиционного показателя периода доступности

$$\frac{\text{период недоступности компонента}}{\text{весь период}}$$

(который имеет смысл использовать, когда вы наблюдаете за малыми компонентами) вам стоит предпочесть показатель доступности сервиса (например, определенный сервис может поставляться со специфичными ему производительностью и качеством):

$$\frac{\text{всего запросов – неудачные запросы}}{\text{всего запросов.}}$$

В управлении этими показателями доступности используется понятие о *суммарной погрешности*. Идея в том, что у каждого сервиса есть стоимость периодов недоступности сервиса по причине запланированной деятельности (например, обновления или развертывания) или некоторой проблемы. Имея этот показатель, команды могут в определенной степени решать, что с ним делать (например, если они уверены в том, что развертывание потребляет 5 % бюджета, но расчеты неверны и на самом деле потребляется 25 % ресурсов, то у них будет меньше ресурсов для выполнения других задач). Это мотивирует команды находить менее затратные решения для обновлений и развертываний, а также более подходящие способы поддержания доступности сервисов. Также наличие общего для Dev- и Ops-команд показателя часто используется в кругах DevOps для согласования работы команд. Облачные решения нередко разрабатываются обеими командами, чтобы можно было минимизировать воздействие на эту стоимость.

Одним из релевантных показателей, который поможет вам свести к минимуму ошибки при расходовании бюджета, является *время до восстановления* (mean time to recovery, MTTR). Его часть называют ключевым показателем. Он охватывает время, за которое восстанавливается доступность сервиса с мо-

мента обнаружения проблемы. Вместе с показателем *времени до обнаружения* (mean time to discovery, MTTD), который охватывает период с момента возникновения проблемы до ее обнаружения, эти метрики помогут вам справляться с незапланированной недоступностью. Учитывайте эти две метрики в ваших оценочных таблицах DevOps или SRE – вместе с метрикой доступности, – чтобы все могли их увидеть и вы смогли оценивать и измерять ваше совершенствование со временем.

Мониторинг в SRE-модели (безусловно) должен разделяться на три категории:

- 1) уведомления: это когда вам нужно решительно что-то делать, чтобы восстановить работу сервиса. Помните, что мы не просто пытаемся здесь успеть восстановить все как можно раньше, и мы не будем будить инженера, если сервер или сервис не работает, но это не окажет критического воздействия на пользователя. Нам нужно придерживать решение этого вопроса до подходящего момента. Иначе наши дежурные инженеры вскоре перегорят;
- 2) тикеты: существуют проблемы, которые мы обнаруживаем, но не нуждаемся в их срочном разрешении. При мониторинге системы должны создаваться тикеты, которые сразу будут приоритизироваться в бэклоге и обрабатываться в нормальное рабочее время;
- 3) логи: они окажутся полезными не только при возникновении проблем, но еще и когда нужно будет проводить анализ тенденций и определять области, нуждающиеся в улучшении.

Проектирование надежных сайтов формализует использование научного метода для постоянного совершенствования. Поэтому вам нужно каждый раз прогнозировать, к чему приведет то или иное улучшение, оценивать исходные условия, а после реализации проверять, действительно ли улучшение принесло пользу.

Тем не менее важно стремиться к лучшему, всячески мотивируя к этому вашу команду и не подразумевая некоего наказания за то, что улучшения не были сделаны раньше. Тактика подведения итогов без поиска виноватых символизирует переход от поиска корня проблемы, когда организация пытается выявить команду или человека, ставшего причиной возникновения проблемы, к прогрессивной культуре, в которой проблема используется для выявления способов улучшить систему и по возможности исключить повторение той же ошибки в будущем. Как я отмечал в главе 8, Etsy придерживается идеи о том, что каждый новый сотрудник должен сразу начинать совершать развертывание в продуктивной среде. Вы могли бы подумать, что это рискованно, но в Etsy считают, что если новичок может что-то сломать в продуктивной среде, это всего лишь сигнал: система недостаточно прочна, чтобы выявлять простые проблемы, которые может принести новичок. Сосредоточенность на совершенствовании системы, которое ставит целью упростить ее применение, аналогичным образом используется в сообществах DevOps и SRE.

Этой перемене культуры способствует то, что DevOps-практики и облако помогают справляться с изменениями, вовлекая меньше рисков. Так или иначе, развертывание в продуктивную среду можно рассматривать как очередную стадию тестирования. Если вы развертываете всего лишь небольшой пакет изменений в продуктивную среду и тестируете новую версию при помощи небольшого потока данных из продуктивной среды – это можно назвать *канареечным тестированием* (дело в том, что когда-то канареек использовали в угольных шахтах для выявления мест скопления газа), – то любое отрицательное воздействие будет ограничиваться количеством данных, которое мы передали новой версии. Мы можем регулировать тестирование согласно нашим требованиям по рискам, а также откатывать изменения при необходимости.

Та же техническая конфигурация, что и в случае с канареечным тестированием, позволяет нам проводить и A/B-тестирование; таким образом, мы можем использовать две различные конфигурации сервиса в продуктивной среде и смотреть, какая из них показывает наилучшие результаты, а затем, когда мы уже уверены в том, что нашли наилучшую альтернативу, мы выкатываем эту конфигурацию полностью на продуктивную среду.

Я хотел бы упомянуть еще два признака хорошей облачной архитектуры и организаций, которые их достойно обслуживают. Во-первых, это предсказуемость: поставщики облака позволяют вам осуществлять динамическое масштабирование в ряде ваших сервисов. Различные обстоятельства могут все же вынудить вас произвести некоторое прогнозирование (и вам нужно будет проводить его постоянно). В Австралии проводятся скачки под названием Кубок Мельбурна, на которых формируется фонд в 140 миллионов австралийских долларов на ставках в забеге, который длится секунды и вызывает всплеск интернет-пары [3]. Этот всплеск запросов на сайте Кубка Мельбурна не то, что DevOps-команда сайта может сбросить на плечи поставщика облака: здесь им нужно формировать свое собственное решение для прогнозирования и масштабирования. Хорошие организации понимают, в каком случае условия будут отличаться и какая архитектура будет подходящей для таких случаев, в то время как другие организации просто будут полагаться на стандартные средства, предоставляемые поставщиком облака.

Во-вторых, вам нужно моделировать работу над возможными проблемами. Вы можете использовать нечто вроде «обезьянней армии» Netflix – в состав которой, помимо других инструментов, входят Chaos Monkey (произвольно отключающий серверы), Chaos Gorilla (отключающий целые зоны доступности Amazon) и Latency Monkey (искусственно провоцирующий задержки во взаимодействии с клиентским сервером), – чтобы посмотреть, способны ли вы устранить такого рода проблемы [4]. Эти инструменты можно использовать регулярно, и они все чаще становятся составной частью стратегии организации для поддержания надежности сервисов. Еще одна стратегия – симуляция крупной катастрофы (такой как землетрясение или пожар; некоторые даже учитывают сценарии вторжения пришельцев), для того чтобы протестировать устойчивость и выявить слабые места. На самом деле эти эксперименты нуж-

ны не для того, чтобы доказать, что вы готовы к катастрофе, а для того, чтобы выявить пути дальнейшего развития. Чем лучше становится ваша система, тем больше усилий нужно приложить для того, чтобы ее сломать. Слабая точка всегда будет, и ваша задача – ее найти. Хорошие облачные архитектуры устойчивы к деструктивному воздействию и улучшаются после каждой попытки их сломать. Архитектуры, которые не тестировались на устойчивость, рискуют сломаться тогда, когда это действительно важно, – во время реального использования. Коротко говоря, хорошая обычная архитектура использует то, что предоставляет платформа и расширяется самой организацией дополнительными возможностями, для того чтобы она могла обеспечить потребности бизнеса и архитектуры приложения.

Первые шаги вашей организации

Пересмотрите ваши облачные приложения

Исходя из того, какие преимущества предоставляет для вас облако (с учетом двух факторов – разветвленности архитектуры и зрелости приложения относительно DevOps-практик), пересмотрите ваши текущие облачные приложения (или те, которые планируете убрать). Чтобы это осуществить, сначала проанализируйте архитектуру для выявления компонентов, которые не зависят друг от друга и позволяют масштабировать их по отдельности. Также выявите сервисы, которые нужно изолировать для целей дальнейшего рефакторинга архитектуры. Пересмотрите каждый изолированный компонент на предмет зрелости относительно DevOps-практик (SCM, управление сборкой и развертыванием, автоматизация тестирования), чтобы выявить бреши, которые необходимо заполнить.

Далее спросите себя, действительно ли вы получите выгоду от гибкости облака, предоставляемого для этих приложений, а также от гибкости архитектуры. Только при наличии подходящей архитектуры и возможностей автоматизации вы сумеете полноценно использовать преимущества облака. Вам стоит начать с обеспечения этих возможностей – перед переходом в облако или по факту перехода, – чтобы сократить стоимость содержания облачной архитектуры, а также риски отрицательного появления воздействия на бизнес в случае обнаружения проблем.

Основываясь на этом анализе, вы получите список приложений, которые уже готовы к переходу в облако, и бэклог предстоящей работы, которая предполагает подготовку все большего количества приложений для перемещения в облако посредством рефакторинга архитектуры и обеспечения дополнительных возможностей DevOps.

Прорепетируйте ситуацию катастрофы в облаке

Выберите какой-либо сценарий для тестирования (например, ваш поставщик облака обанкротился, и вы потеряли доступ ко всем системам и дан-

ным, хранящимся в облаке) и проведите несколько экспериментов: что вы будете предпринимать, чтобы все восстановить. Это будет подразумевать, например, создание новой инфраструктуры у разных поставщиков облака, установку приложений, необходимых для обслуживания бизнеса, а также восстановление данных из внешнего источника. Здесь нужно сделать две вещи:

- 1) выявить слабые места и приоритизировать их для того, чтобы усовершенствовать вашу облачную архитектуру;
- 2) оценить область поражения и затраты времени на восстановление, чтобы понять, что можно было бы улучшить в дальнейшем.



ЗАКЛЮЧЕНИЕ

Осознанная работа

Я убежден, что самообучение – это единственно возможный вид обучения.

Айзек Азимов, «Прошлое науки – будущее науки»

На протяжении всей книги мы в деталях обсудили, насколько должна трансформироваться работа организации, для того чтобы можно было отойти от производственного стиля мышления. Такую перемену осуществить нелегко, и не все методики из тех, что я упоминал, подходят каждой организации. Более того, важно, чтобы вы вкладывали время, силы и средства в правильные преобразования, иначе вы еще больше запутаетесь. Тем не менее потенциальная выгода очевидна, и я советую вам при любой возможности выискивать способы реализации современных технических подходов в вашей компании. Работа ИТ – креативная работа, для выполнения которой требуются творчески мыслящие люди, а не роботы, механически делающие одно и то же. Будучи руководителями и менеджерами креативно настроенных сотрудников, мы должны оставаться в курсе того, что происходит в индустрии, чтобы развивать наши рабочие процессы в верном направлении. В конце концов, нам нужно использовать все новые технологии и практики, способные укрепить бизнес. Необходимо постоянно учиться.

Теперь, когда мы достигли конца книги, я хочу поделиться некоторыми ображениями по поводу того, как удовлетворять потребность в непрерывном обучении, а также поделюсь с вами ресурсами, которые использую для пополнения своих знаний. Эта информация пригодится тем, кто считает себя сознательным работником, особенно тем, кто работает в ИТ.

Как управлять собой в мире, где ваша работа меняется каждые несколько лет и новые инструменты и технологии изобретаются быстрее, чем когда-либо? Работа в современной ИТ-организации может пугать: многое меняется на

глазах, традиционные роли смещаются. Agile, в частности, стал испытанием для многих проектных менеджеров, поддерживающих проектные планы, составленные задолго до этого. А новые техники и инструменты продолжают появляться все быстрее.

Вот что я уяснил за последние несколько лет: организации не смогут обучить вас всему, что вам нужно. Я считаю, что в Accenture самая лучшая программа обучения в мире, она охватывает почти все темы, но вам нужно не только развивать широкий ряд навыков, но еще и продвигаться вглубь, осваивая каждый из них. Для этого обычно нужно больше, чем компания может обеспечить, и для погружения организации в совершенно новую тему чаще всего требуется время. А посему где можно пройти дополнительное обучение и чего это будет стоить?

- Конференции: хотя я понял, что невозможно составить бизнес-кейс для конференций, ибо большая часть того, что вы узнаете, принесет результат только через несколько месяцев, это все еще наилучший источник новых тенденций и идей. Если вы подойдете к кому-то из спикеров после выступления, то узнаете чуть больше о неудачах и горьком опыте на его пути. Постарайтесь поговорить с людьми откровенно, чтобы сделать для себя полезные выводы.
- Локальные митапы: похожее занятие – посещение локальных митапов. Сейчас проводится такое количество митапов, что бывает сложно выбрать наилучший из них. Мой совет: выбирайте те, которые вписываются в ваш график. В моей организации я поручил одному человеку проводить регулярные собрания для группы сотрудников: так им легче посещать митапы. Таким образом можно объединить тимбилдинг и обучение чему-то новому. Это бесплатно! Я имею в виду, насколько лучшим может казаться такой тимбилдинг для компании? Возможно, вам стоит периодически объявлять и чествовать в вашей организации чемпиона по посещению митапов.
- Массовые открытые онлайн-курсы, такие как Coursera, бесплатно предоставляют слушателям курсы университетского уровня. Они обычно выстраиваются согласно материалам видео- и аудиолекций и дополняются заданиями, которые необходимо выполнить для закрепления пройденного (для этого понадобится не только смотреть видео, но и читать тексты, что может отнимать довольно много времени). Я проходил несколько десятков таких курсов; некоторые из них были связаны с работой (искусственный интеллект, программирование, блокчейн), другие затрагивали общие темы, такие как искусство и политика. Это замечательный способ узнавать что-то новое, если вы можете позволить себе потратить на это пару часов в неделю.
- Open-source проекты: если у вас есть несколько свободных часов, но вы не хотите потратить их на структурированную деятельность, например прохождение онлайн-курсов, то можете предпочесть open-source проект,

что позволит вам осваивать новые технологии и инструменты. Лично я не занимался этим продолжительное время, я занимался лишь короткими домашними проектами, где писал небольшие программы для упорядочивания моей фотоколлекции или для сбора данных из различных источников для оптимизации планирования моего бюджета. Я уверен, что есть много способов быстро добиваться результатов, но обучение, как ни крути, важнее, чем выполнение текущего задания.

- Блоги и подкасты: если у вас не очень много времени, то блоги и подкасты, возможно, подойдут вам больше. Вы можете следить за частными блогерами, такими как я, или воспользоваться агрегаторами блогов, такими как Dzone, InfoQ, DevOps.com, либо DevOps-блогом Accenture, где представлены проработанные статьи блогов, охватывающих широкий круг тем. Подкасты – также хороший источник информации: их можно слушать по дороге на работу, занимаясь спортом или путешествуя. Таким образом, вы сумеете уделить время самообразованию даже в условиях, когда это обычно полагают невозможным. Можно было бы, как я или многие другие, вместо этого зависать в интернете или тысячу раз проверять почту... Но, согласитесь, изучать что-то новое во сто раз полезней!
- Книги: и конечно же, всегда найдется книга, которая вас чему-то научит. В конце этой книги приводится список литературы, которую я настоятельно рекомендую к прочтению.

Тайм-менеджмент

Быть новоиспеченным родителем, писать эту книгу (а также вести блог до и после ее выхода), работать консультантом в международной компании и при всем этом поддерживать здоровый образ жизни – для меня испытание не из легких. Мир технологий быстро развивается, и если погружаться в него лишь на работе, со временем вы потеряете связь с последними тенденциями. Для поддержания статуса ответственного работника вам нужно быть в курсе происходящего и находить время на изучение новостей. Все, что касается вашего саморазвития, крайне важно, и если вы не отводите для этого достаточно времени, то не сможете поспевать за прогрессом. Как я уже говорил, проблемы, которые существуют на данный момент в индустрии, на мой взгляд, частично вызваны нами самими, потому что как лидеры мы должны держать руку на пульсе и следить за переменами. Мы слишком сильно полагаемся на расхваленные подходы, продолжая действовать по шаблону, вместо того чтобы попытаться понять, как последние тенденции формируют новый мир ИТ и бизнеса.

Для меня каждая тренировка – это возможность послушать подкаст (пусть не всегда, но довольно часто я сопротивляюсь соблазну послушать музыку и предпочитаю выбрать подкаст). То же самое касается походов на работу и путе-

шествий. Я часто добираюсь до работы на велосипеде и слушаю подкаст – получается, что я одновременно выполняю три задачи: тренируюсь, еду на работу и узнаю что-то новое.

На работе много отвлекающих факторов, и порой твой календарь забит под завязку всякого рода совещаниями, важными и не очень. Один из способов сберечь полезные рабочие часы – распланировать время на работу и на проверку почты. Если у вас есть дела, которые должны выполняться регулярно (например, подготовка текущего отчета, написание статьи для блога или составление отчета по расходам), пометьте их в вашем календаре. То же касается и почты: вместо того чтобы просматривать ее когда придется, зафиксируйте это занятие в определенном получасовом временном промежутке дня. И наконец, выделяйте интервалы времени на вашу основную работу – когда вы будете создавать продукт, писать код или просматривать чью-то работу. Если в вашем календаре есть наиболее приоритетные пункты, то другие несрочные дела должны занимать только пустые места в этом календаре. Так вы не обнаружите себя составляющим отчеты по ночам из-за того, что время длиной в день, неделю или месяц умудрилось ускользнуть от вас.

В этой книге я не стремлюсь дать вам пошаговые инструкции: я не тешу себя мыслью, что вы в точности будете повторять то, что я вам расскажу (как консультант и как муж я знаю: к тому, что твои ценные советы игнорируют, поневоле привыкаешь). На что я действительно надеюсь, так это на то, что вы позаимствуете из книги некоторые идеи. Все, что я написал, выстрадано на опыте. Как и все вы, я продолжаю учиться и развиваю свои подходы к каждому проекту, клиенту и к сотрудничеству с людьми, практикующими DevOps.

Для того чтобы очистить ИТ-индустрию от накопившихся стереотипов, как я уже говорил, нужно много усилий. Новые технологии и практики будут появляться непрерывно. Эта книга, мне кажется, будет актуальна еще долгое время, но мы продолжим развиваться, и следующее поколение лидеров будет воспринимать новый на сегодняшний день образ мышления как данность. Подготовительные траты будут по-прежнему сокращаться (просто подумайте, например, о функциях Amazon Lambda), и вместе с этим меньше партии работы и ускоренная доставка станут реалистичными. Нам нужны новый образ мышления и новые техники управления, чтобы справляться со сложностью, которая возникает из-за таких подвижных явлений. Но сначала давайте сосредоточимся на нескольких шагах в ближайшей перспективе и с них начнем развивать наше собственное решение. В книге я представил свои проверенные рекомендации и поделился опытом работы с десятками проектов и компаний. Надеюсь, это поможет вам на пути к трансформации вашей организации. Я видел, что происходит, когда организации совершенствуются и люди, которые работают в ИТ, по-настоящему увлекаются своим делом. Наблюдать такие изменения – лучшее вознаграждение, и все это очень помогает бизнесу. Вам не нужно становиться еще одним Netflix или наилучшим ИТ-отделом в стране, чтобы оказывать влияние на своих сотрудников и бизнес. Продолжайте движение, и кто знает – может быть, вы станете примером для подражания.

Подозреваю, что у вас, как и у всех нас, свободного времени не в избытке. К тому же, потратив деньги на эту книгу, вы часть времени посвятили ей, а это для меня еще более ценно. Спасибо вам! Эта книга – плод многих размышлений, призванных улучшить индустрию, в которой мы работаем. Я буду рад, если вы напишете мне, что сработало для вас, а что – нет: это поможет мне продолжить свои изыскания. Не стесняйтесь высказывать свои соображения и пожелания. Возможно, мы могли бы даже встретиться на одной из конференций или на локальном митапе. Если увидите меня, подходите поболтать!



ПРИЛОЖЕНИЕ

Аналогия с заводом: подробности

Фундаментальный принцип: процессы в производстве и креативные процессы в ИТ

Концепция производства состоит в том, что мы проектируем продукт, определяем процессы производства, а затем производим ряд одинаковых товаров. В ИТ мы поставляем решение, которое уникальным образом воплощается в нашем контексте каждый раз, когда вносятся изменения. Мы никогда не делаем один и тот же продукт, используя все те же компоненты и такой же исходный код в точно такой же архитектуре. Устаревшие процессы производства стремятся к уменьшению вариативности. В ИТ мы стремимся при помощи вариативности находить наилучшее решение проблемы, тем самым удовлетворяя наших клиентов.

Оценка продуктивности и качества на основе стандартизированных результатов

Мы уже говорили о том, что в ИТ одно и то же решение никогда не поставляется дважды, между тем как в производстве поставляется большое количество одинаковых товаров. Это, в свою очередь, влияет на оценку продуктивности и качества. Давайте начнем с чего-то менее противоречивого – с качества.

В производстве, если мы изготавливаем одинаковые товары, оценить качество легко, если у нас есть некий образец или спецификация. Любое отличие от образца будет восприниматься как снижение качества, и мы можем расценивать количество таких расхождений как меру качества нашей производственной системы. При наличии системных проблем, если исправить их, решение распространится на все копии продукта. Тестирование произведенного продукта часто осуществляется стохастически – мы выбираем некоторое количество образцов из нашей производственной системы, чтобы удостовериться, что вариативность в производстве остается в пределах ожидаемых показателей.

В ИТ у нас нет «правильных» образцов или целевых спецификаций. Мы осуществляем тестирование согласно требованиям, пользовательским историям или спецификациям проекта, но исследования и опыт показывают, что в них кроются источники многих дефектов в ИТ. Поэтому на образец или целевую спецификацию не получится полностью положиться. Дефекты чаще всего исправляются путем решения проблемы отдельного товара, а не всей производственной системы. В итоге количество найденных дефектов не всегда говорит о самом уровне развития системы производства, так как мы можем продолжать поставлять все тот же неэффективный код, что и раньше. Оценивать качество в ИТ нужно по-другому. (Как это делать, было показано в главе 7.)

Продуктивность в ИТ оценивать еще сложнее¹. По правде говоря, я был участником многих дискуссий, круглых столов и разговоров о метриках, но пока что выверенного средства для оценки ИТ-продуктивности не нашел никто из тех, с кем я общался. Многие СЮ признавались, что им не нравится то, что они используют для оценки продуктивности. Если представить это все в контексте отличия ИТ от производства – то, что в ИТ креативные начинания позволяют находить уникальные решения, и как это выглядит в сравнении с массовым производством, – то становится очевидно, что добиться правильной оценки продуктивности сложно. Как бы вы измеряли продуктивность работы отдела маркетинга, писателя или автора песен? Вы можете оценить результаты (за год стало больше листовок, больше книг, больше песен), но лучше ли от этого стала работа отдела маркетинга, писателя и автора песен?

Думаю, вы согласитесь, что результаты (например, успешная маркетинговая кампания, продажи бестселлера или популярность песни) более важны, чем конкретный продукт вашей работы. Раньше мы измеряли продуктивность количеством строчек кода, *функциональными точками* и другими количественными показателями, хотя мы довольно быстро найдем аргументы против того, чтобы их использовать. С приходом Agile мы стали использовать стори-поинты и высчитывать скорость работы по проекту (*velocity*), которые являются шагами для нахождения хорошего ответа на наш вопрос, так как с их помощью можно оценить поставляемую функциональность. Но по своей сути продук-

¹ В одной из статей в своем блоге я рассуждал о том, что продуктивность – это показатель, который сложно измерить в ИТ. Вместо этого вы можете измерять продолжительность циклов, расходы и поставленную функциональность [1].

тивность все еще остается показателем, который измерить сложно. Это приводит к развернутым дискуссиям, особенно тогда, когда вы работаете с партнером по ИТ-доставке, которого хотите убедить в том, чтобы он работал более эффективно. (Я раскрываю эту тему подробнее в главе 4.)

Я бы хотел, чтобы кто-нибудь потратил немного денег и поэкспериментировал с запуском параллельных проектов на Agile и водопаде, с распределенными командами или размещенными в одном месте и т. п., чтобы можно было продемонстрировать, какой из вариантов лучше, и доказать всем, кто задерживает доставку своей позицией, благосклонной к водопаду. В то же время среда делает выбор за нас: стремительно развивающийся рынок с постоянно меняющимися требованиями мешает упрямо следовать методологии водопада.

Функциональная специализация и набор навыков сотрудников

На традиционном производстве оттачивать процессы стремятся при помощи высококвалифицированных и узкоспециализированных сотрудников, вместо того чтобы уделить внимание тем сотрудникам, которые являются неотъемлемой частью процесса. Методологии ИТ-доставки изначально следовали такому подходу, поскольку применение хорошо структурированной методологии несет в себе ряд преимуществ. ИТ сегодня полагается на креативных сознательных сотрудников, что отличает эту индустрию от традиционного производства. Чрезмерно узкая специализация сотрудника, который выполняет одну специфичную задачу в цепочке доставки ценности в ИТ (например, тестирование или разработку), доказала свою неэффективность, так как узкоспециализированным организациям бывает трудно сложить общую картину контекста. Учитывая, что решения в ИТ не повторяются, освоение контекста – это очень важный этап обеспечения успешной доставки.



Рис. П.1. Т-образная схема навыков: сотрудники, обладающие Т-образными навыками, имеют больше навыков, чем «I-образные» сотрудники

Движения Agile и DevOps пытаются преодолеть разобщенность, которая присутствует на протяжении всего цикла разработки продукта, и преследуют цель сделать работу организации более ориентированной на контекст, более быстрой и высококвалифицированной. Вместе с этим на смену идеальному работнику, работающему только в одной области, приходит человек с навыками в более широком ряде областей. Сотрудники с T-образными навыками имеют хорошее понимание нескольких областей и глубоко специализируются в одной из них, между тем как сотрудники с I-образными навыками обладают знаниями лишь в одной области [2]. Идея, стоящая за всей этой специализацией, в производстве должна была позволить менее опытным работникам научиться хорошо выполнять работу, полагаясь на исчерпывающее количество инструкций для процесса производства (которые были составлены квалифицированным инженером), что помогало в некотором роде восполнить нехватку навыка. Такой вариант, к сожалению, невозможно осуществить в ИТ из-за креативной и сложной природы работы.

Предсказуемость процесса производства и управление им

Процесс традиционного производства довольно жестко детерминирован. Как только вы определитесь с процессом производства, необходимыми ресурсами, вы начнете получать ожидаемый продукт. К сожалению, ИТ это не свойственно. Следование методологии, которая успешно сработала в другом проекте, не гарантирует того, что в новом проекте вы получите аналогичные результаты. Конечно, существует определенная корреляция с тем, что организации становятся более успешными: в результате некоторые методологии применяются более широко, чем другие (например, SCRUM или PMBOK). Но это методология, которая не настолько эффективна для ИТ, как для традиционного производства.

Умение предсказывать результаты производства предоставляет возможность исправлять проблемы с продуктом, изменяя уже сам процесс. Это не случай ИТ: просто внести изменения в процесс – не значит исправить его. Многие профессионалы по смене подходов к управлению в этом убедились.

Более того, наличие множества ресурсов для креативной работы подразумевает, что процесс сам по себе будет более сложным и менее предсказуемым. Процесс управления, который подразумевает такой же уровень предсказуемости, как на производстве, в итоге приводит к появлению массы непродуктивных явлений в организации. Сотрудники будут стараться подгонять цифры под ожидаемые, но это осуществляется в рамках процесса реагирования на непредвиденные ситуации или при помощи манипулирования данными результатов работы процесса и с использованием всякого рода неоднозначных моментов в ИТ. Более эмпирический подход, такой как Agile, позволяет нам показывать действительный, менее точно прогнозируемый прогресс и приводить наши ожидания в соответствие ему. Дон Райнертсен хорошо описал слу-

чаи, когда предположение о том, что доставка ИТ-продукта может быть предсказуемой, может принести немало проблем, связанных с менеджментом. Он объяснил, что традиционное производство основывается на повторяющихся и предсказуемых задачах, в то время как доставка продукта – по своей сути процесс, уникальный в каждом случае. Попытки использовать техники, которые работают для предсказуемого процесса доставки, в стремительно меняющейся среде приведут к неудаче [3].

Подробнее аспекты управления освещаются в главе 3. А здесь лишь замечу, что если вы, рассматривая графики burndown или burnup (Agile-механизмы для составления отчетности о работе в проекте), видите полное соответствие действительных значений планируемым, то вы, скорее всего, где-то смухлевали.

Важность предварительного планирования и возможность рассчитывать на него

Благодаря тому факту, что процессы производства более предсказуемы, чем издержки на подготовку, стоит полагать, что есть смысл выделять больше времени и сил на предварительное планирование. Это означает, что мы можем составить план изготовления нового продукта на производстве, сделать его прототип, а затем выпускать один и тот же продукт партия за партией.

В ИТ каждый из продуктов уникален, как мы говорили ранее. Это значит, что мы не сможем добиться по-настоящему производственного процесса, но вместо этого будем работать в среде, которую скорее можно сравнить с процессом прототипирования в производственной среде. Однако мы часто пытаемся использовать опыт процесса производства, подразумевающего все это планирование, вместо того чтобы обратиться к более инкрементальному процессу прототипирования. В итоге мы, получается, ожидаем увидеть предсказуемость там, где существует вариативность результатов.

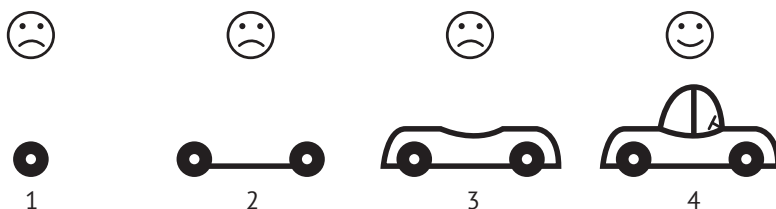
Как писали Гэри Грувер и Томми Маусер в книге *Leading the Transformation: Applying Agile and DevOps Principles at Scale*, «исполнительным директорам необходимо понимать, что управлять ПО и процессами планирования так же, как и всем остальным в организации, – не самый эффективный подход. Каждое новое ПО проекта уникально, поэтому здесь уровень неопределенности при планировании еще выше» [4].

Управление доставкой

Традиционное производство долгое время руководствовалось научными подходами в менеджменте, и хотя с течением времени они меняются, они все еще являются основой современного производства. По сути, это значит, что нам нравится управлять компонентами доставки в конце процесса: например, нас вполне устроит, что доставка будет осуществляться по принципу «черного ящика», если конечный продукт соответствует изначальным ожиданиям. По-

скольку спецификации здесь тоже играют немаловажную роль, мы вполне можем полагаться на этот процесс.

НЕ ТАК!



А ВОТ ТАК:

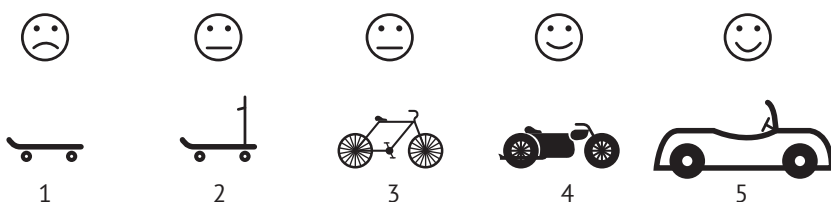


Рис. П.2. Итеративная и инкрементальная доставка:

у итеративной доставки преимущества продукта наращиваются постепенно, в то время как в инкрементальной продукт можно будет использовать только после того, как он будет полностью готов

(по рисунку Хенрика Кнайберга «Понимаем MVP (минимальный жизнеспособный продукт)», 25 января 2016 года, blog.crisp.se/2016/01/25/Henrik_kniberg/making-sense-of-MVP)

В ИТ спецификации не столь однозначные, управление в ИТ нужно осуществлять как можно более прозрачно. С течением времени Agile доказал, что с конусом неопределенности можно обходиться, создавая небольшие инкременты рабочей программы, которые уже можно оценивать при осуществлении каждой итерации. Такая схема не совсем возможна в производстве, поскольку осуществлять множество итераций при создании автомобиля труднее, чем при создании сайта. Поэтому в производстве мы продолжаем полагаться на инкрементальные процессы создания и улучшения. На рис. П.2 наглядно показана разница между инкрементальной и итеративной моделями доставки на примере создания автомобиля.

Автоматизация = продуктивность

Автоматизация – один из аспектов, в котором производство и ИТ-доставка стремятся достичь общей цели: автоматизировать настолько, насколько это возможно. Автоматизация – ключ к продуктивности. В производстве автоматизация подразумевает то, что мы можем изготавливать больше товаров, во-

влекая в процесс все меньше людей; это справедливо и для ИТ. Разница в том, что в производстве автоматизация является частью процесса изготовления (например, автоматизация вносит свой вклад в результаты сборки или создания деталей продукта). В ИТ автоматизация упрощает работу разработчикам и тестировщикам и помогает им быть более продуктивными и креативными, когда выполнение рутинных и малозначимых процессов автоматизируется. На заводах мы часто наблюдаем автоматизацию производства от начала до конца, в то время как в ИТ нам непросто представить такое явление (только если не предположить сценарий доминирования искусственного интеллекта над человеческим). Справедливо для обеих отраслей, что достоверность результатов ухудшается, если для выполнения автоматизируемых задач используются ручные тестировщики. Люди не очень хорошо справляются с повторяющимися задачами, и им стоит сосредоточиться на креативных аспектах работы.

Масштабирование усилий для доставки большей ценности

Все, о чем мы говорили выше, – детерминированный процесс производства, меньшая возможность полагаться на работников, обладающих узкоспециализированными навыками, разница в предсказуемости результатов – указывает на то, что масштабирование производства мы пытались осваивать на протяжении многих лет. Вы строите завод и нанимаете рабочих, и у вас уже есть неплохие шансы на то, чтобы производить какой-либо продукт, даже несмотря на возможные проблемы с культурой или логистикой.

В ИТ при масштабировании усложняются рабочие процессы – они становятся значительно сложнее, чем в традиционном производстве. Здесь присутствует больше заинтересованных сторон, с которыми необходимо взаимодействовать, нужно более широко распространять информацию, и общий контекст нужно составлять, основываясь на взаимодействиях и их границах. Стоимость дополнительного масштабирования в ИТ довольно значительная. Хотя ИТ-системы продолжают расти, нам надо находить способы справляться с этим, помимо того что следует приглашать больше людей. Наши ИТ-системы должны решать крупные проблемы, поэтому следует искать лучшие подходы к масштабированию. Примеры показывают, что если вовлечь чересчур много людей в проект, у которого имеются проблемы, это не улучшит результаты, а только ухудшит их. Фредерик Брукс рассказывал, как приглашение все большего количества программистов в проект IBM не ускорило работу, а еще больше замедлило [5]. Или, как он едко заметил, «вынашивание младенца в утробе занимает девять месяцев, несмотря на количество женщин, причастных к его рождению» [6]. Иметь возможность делать больше, не расширяя круг участников проекта и при этом упрощая поддержку систем, – вот чего добиваются те, кто практикует Agile и DevOps, вместо того чтобы просто раздувать рабочую группу.

Централизация ресурсов

Заводы были механизмом, обеспечивающим концепцию экономии на масштабе. Центральные ресурсы производства, например производственные машины и исходные материалы, хранились в одном месте, чтобы рабочие могли иметь к ним доступ и производить продукт наиболее эффективным путем. В ИТ дела изначально обстояли точно так же. У вас был доступ к мощным компьютерным ресурсам, а позднее и к хорошему интернет-соединению. Сегодня все это вам доступно благодаря широкополосному интернету и облаку. А значит, местоположение определяется не расположением ресурсов, а необходимостью взаимодействовать и иметь возможность пользоваться рядом навыков. Как собрать хорошую команду, чтобы поставлять желаемые результаты? Существуют некоторые ресурсы, которые еще стоит централизовать (например, предоставление удобных инструментов для разработчиков и стандартизированных окружений), но в этом со временем становится все меньше надобности, и это определенно не влияет на выбор местоположения.

Офшоринг

Выведение производства за рубеж было подходящим способом сократить экономическое влияние на производство. Процесс производства можно было воспроизвести за рубежом, и вариативность результатов можно было сносно контролировать. В ИТ слишком часто применяется этот же принцип, но без осознания того, что невероятно важно для успешной ИТ-доставки учитывать контекст – и, соответственно, для получения того же результата необходимо поддерживать каналы взаимодействия. Офшоринг все еще является хорошим способом расширения ваших ИТ-возможностей, особенно когда речь идет о масштабировании. Если говорить об эффективном использовании средств на оплату работы специалистов, то доставка проекта, осуществляемая при помощи штатных команд или команд, распределенных по всему миру, скорее всего, обойдется в ту же цену. Распределенность команд обычно замедляет процессы из-за проблем с коммуникацией; таким образом, проекты с распределенными командами обычно длятся дольше. Во многих случаях штатные команды не способны выступать в роли подходящего варианта из-за требуемых навыков и доступного количества инженеров. И возможностями офшора можно воспользоваться, чтобы успешно поставлять сложные проекты. К сожалению, многие ИТ-директора все еще рассматривают офшоринг как средство сокращения расходов, вместо того чтобы пользоваться им для расширения возможностей, что, в свою очередь, приводит ко множеству проблем с неоднозначной репутацией, создаваемой для офшорной доставки.

Аутсорсинг

Аутсорсинг ИТ-услуг осуществлять намного сложнее, чем аутсорсинг традиционного производства. В производстве вы выводите за рубеж изготовление некоторого специфичного компонента, и пока все соответствует спецификациям – все счастливы. К тому же вам удобно контролировать результаты, так как вы производите конкретный продукт.

Аутсорсинг ИТ осуществлять намного сложнее. Спецификации в ИТ сложнее и в большей степени подвержены изменениям. Мы знаем, что многие проблемы с качеством исходят из самих требований, и ни один проект еще не завершился до того, как одна из заинтересованных сторон не изменила требований. Учитывая то, что мы не можем с легкостью предопределить результат и оценить его заранее, нам нужно быть внимательными к процессам. Аутсорсинг-партнер в ИТ должен предоставлять вам возможность, которой вы не имеете, пользуясь штатными возможностями, будь то навыки или опыт работы, а также соблюдать прозрачность и взаимодействовать с вами, поскольку вам придется вместе работать над сложным процессом доставки. Только тогда, когда обе стороны получают свою выгоду, проект будет успешным. Подумайте о том, что это может означать для вашей коммерческой модели и для стратегии работы с людьми в контексте обеих сторон. Слишком много представителей ИТ-аутсорсинга много обещают и затем довольно быстро остывают или выходят в работе на тонкую грань. Мне повезло, что я работал с прекрасными организациями, представители которых тесно сотрудничали со мной, чтобы выстроить взаимовыгодную структуру для доставки проектов.

Надеюсь, вам стало понятно, что идеи, которые привели нас сюда и ранее делали нас успешными, необходимо переосмысливать и адаптировать к нынешней ситуации. Вместо того чтобы думать о трудоемких моделях традиционного производства, нужно использовать нечто подобное на сильно автоматизированное производство. И я думаю, что движение DevOps будет замечательным катализатором изменений в образе мыслей работников компаний.



МАТЕРИАЛЫ ДЛЯ САМОСТОЯТЕЛЬНОГО ИЗУЧЕНИЯ

Книги

- *Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation* Джеза Хамбла и Дэвида Фарли: довольно неплохое руководство о том, как реализовывать непрерывную доставку.
- *Leading the Transformation: Applying Agile and DevOps Principles at Scale* Гэри Грувера и Томми Маусера: прекрасная книга с прагматичными советами о том, как начинать трансформацию в ИТ.
- *The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations* Джина Кима, Джеза Хамбла, Патрика Дебуа и Джона Уиллиамса: эта книга предоставляет вам объемное руководство для реализации DevOps-практик.
- *The Effective Manager* Марка Хорстмана: замечательная книга о хорошем менеджменте, который сосредоточен на людях, с которыми вы работаете.
- *The Goal: A Process of Ongoing Improvement* Элияху Голдрата и Джефа Кокса: легкое чтение о бизнесе, которое познакомит вас с системным мышлением.
- *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* Эрика Рая: Эрик описывает, как структурированное экспериментирование позволит вам лучше решать бизнес-проблемы.
- *The Phoenix Project: A Novel About IT, DevOps, and Helping Your Business Win* Джина Кима, Кевина Бера и Джорджа Спаффорда: эта книга легко познакомит вас с концепциями и культурой DevOps.
- *The Principles of Product Development Flow: Second Generation Lean Product Development* Дональда Райнертсена: прекрасная книга, содержащая лучшие рассуждения о партиях доставки.

- *Site Reliability Engineering: How Google Runs Production Systems* Бетси Бейер, Криса Джонса, Дженнифер Петофф и Найала Ричарда Мерфи: узнайте о современных методах администрирования для приложений, вдохновленных опытом Google.

Подкасты и онлайн-ресурсы

- *The Agile Revolution*: австралийский подкаст, посвященный Agile (TheAgileRevolution.com).
- *Arrested DevOps*: в подкасте предоставляется информация о предстоящих конференциях, а также звучат рассуждения на тему DevOps (ArrestedDevOps.com).
- *Career Tools*: полезный подкаст компании Manager Tools, предоставляющий рекомендации каждому на пути его карьеры (www.manager-tools.com/all-podcasts?field_content_domain_tid=5).
- *DevOps Café*: разговорный подкаст обо всем, что связано с DevOps (DevOpsCafe.org).
- *The Economist Radio*: ежедневный подкаст с новостями науки и политики (radio.economist.com).
- *Freakonomics Radio*: подкаст об удивительных взглядах науки на мир вокруг нас (freakonomics.com/archive/).
- *HBR IdeaCast*: бизнес-подкаст издания *Harvard Business Review* с глубоким анализом различных тем (feeds.harvardbusiness.org/harvardbusiness/ideacast).
- *Manager Tools*: замечательное руководство для менеджеров и руководителей (www.manager-tools.com/all-podcasts?field_content_domain_tid=4).
- *The Ship Show* (больше не выпускается, но прежде записанные эпизоды все еще доступны): один из самых ранних DevOps-подкастов (TheShipShow.com).
- *Software Engineering Radio*: профессиональный подкаст на технические темы (www.se-radio.net).
- TED Talks: воодушевляющие разговоры, которые часто раскрывают научные и технологические аспекты (www.ted.com/talks).



ГЛОССАРИЙ

12-факторное приложение: архитектурный концепт, предусматривающий 12 критериев для разработки современных приложений.

CRM-система: система управления взаимоотношениями с клиентами, позволяющая компании последовательно работать со своими клиентами и в дальнейшем выстраивать бизнес-отношения.

Definition of done: практика Agile, согласно которой пользовательская история будет считаться успешно выполненной (см. **Definition of ready**).

Definition of ready: практика Agile, определяющая входной критерий готовности пользовательских историй к работе в следующем спринте (см. **Definition of done**).

ERP-система: система управления ресурсами – практика управления всеми ресурсами для производства и выполнения необходимых процессов организации.

Jenkins: инструмент для реализации непрерывной интеграции.

LeSS: Large-Scale Scrum: метод масштабирования в Agile.

MTTD: примерное время, необходимое для подтверждения обнаружения проблемы.

MTTR: примерное время, необходимое для исправления проблемы.

Open source: модель распространения приложений, основанная на идее безвозмездного пользования и добровольного внесения своего вклада в исходный код приложения.

Perl: скриптовый язык программирования, часто используемый в задачах по автоматизации.

PI-планирование: регулярное крупное мероприятие по планированию, которое является составляющей Scaled Agile-фреймворка и на котором собираются все заинтересованные стороны для осуществления следующего цикла планирования.

PMI (ИУП): Институт управления проектами; проводит тренинги и сертификации для проектных менеджеров.

Scaled Agile-фреймворк (SAFe): популярный фреймворк масштабирования для осуществления Agile-доставки.

Site Reliability Engineering: современный подход к организации процессов эксплуатации, популяризованный компанией Google.

WSJF: система оценки, по результатам которой вы получаете список задач, приоритизированный по соотношению ценности задачи для бизнеса к стоимости ее реализации. Формула этой оценки основана на принципах SAFe: стоимость задержки / время выполнения.

ХааS: модель предоставления услуг «все как сервис».

Артефакты сборки: файлы, полученные в результате сборки билда, обычно в виде бинарного файла, который можно использовать в развертывании приложения.

Бимодальная ИТ: концептуальная идея того, как новые, более совершенные ИТ-системы разрабатываются в отличной от старых систем манере.

Ввод в эксплуатацию: выпуск нового функционала или новой программы, полностью подготовленных к использованию клиентами.

Версионирование: практика хранения множества версий программы или компонента для дальнейшей возможности отката к любой из версий.

Вертикальное масштабирование: техники масштабирования, при которых добавляются дополнительные вычислительные или другие службы для того же экземпляра приложения вместо распределения рабочих процессов на дополнительные экземпляры.

Вызов без сохранения состояния: техника программирования, при которой службе не требуется знать текущее состояние транзакции.

Вызов с сохранением состояния: техника программирования, при которой служба должна запоминать состояние транзакции для последующего успешного его использования в нескольких транзакциях.

Вызов функции: техника программирования, позволяющая использовать функции других приложений или частей текущего приложения.

Вычислительная среда: окружение приложения, которое позволяет выполнять программы.

Горизонтальное масштабирование: техника масштабирования, в которой дополнительные рабочие процессы распределяются на большее количество систем аналогичного размера и формы, вместо того чтобы обеспечивать наличие дополнительных ресурсов для этих систем.

Двухскоростная модель доставки: модель, поддерживающая две разные скорости доставки, которые будут отличать быстро изменяющиеся системы от медленно изменяющихся.

Декомпозиция систем: техника, позволяющая изменять системы независимо друг от друга и подразумевающая создание интерфейсов, которые будут эффективно работать при смене каждой из систем.

Жизненный цикл доставки ПО (SDLC): данный цикл описывает все действия, необходимые для имплементации требований идей к выпуску продукта в массы.

Изоморфизм ИТ-бизнеса: подход к организации, который подразумевает сближение ИТ и бизнес-функций, что поможет упростить коммуникацию между ними.

Индикатор соотношения стоимости/производительности (CPI): метрика, позволяющая измерять объем произведенной работы за определенную стоимость.

Инструментарий DevOps: набор инструментов, сопутствующий таким практикам DevOps, как управление конфигурациями, автоматическая загрузка и автоматизация тестирования.

ИПЛ (NPS): индекс потребительской лояльности – метрика, определяющая степень удовлетворенности услугами, предоставляемыми организацией или провайдером.

Истинно устаревшее ПО: системы, которые более не обновляются, но продолжают работать, поддерживая бизнес-функционал (см. также **Устаревшее ПО**).

Итоги ознакомления: встреча по окончании фазы ознакомления, во время которой более широкий круг участников информируется о результатах окончания фазы.

Канареечное тестирование: метафора отсылает к канарейкам, использовавшимся в угольных шахтах; при данном подходе подразумевается развертывание в ограниченном ряде сред в продакшн для валидации приложения перед выпуском его в более широкий ряд окружений.

Каскадная модель разработки (Waterfall): модель процесса разработки программного обеспечения, в которой процесс разработки выглядит как поток, последовательно проходящий фазы анализа требований, проектирования, реализации, тестирования, интеграции и поддержки.

Коммерческие программные продукты: преднастроенные ИТ-приложения, способные поддерживать конкретные бизнес-процессы и не требующие осуществления дополнительной конфигурации и программирования.

Компиляторы: средства, которые «переводят» программный код в выполнимые программы.

Конечное состояние архитектуры: предполагаемое конечное состояние архитектуры приложения, которая полностью готова к использованию для бизнеса организации.

Контракты разработки, эксплуатации и переходного периода (DOT): популярная структура контрактов, в которых упоминаются поставщики, создающие решения, поставщики, администрирующие решения, и состояние, в котором организация переносит решение обратно в штатную эксплуатацию.

Конфигурация абстрактной среды: такие переменные, как IP-адреса и названия серверов, должны быть абстрагированными, для того чтобы файлы конфигурации содержали в себе лишь плейсхолдеры вместо конкретных значений.

Концепция бюджета ошибок: бюджет, в котором вместо обычной стоимости закладывается покрытие вероятных неполадок или периоды недоступности, с которыми командам следует справиться, чтобы их работа могла считаться успешной.

Микрослужбы: архитектурная парадигма, пытающаяся идентифицировать наименьший независимый компонент, который можно использовать в качестве самостоятельной службы.

Минимально жизнеспособный продукт (MVP): продукт, предлагающий лишь самые базовые и необходимые функции, готовые к использованию клиентами. Прочие функции добавляются позже с обновлениями.

Минимальный жизнеспособный кластер: базовый набор приложений, который можно изменять, что позволит с использованием возможностей Dev-Ops обеспечивать положительные результаты.

Монолитные приложения: приложения, предоставляющие различные службы, которые можно развертывать только целым набором.

Мультимодальная ИТ: ИТ-среда, в которой используются некоторые модели доставки в рамках Agile и Waterfall.

Непрерывная интеграция: практика в разработке, для соблюдения которой требуется, чтобы разработчики интегрировали код в общий репозиторий несколько раз в день. Каждый раз проводится проверка во время автоматической сборки, что позволяет командам заранее выявлять неполадки.

Непрерывная доставка: ИТ-практика, ставшая популярной благодаря книге с похожим названием, где ПО автоматически проверяется на качество и развертывается далее в окружениях вплоть до среды эксплуатации.

Облако: практика использования сети серверов удаленного доступа в интернете для хранения, управления и обработки данных, приходящая на смену использованию локальных серверов.

Облакоориентированное приложение: приложение, созданное специально под стандарты и возможности облачных вычислений, в результате чего оно более стабильно и эффективно.

Образ контейнера: представление приложения в контейнере, которое можно развернуть в ПО для работы с контейнерами, чтобы иметь возможность быстро создавать приложения.

Ознакомление: начальная фаза Agile-проекта, во время которой приводятся к общему знаменателю ожидания по проекту всех заинтересованных сторон, а также способы, которые команда будет применять для достижения заданной цели.

Очки функциональности: техника оценки, регламентирующая объективный способ оценки объема работы в ИТ-проектах.

Панель наблюдения: визуальное отображение нескольких контрольных точек или отчетов, составленных на основе нескольких источников данных, для более упрощенного восприятия информации.

Паттерн заслонки: техника программирования, при которой создается новый функционал, и рабочие процессы постепенно передаются на него до тех пор, пока не появится возможность полностью отказаться от старой программы.

Плотность дефектов: метрика, измеряющая количество дефектов, обнаруживаемых в день, в программе или строках кода.

Пользовательские истории: термин, использующийся в Agile для описания функционала системы, обычно в формате «Будучи <ролью>, я хочу <функциональность>, чтобы получить <результат>».

Постепенное отключение функций: практика, согласно которой системы оказываются способными предоставлять базовую функциональность при отключении ее основных процессов; более щадящий режим, нежели полная недоступность при выходе из строя какой-либо функции.

Постфактум без обвинений: техника проведения анализа, сосредоточенная на исправлении систематических проблем без предъявления обвинений конкретным лицам.

Прикладной программный интерфейс: набор определенных методов коммуникации между различными программными компонентами, который позволяет иметь доступ к их функционалу из внешних систем.

Приложение как услуга (SaaS): программное обеспечение, предоставленное в виде сервиса в облаке с применением модели разового потребления.

Программный инкремент: период планирования, занимающий несколько спринтов/итераций. Обычно состоит примерно из пяти спринтов и длится около трех месяцев.

Продолжительность цикла: общее время от начала производственного процесса до его конца, оговоренное между вами и вашим клиентом.

Проект «с чистого листа»: проект, который команда может начать с нуля, не разбираясь с уже существующими приложениями.

Расходные сервисы: ИТ-сервисы с доступными и легко используемыми интерфейсами, которые могут быть вызваны другими программами.

Расширения IDE: расширения для интегрированной среды разработки, которые обеспечивают языки программирования полезными утилитами.

Регрессивное тестирование: комплекс тестов для подтверждения работоспособности функционала, который был добавлен ранее.

Режим «черного ящика»: тип ИТ-поставки, при котором для клиента не имеет значения, каким образом осуществляется доставка продукта, а важны лишь результаты.

Рефакторинг: практика в программировании, позволяющая программистам улучшать структуру программы без внесения функциональных изменений.

Роботизированный процесс автоматизации (RPA): техника, при которой предоставляются утилиты для автоматизации в приложениях задач, обычно выполняемых человеком вручную.

Связующее ПО (middleware): программное обеспечение, которое работает в качестве связующего между операционной системой и приложениями (например, службы интеграции и слои доступа данных).

Сдвиги конфигурации: ситуация, в которой конфигурации начинают несогласованно меняться, уходя от первоначальной конфигурации по причине вмешательства системы или человека.

Системное мышление: подход к восприятию систем в виде единого целого, а не суммы ее частей.

Системный интегратор (SI): компания, помогающая организациям собирать различные компоненты системы воедино, осуществляя реализацию,

планирование, координирование, тестирование, улучшение и иногда поддержку процессов системы.

Системы взаимодействия: быстро развивающиеся системы, с которыми пользователи взаимодействуют напрямую (см. также **Системы фиксации данных**).

Системы фиксации данных: системы, содержащие основные данные и не нуждающиеся в быстром развитии.

Составление потоков ценностей: деятельность, направленная на составление плана для трансформации организации, который будет включать в себя такие подробности, как сроки, инструментарий и др.

Среднедневная ставка: средняя стоимость рабочего дня команды с учетом нескольких значений дневных ставок на человека.

Стадия закалки: фаза Agile-проекта прямо перед развертыванием в продуктивную среду, в которой проводятся дополнительные тесты (например, производительности и безопасности), которые нельзя было провести во время выполнения спринтов.

Стек технологий: совокупность технологий, программ и компонентов, необходимых для поддержания функционала бизнеса, начиная от операционной системы вплоть до используемых приложений.

Стори-поинты: оценка работы в Agile, применяющая относительные единицы оценки вместо абсолютных, вроде дней или часов.

Сценарий командной оболочки: популярная техника автоматизации, основанная на оболочке UNIX.

Теория ограничений: научный подход к анализу систем, основанный на ограничениях, существующих в данной системе.

Теория очередей: научный подход к пониманию того, как работают очереди.

Технический долг: известные и неизвестные части программ, являющиеся на данный момент неудовлетворительными и требующими рефакторинга.

Управление конфигурацией ПО: практика отслеживания и контроля изменений в ПО, включающая в себя контроль версии, разветвление параллельной разработки и наблюдение за версией кода, включенной в программный пакет.

Уровень доступа: как правило, пользовательский интерфейс, который позволяет легче и проще получать доступ к нижележащим системам, чем при помощи систем с прямым доступом.

Уровни абстракции: разделяют два уровня архитектуры, позволяя им развиваться независимо друг от друга, не быть связанными и не вызывать появления зависимостей.

Устаревшее ПО: ИТ-термин, описывающий приложения, которые были собраны в прошлом и требуют обслуживания.

Фронтенд-команда: команда, разрабатывающая фронтенд-составляющую, которая будет напрямую обращена к клиентам.



СПИСОК ЛИТЕРАТУРЫ И ВИДЕОРЕСУРСОВ

Предисловие

1. *Mirco Hering*. Agile Reporting at the Enterprise Level (Part 2) – Measuring Productivity // Not a Factory Anymore (блог). 26 Feb 2015. notafactoryanymore.com/2015/02/26/agile-reporting-at-the-enterprise-level-part-2-measuring-productivity.

Введение

1. *Stefan Thomke and Donald Reinertsen*. Six Myths of Product Development // Harvard Business Review. May 2012. hbr.org/2012/05/six-myths-of-product-development.

2. *Don Reinertsen*. Thriving in a Stochastic World: речь на конференции YOW! 7 декабря 2015 года, Брисбен, Австралия, YouTube-видео, 56:49, опубликовано YOW! Conferences, 25 декабря 2015 года. www.youtube.com/watch?v=wyzNB172VI.

3. The Lean Startup Methodology // The Lean Startup (сайт), запущен 10 ноября 2017 года. theleanstartup.com/principles.

4. *Brad Power*. How GE Applies Lean Startup Practices // Harvard Business Review. 23 Apr 2014. hbr.org/2014/04/how-ge-applies-lean-startup-practices.

5. *Mirco Hering*. Agile Reporting at the Enterprise Level (Part 2) – Measuring Productivity // Not a Factory Anymore (блог). 9 Nov 2015. notafactoryanymore.com/2015/11/09/lets-burn-the-software-factory-to-the-ground-and-from-their-ashes-software-studios-shall-rise.

6. *Mark Rendell*. Breaking the 2 Pizza Paradox with Platform Applications: речь на саммите DevOps Enterprise Summit 2015, Сан-Франциско, Калифорния, YouTube-видео, 25:26, опубликовано DevOps Enterprise Summit, 10 ноября 2015 года. www.youtube.com/watch?v=8WRRi6oui34.

Глава 1

1. The DevOps Platform: Overview // ADOP (DevOps-платформа Accenture на GitHub), Accenture (дата посещения 2 мая 2017 года). accenture.github.io/adop-docker-compose.

2. *Carreth Read*. Logic: Deductive and Inductive. London: DeLaMare Press, 1909. P. 320.

Глава 2

1. Gartner IT Glossary: Bimodal // Gartner, Inc. (дата посещения 2 мая 2017 года). <http://www.gartner.com/it-glossary/bimodal>.

2. *Ted Schadler*. A Billion Smartphones Require New Systems of Engagement // Forrester Research, Inc. (блог). 14 Feb 2012. blogs.forrester.com/ted_schadler/12-02-14-a_billion_smartphones_require_new_systems_of_engagement.

3. *Martin Fowler* Strangler Application // MartinFowler.com (блог). 29 Jun 2004. www.martinfowler.com/bliki/StranglerApplication.html.

Глава 3

1. *Mirco Hering*. How to Deal with COTS Products in a DevOps World // InfoQ (блог). 24 Jul 2016. www.infoq.com/articles/cots-in-devops-world.

Глава 4

1. *Francis Keany*. Census Outage Could Have Been Prevented by Turning Router On and Off Again: IBM // ABC News. 25 Oct 2016. www.abc.net.au/news/2016-10-25/turning-router-off-and-on-could-have-prevented-census-outage/7963916.

2. *Mike Masnick*. Contractors Who Built Healthcare.gov Website Blame Each Other for All the Problems // Techdirt (блог). 24 Oct 2013. www.techdirt.com/articles/20131023/18053424992/contractors-who-built-healthcaregov-website-blame-each-other-all-problems.shtml.

Часть Б (введение)

1. *Barry Schwartz*. The Way We Think about Work Is Broken: TED-видео, 7:42, снято в марте 2014 года в Ванкувере. www.ted.com/talks/barry_schwartz_the_way_we_think_about_work_is_broken.

2. *Dan Pink*. The Puzzle of Motivation: TED-видео, 18:36, снято в июле 2009 года в Оксфорде, Англия. www.ted.com/talks/dan_pink_on_motivation.

Глава 5

1. PI Planning // SAFe (Scaled Agile Framework). Scaled Agile, Inc. (дата обновления 11 ноября 2017 года). www.scaledagileframework.com/pi-planning.

2. *Paul Ellarby*. Using Big Room Planning to Help Plan a Project with Many Teams // TechWell Insights (блог). 26 Nov 2014. www.techwell.com/techwell-insights/2014/11/using-big-room-planning-help-plan-project-many-teams.

3. Wikipedia, Dunning–Kruger effect (дата обновления 11 ноября 2017 года, 19:01). en.wikipedia.org/wiki/Dunning%E2%80%93Kruger_effect.
4. Wikipedia, Technology tree (дата обновления 13 ноября 2017 года, 21:45). en.wikipedia.org/wiki/Technology_tree.

Глава 6

1. *Jargon File* (version 4.4.7), s.v. Conway's Law (дата посещения 14 ноября 2017 года). catb.org/~esr/jargon/html/C/Conways-Law.html.
2. 2016 State of DevOps Report. Portland: Puppet Labs, 2016). P. 9. puppet.com/resources/white-paper/2016-state-of-devops-report.
3. *Rouan Wilsenach*. DevOpsCulture // MartinFowler.com (блог). 9 Jul 2015. martinfowler.com/bliki/DevOpsCulture.html.
4. *Matthew Skelton*. What Team Structure Is Right for DevOps to Flourish? Manuel Pais (ed.) // DevOps Topologies (блог) (дата посещения 2 мая 2017 года). web.devopstopologies.com.
5. WSJF – Weighted Shortest Job First // Black Swan Farming (дата посещения 2 мая 2017 года). blackswanfarming.com/wsjf-weighted-shortest-job-first.

Глава 7

1. *W. Edwards Deming*. Out of the Crisis. Cambridge, Massachusetts: MIT Press, 1982. P. 29.
2. *Kin Lane*. The Secret to Amazon's Success Internal APIs // API Evangelist (блог, сфокусированный на API). 12 Jan 2012. apievangelist.com/2012/01/12/the-secret-to-amazons-success-internal-apis.
3. *Jeff Galimore et al.* Tactics for Implementing Test Automation for Legacy Code. Portland: IT Revolution, 2015.

Глава 8

1. Аноним, приватная беседа с автором, 2004.
2. *Dan Pink*. The Puzzle of Motivation: TED-видео, 18:36, снято в июле 2009 года в Оксфорде, Англия. www.ted.com/talks/dan_pink_on_motivation.
3. *Mark Horstman*. Managerial Economics 101: YouTube-видео, 4:33, опубликовано Manager Tools 3 мая 2009 года. www.youtube.com/watch?v=gP-RC5ZqiBg.
4. *John Goulah*. Making It Virtually Easy to Deploy on Day One // Code as Craft (блог). 13 Mar 2012. codeascraft.com/2012/03/13/making-it-virtually-easy-to-deploy-on-day-one.
5. *Mirco Hering*. Dominica DeGrandis and Nicole Forsgren, Measure Efficiency, Effectiveness, and Culture to Optimize DevOps Transformation. Portland: IT Revolution, 2015. P. 14. itrevolution.com/book/measure-efficiency-effectiveness-culture-optimize-devops-transformations.

Глава 9

1. *Jez Humble and David Farley*. Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation. Crawfordsville, IN: Pearson Education, Inc., 2011.
2. The Netflix Tech Blog (дата посещения 16 ноября 2017 года). techblog.netflix.com.
3. Hygieia: An OSS Project Sponsored by Capital One // Capital One DevExchange (дата посещения 16 ноября 2017 года). developer.capitalone.com/open-source-projects/hygieia.

Глава 10

1. *Jez Humble*. Architecting for Continuous Delivery: речь на саммите DevOps Enterprise 2015, Сан-Франциско, YouTube-видео, 34:17, опубликовано DevOps Enterprise Summit, 17 ноября 2015 года. www.youtube.com/watch?v=_wnd-eyPoMo.
2. *Randy Shoup*. Pragmatic Microservices: Whether, When, and How to Migrate: речь на конференции YOW!, декабрь 2015 года, Брисбен, Австралия, YouTube-видео, 49:00, опубликовано YOW! Conferences, 30 декабря 2015 года. www.youtube.com/watch?v=hAwpVXiLH9M.
3. *James Lewis*. Microservices – Building Software That Is #Neverdone: речь на конференции YOW!, декабрь 2015 года, Брисбен, Австралия, YouTube-видео, 45:55, опубликовано YOW! Conferences, 29 декабря 2015 года. www.youtube.com/watch?v=JEtxmsJzrnw.
4. Wikipedia, Conway's law (дата обновления 3 ноября 2017 года, 09:02). en.wikipedia.org/wiki/Conway%27s_law.

Глава 11

1. About IT4IT // The Open Group (дата посещения 4 августа 2017 года). www.opengroup.org/IT4IT/overview.

Глава 12

1. *Keith Collins*. How One Programmer Broke the Internet by Deleting a Tiny Piece of Code // Quartz Media. 27 Mar 2016. qz.com/646467/how-one-programmer-broke-the-internet-by-deleting-a-tiny-piece-of-code.
2. *Josh Corman and John Willis*. Immutable Awesomeness: речь на саммите DevOps Enterprise 2015, Сан-Франциско, YouTube-видео, 34:25, опубликовано Sonatype 21 октября 2015 года. www.youtube.com/watch?v=-S8-lrm3iV4.
3. *Debbi Schipp*. Bonus Bet Offers Peak as Online Agencies Chase Cup Day Dollars // News.com.au. 1 Nov 2016. www.news.com.au/sport/superracing/melbourne-

cup/bonus-bet-offers-peak-as-online-agencies-chase-cup-day-dollars/news-story/8e09a39396fb5485cf1f24cbea228ff9.

4. *Yury Izrailevsky and Ariel Tseitlin*. The Netflix Simian Army // The Netflix Tech Blog. 18 Jul 2011. techblog.netflix.com/2011/07/netflix-simian-army.html.

Приложение

1. *Mirco Hering*. Agile Reporting at the Enterprise Level (Part 2) – Measuring Productivity // Not a Factory Anymore (блог). 26 Feb 2015. notafactoryanymore.com/2015/02/26/agile-reporting-at-the-enterprise-level-part-2-measuring-productivity.

2. *Andy Boynton and William Bole*. Are You an ‘I’ or a ‘T’? // Forbes Leadership (блог). 18 Oct 2011. www.forbes.com/sites/andyboynton/2011/10/18/are-you-an-i-or-a-t/#2517d45b351b.

3. *Don Reinertsen*. Thriving in a Stochastic World: речь на конференции YOW!, 7 декабря 2015 года, Брисбен, Австралия, YouTube-видео, 56:50, опубликовано YOW! Conferences, 25 декабря 2015 года. www.youtube.com/watch?v=wyZNxB172VI.

4. *Gary Gruver and Tommy Mouser*. Leading the Transformation: Applying Agile and DevOps Principles at Scale. Portland: IT Revolution, 2015. P. 17.

5. *Frederick P. Brooks, Jr.* The Mythical Man-Month: Essays on Software Engineering, anniversary ed., 2nd ed. Crawfordsville: Addison-Wesley Longman, Inc., 2010). P. 25.

6. *Frederick P. Brooks, Jr.* The Mythical Man-Month. Addison-Wesley Longman, Inc., 1995. P. 17.

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УНИВЕРСИТЕТ ИТМО

П.Е. Гладилин, К.О. Боченина
ТЕХНОЛОГИИ МАШИННОГО ОБУЧЕНИЯ

УЧЕБНО-МЕТОДИЧЕСКОЕ ПОСОБИЕ

РЕКОМЕНДОВАНО К ИСПОЛЬЗОВАНИЮ В УНИВЕРСИТЕТЕ
ИТМО

по направлению подготовки 01.04.02, 09.04.01, 09.04.02, 09.04.03,
09.04.04, 27.04.07, 38.04.05

в качестве учебно-методического пособия для реализации основных
профессиональных образовательных программ высшего образования
магистратуры,

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Санкт-Петербург
2020

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В настоящем пособии представлены методические указания к выполнению лабораторных работ по дисциплине «Технологии машинного обучения».

По итогам выполнения всех работ студент должен получить теоретические знания об основных математических подходах и технологиях построения моделей машинного обучения, методах предобработки и анализа данных, основам работы с текстовыми данными, изображениями и временными рядами.



Университет ИТМО – ведущий вуз России в области информационных и фотонных технологий, один из немногих российских вузов, получивших в 2009 году статус национального исследовательского университета. С 2013 года Университет ИТМО – участник программы повышения конкурентоспособности российских университетов среди ведущих мировых научно-образовательных центров, известной как проект «5 в 100». Цель Университета ИТМО – становление исследовательского университета мирового уровня, предпринимательского по типу, ориентированного на интернационализацию всех направлений деятельности.

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Введение

В настоящем пособии представлены методические указания к выполнению лабораторных работ по дисциплине «Технологии машинного обучения» в соответствии с курсом лекций, читаемым авторами студентам Университета ИТМО, обучающимся по программам «Большие данные и машинное обучение», «Финансовые технологии больших данных», «Цифровое здравоохранение» и «Цифровые технологии умного города».

Учебно-методическое пособие разработано в соответствии с Федеральным государственным образовательным стандартом высшего профессионального образования по направлению подготовки 01.04.00 «Прикладная математика и информатика», утвержденным приказом Министерства образования и науки Российской Федерации от 28 августа 2015 г. № 911, Образовательным стандартом Университета ИТМО по направлениям подготовки 01.04.02 «Прикладная математика и информатика» и 09.04.02 «Информационные системы и технологии».

Пособие может использоваться как для самостоятельного изучения методов и алгоритмов машинного обучения студентами, аспирантами и научными работниками, так и служить руководством к решению задач, возникающих в научно-исследовательских бакалаврских, магистерских и аспирантских проектах, связанных с применением современных методов анализа данных.

Для выполнения заданий к каждой лабораторной работе необходимо скачать данные по ссылке, указанной посредством QR-кода. Задания к лабораторным работам содержат рекомендованную последовательность действий для работы с наборами данных и получения требуемого результата. В помощь к самостоятельному изучению материала в конце описания каждой лабораторной работы приведены дополнительные вопросы для самоконтроля и ссылки на дополнительную литературу.

По итогам выполнения всех восьми лабораторных работ студент должен получить теоретические знания об основных математических подходах и технологиях построения моделей машинного обучения, методах обработки и анализа данных, способах оценки качества моделей, приобрести навыки работы с современными библиотеками и фреймворками для реализации моделей машинного обучения, навыки работы с текстовыми данными, изображениями и временными рядами.

По итогам выполнения каждой лабораторной работы студенту необходимо подготовить письменный отчет, содержащий основные результаты работы. Отчет должен быть оформлен согласно требованиям ГОСТ, включать титульный лист, основную часть и выводы. Образец титульного листа и общая структура отчёта представлены в Приложении А к учебному пособию.

Лабораторная работа № 1. Метрики качества задач классификации

Цель работы

Целью данной лабораторной работы является получение знаний основных метрик качества бинарной классификации и вариантов тонкой настройки алгоритмов классификации.

Краткие теоретические сведения

Примеры алгоритмов классификации

Для расчета метрик качества в задаче машинного обучения с учителем необходимы только две величины: векторы действительных и предсказанных значений. Действительные значения – это метки классов в тренировочной и тестовой выборке; алгоритм классификации возвращает предсказанные.

Рассмотрим несколько получаемых на выходе модели примеров векторов.

Пусть в нашей задаче действительные значения составляют вектор из нулей и единиц, а предсказанные лежат в интервале $[0, 1]$ (где число означает вероятность отнести пример к классу “1”). Такие пары векторов будем визуализировать так, как представлено на рисунке 1:

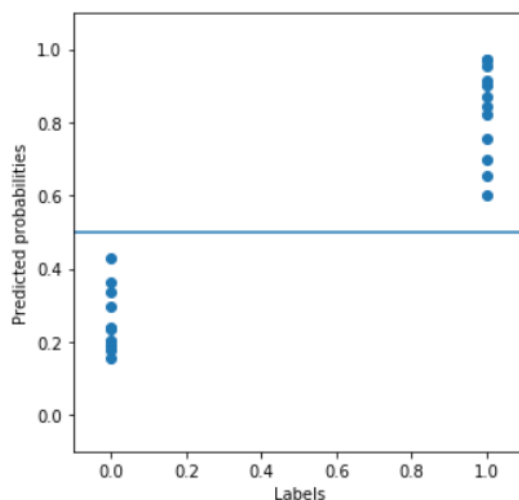


Рисунок 1 – Пример действительных (по оси абсцисс) и предсказанных (по оси ординат) значений

Чтобы сделать финальное предсказание (отнести пример к классу “0” или “1”), нужно установить порог T (горизонтальная линия на рисунке 1): всем объектам с предсказанным значением выше T будет присвоен класс “1”, остальным – “0”.

Наилучшая ситуация: порог T абсолютно верно разделяет предсказанные вероятности по двум классам. Для примера с рис. 1 идеальные интервалы вероятностей можно получить путем выбора порога $T = 0,5$.

Чаще всего вероятностные интервалы накладываются друг на друга (рисунок 2б) – тогда приходится подбирать порог внимательно.

Неверно обученный алгоритм совершает обратное: он ставит вероятности объектов класса “0” выше вероятностей примеров класса “1” (рисунок 2в). В такой ситуации следует проверить, не были ли перепутаны метки “0” и “1” при получении тренировочной выборки.

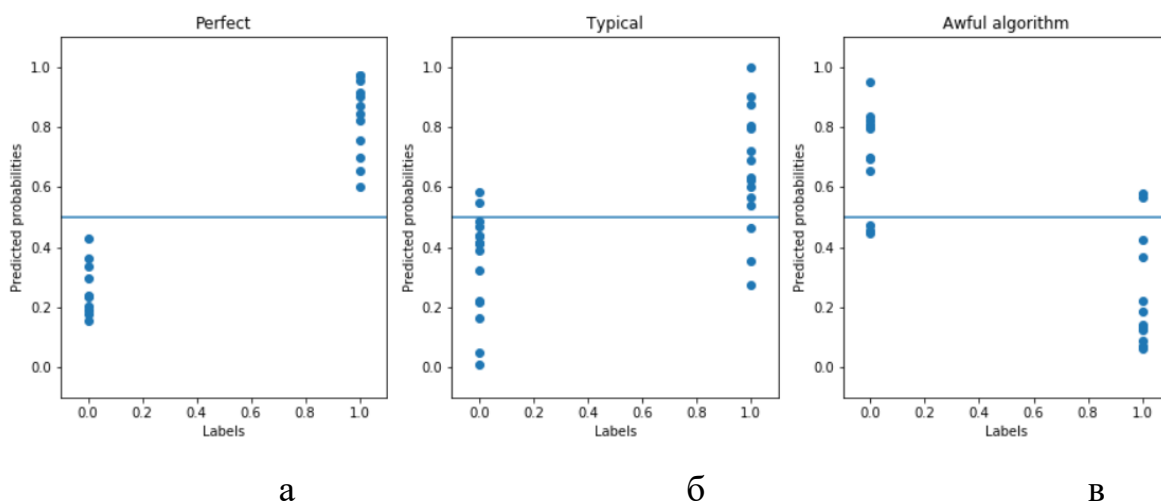
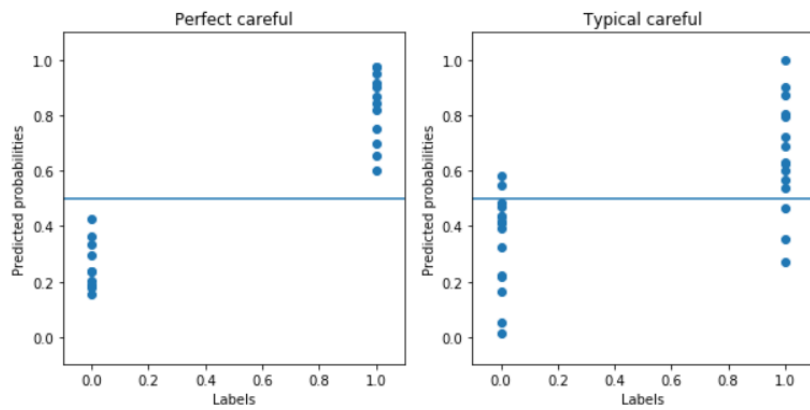


Рисунок 2 – Примеры действительного и предсказанного векторов для идеального (а), типичного (б) и неверно обученного (в) алгоритмов

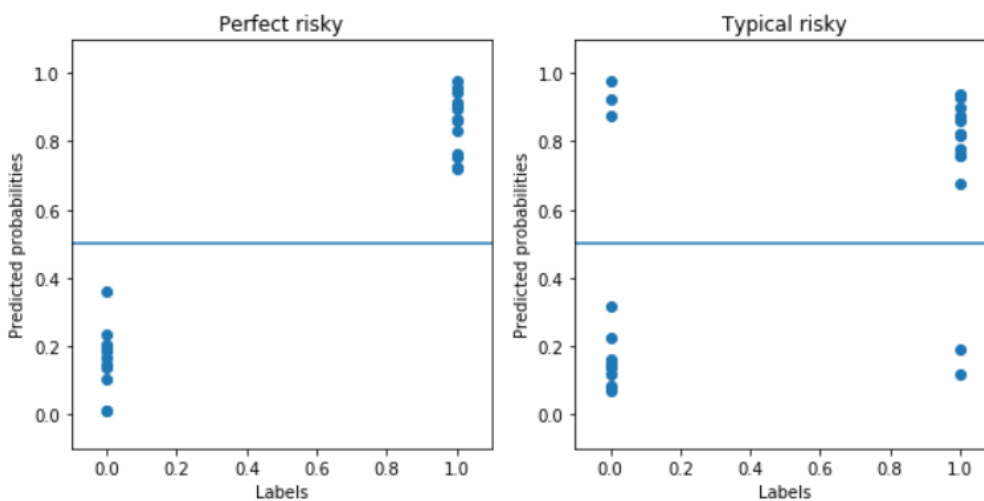
Алгоритмы могут быть осторожными и выдавать значения, не слишком отдаленные от 0,5 (рис. 3), или могут брать на себя риск по получению значений, близких к нулю и единице (рис. 4).



а

б

Рисунок 3 – Примеры действительного и предсказанного векторов для идеального (а) и типичного (б) осторожного алгоритма



а

б

Рисунок 4 – Примеры действительного и предсказанного векторов для идеального (а) и типичного (б) рисковющего алгоритма

Интервалы вероятностей могут быть смещены. Например, если нежелательны ошибки I рода (false-positive), то алгоритм будет выдавать значения в среднем ближе к нулю. Аналогично, для избегания ошибок II рода (false-negative) чаще необходимо получать на выходе модели вероятности выше 0,5. На рисунке 5 представлены примеры векторов в данных ситуациях.

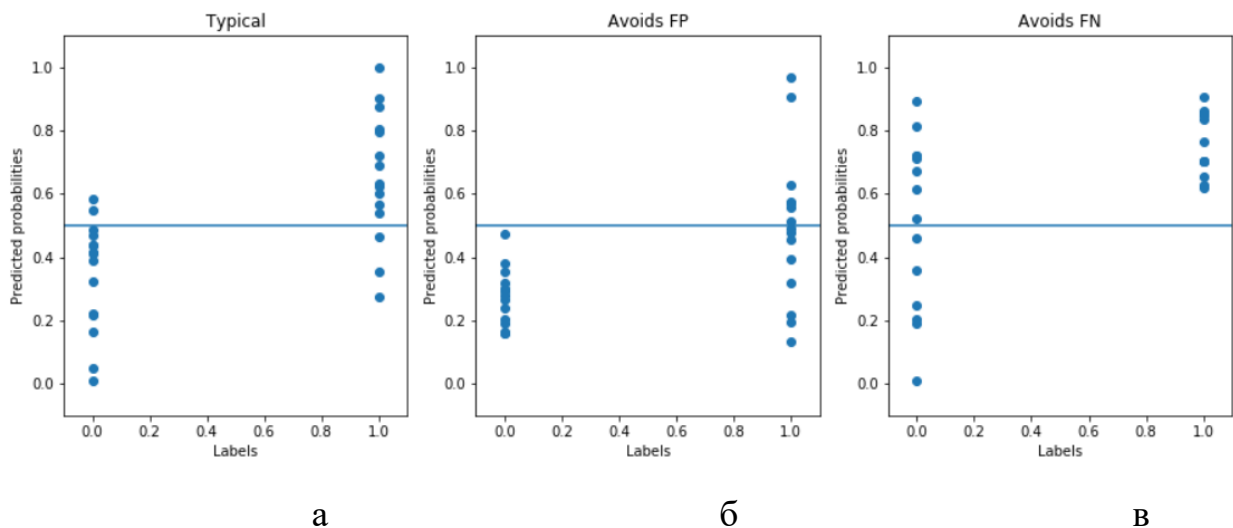


Рисунок 5 – Примеры действительного и предсказанного векторов для типичного (а), избегающего ошибок I рода (б) и избегающего ошибок II рода (в) алгоритмов

Precision u recall. Accuracy

Данные метрики рассчитываются после бинаризации предсказанных значений порогом T . На рисунке 6 представлены типы объектов в зависимости от пар действительных и предсказанных значений.

| | | Предсказанный класс | |
|----------------|---|---------------------|----------------|
| | | 1 | 0 |
| Реальный класс | 1 | True Positive | False Negative |
| | 0 | False Positive | True Negative |

Рисунок 6 – Типы объектов: True, False – верно и неверно предсказанный класс объекта соответственно; Positive, Negative – предсказанный класс объекта “1” (“Yes”) и “0” (“No”) соответственно

Наиболее простая и известная метрика – accuracy. Она показывает долю верно предсказанных примеров:

$$Accuracy = \frac{Tp + Tn}{Tp + Tn + Fp + Fn}$$

где

Tp – True Positive,

Tn – True Negative,

Fp – False Positive,

Fn – False Negative.

Precision и recall также широко распространены. Первая метрика показывает насколько верно предсказаны объекты, которым моделью была выставлена “1”, а вторая – точность предсказания примеров, в действительности относящихся к классу “1” (рисунок 7).

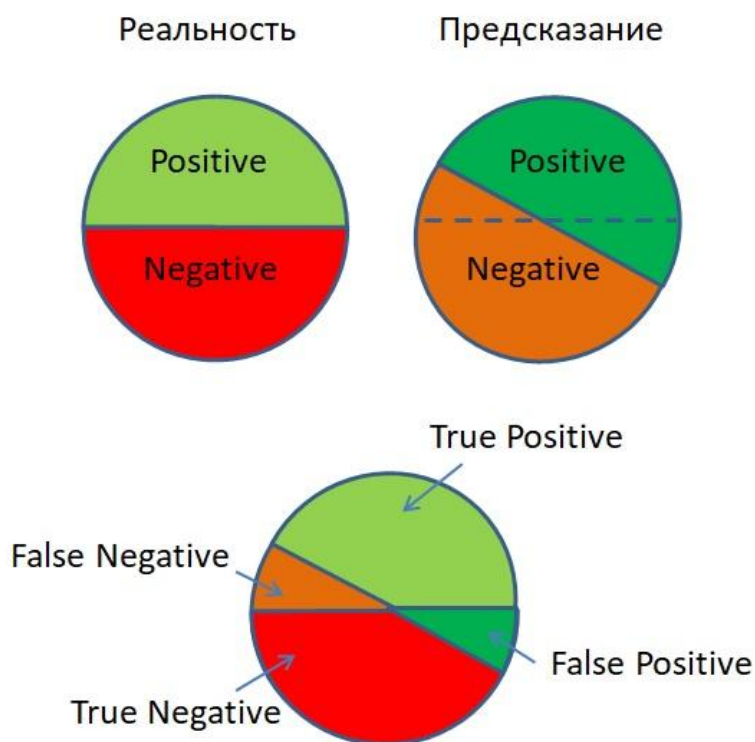


Рисунок 7 – Визуализация типов ошибок бинарной классификации

Расчёт данных метрик осуществляется по следующим формулам:

$$Precision = \frac{Tp}{Tp + Fp}$$

$$Recall = \frac{Tp}{Tp + Fn}$$

С помощью всех трех метрик можно с легкостью определять случаи хорошо и плохо обученных алгоритмов классификации. К тому же, так как возможные значения лежат в интервале $[0, 1]$, то их легко интерпретировать.

Из данных метрик ничего нельзя узнать о самих значениях вероятностей объектов; можно определить только, какая их доля лежит не по ту сторону от порога T .

Метрика ассигасы в равной мере штрафует алгоритм за наличие ошибок I и II родов. В то же время использование пары precision и recall позволяет четко устанавливать соотношение между родами ошибок: данные метрики используются для контроля Fp и Fn ошибок соответственно.

На рисунке 8 представлены метрики precision и recall в зависимости от значения порога T для пар векторов с рисунка 5.

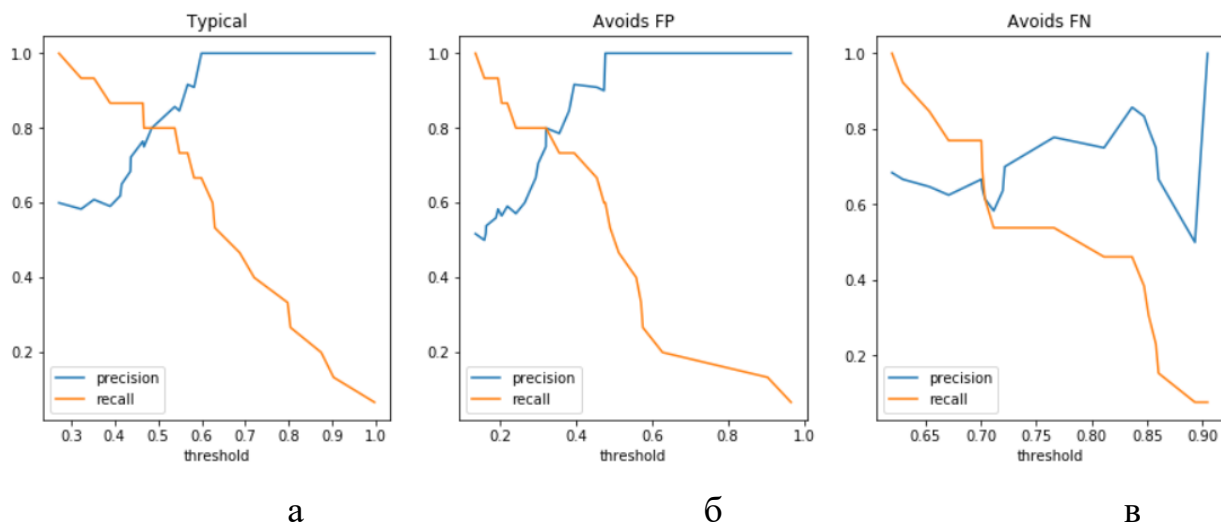


Рисунок 8 – Precision и recall при различных значениях порога T для типичного (а), избегающего ошибок I рода (б) и избегающего ошибок II рода (в) алгоритмов

По мере возрастания значения порога T мы получаем меньше Fp и больше Fn ошибок, согласно тому факту, что одна из кривых поднимается, а вторая падает вниз. Исходя из данной закономерности, можно выбрать оптимальный порог, при котором метрики precision и recall находятся в

приемлемом интервале значений. Если такой порог не был найден, следует найти другой алгоритм для обучения.

Необходимо упомянуть, что приемлемые значения *precision* и *recall* определяются прикладным характером задачи. Например, в случае решения проблемы, имеется ли у пациента рассматриваемая болезнь (“0” – здоров, “1” – болен), *Fn* ошибки крайне нежелательны, отсюда значение метрики *recall* выставляется $\approx 0,9$. Мы можем сказать пациенту, что он болен, и дальнейшей диагностикой выявить ошибку, что намного лучше по сравнению с игнорированием реально имеющейся болезни.

F1-score

Очевидный недостаток пары *precision-recall* в том, что мы рассчитываем две метрики: при сравнении алгоритмов неясно, как использовать обе сразу. Решением данной проблемы является метрика *F1-score*:

$$F1\text{-score} = 2 \frac{\textit{precision} * \textit{recall}}{\textit{precision} + \textit{recall}}$$

F1 метрика будет равна единице только тогда, когда *precision* = 1 и *recall* = 1 (т.е. в идеальном алгоритме).

Довольно сложно ввести в заблуждение с помощью *F1-score*: если одна из составляющих близка к 1, а вторая показывает низкие значения (а такую ситуацию легко получить согласно рис. 8), то *F1* метрика будет далека от идеального значения. Данную метрику трудно оптимизировать, так как для этого нужна как высокая точность, так и сбалансированность между родами ошибок.

Для пар векторов, представленных на рисунках 5а, 5б, 5в, значение *F1-score* при $T = 0,5$ составило 0,828, 0,636 и 0,765 соответственно. Значения метрики для второго и третьего примеров, где одно значение из пары *precision-recall* равнялось единице, оказались меньше по сравнению с первым сбалансированным случаем.

Описанные метрики легко интерпретировать, но при этом мы не берем во внимание большую часть информации, получаемую с выхода модели. В

некоторых задачах нужны вероятности в чистом виде (т.е. без их бинаризации). Например, при выставлении ставки на выигрыш футбольной команды нужно знать не класс, к которому будет отнесен объект, а вероятность его отнесения. Перед бинаризацией предсказаний может быть полезно рассмотреть вектор вероятностей на присутствие каких-либо закономерностей.

Логистическая функция ошибок (log_loss)

Метрика определяет среднее расхождение между вероятностями отнесения объектов к конкретным классам и их действительными классами:

$$\log_loss = -\frac{1}{n} \sum_{i=1}^n [actual_i * \log(predicted_i) + (1 - actual_i) * \log(1 - predicted_i)],$$

где $actual_i$ – действительный класс i -го объекта, $predicted_i$ – вероятность отнесения i -го объекта к классу “1”, n – количество объектов. Функцию необходимо минимизировать.

Далее можно видеть значение функции ошибок для ранее использованных пар векторов.

Алгоритмы, разные по качеству (рис. 2):

Идеальный – 0,249

Типичный – 0,465

Неверно обученный – 1,527

Осторожный и рискующий алгоритмы (рис. 3 и 4):

Идеальный осторожный – 0,249

Идеальный рискующий – 0,171

Типичный осторожный – 0,465

Типичный рискующий – 0,614

Разные склонности алгоритмов к Fp и Fn ошибкам (рис. 5):

Избегающий Fp ошибок – 0,585

Избегающий Fn ошибок – 0,589

Как и предыдущие метрики, \log_loss может различать хорошо и плохо обученные алгоритмы, но при этом значения метрики трудно интерпретировать: она не может достичь нуля и не имеет ограничения сверху. Таким образом, даже для абсолютно точного алгоритма, если взглянуть на его значение логистической функции ошибок, невозможно будет сказать, что он идеален.

С другой стороны, метрика делает различия между осторожным и рискующим алгоритмами. Как видно по рис. 3б и 4б, число ошибочных примеров при пороге бинаризации $T = 0,5$ для типичной осторожной и рискующей моделей приблизительно равно, а в случае идеальных алгоритмов (рис. 3а, 4а) ошибок нет совсем. Однако рискующий алгоритм вносит больше веса в метрику \log_loss за неверно подобранные предсказания по сравнению с осторожным, если модель является типичной, и меньше, если модель абсолютно точная.

Таким образом, \log_loss чувствительна к вероятностям, близким как к 0 и 1, так и к 0,5.

Fp и Fn ошибки метрика выявить не может, но несложно перейти к более обобщенной версии функции ошибок, где можно поднять штраф для того или иного рода ошибок. Для этого добавим комбинацию неотрицательных и дающих в сумме единицу коэффициентов при вероятностных членах функции. Например, если нужно больше штрафовать Fp ошибки:

$$\begin{aligned} & \text{weighted_log_loss(actual, predicted)} = \\ & = -\frac{1}{n} \sum_{i=1}^n [0,3 * \text{actual}_i * \log(\text{predicted}_i) + 0,7 * (1 - \text{actual}_i) * \log(1 \\ & \quad - \text{predicted}_i)]. \end{aligned}$$

Если алгоритм выдает высокое значение вероятности, а объект в действительности принадлежит к классу “0”, то первый член функции будет равен нулю, а второй будет рассчитан с учетом его большего веса.

ROC и AUC

При построении ROC-кривой (Receiver Operating Characteristic) подвергается варьированию порог бинаризации и рассчитываются некоторые величины, зависящие от количества Fp и Fn ошибок. Эти параметры подбираются таким образом, что в случае наличия порога для идеального разделения классов ROC-кривая будет проходить через определенную точку – левый верхний угол квадрата $[0, 1] \times [0, 1]$. В дополнение к этому, кривая всегда начинается в левом нижнем и заканчивается в правом верхнем углу. Для того, чтобы охарактеризовать кривую численно, используется метрика AUC (Area Under the Curve) – площадь под ROC-кривой.

Далее визуализированы ROC-кривые для ранее использованных пар действительных и предсказанных векторов (рисунок 9).

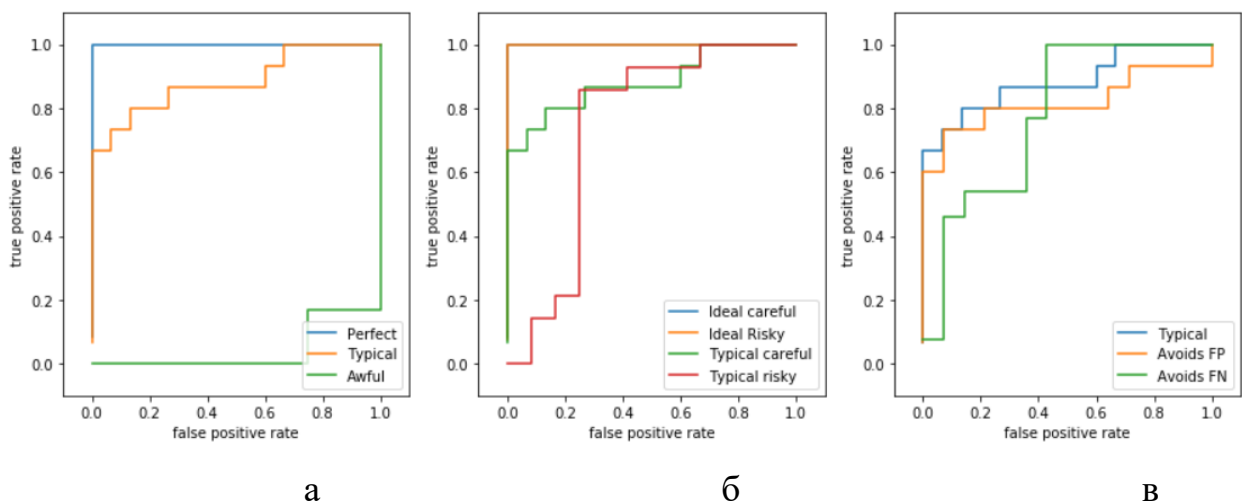


Рисунок 9 – ROC-кривые для пар векторов, представленных на рисунках 2 (а), 3 и 4 (б), 5 (в)

Значения AUC, соответствующие кривым на рис. 9, представлены ниже.

Алгоритмы, разные по качеству (рис. 2):

Идеальный – 1,000

Типичный – 0,884

Неверно обученный – 0,042

Осторожный и рискующий алгоритмы (рис. 3 и 4):

Идеальный осторожный – 1,000

Идеальный рискующий – 1,000

Типичный осторожный – 0,884

Типичный рискующий – 0,738

Разные склонности алгоритмов к Fp и Fn ошибкам (рис. 5):

Избегающий Fp ошибок – 0,819

Избегающий Fn ошибок – 0,780

Чем больше объектов в выборке, тем более гладкими будут кривыми (хотя при приближении будет видно, что они все еще ступенчатые).

Как и ожидалось, кривые идеальных алгоритмов проходят через верхний левый угол. Также на рис. 9а желтой линией обозначена типичная ROC-кривая (в большинстве случаев кривая не может достичь данного угла).

Метрика AUC у рискующей модели значительно ниже по сравнению с осторожным алгоритмом, хотя в случае абсолютно точных моделей разницы между их ROC-кривыми и AUC метриками нет (рис. 9б). Таким образом, для идеального алгоритма нет смысла отдалять друг от друга точки, относящиеся к разным предсказанным классам.

При наличии большего числа Fp или Fn ошибок на кривых будет наблюдаться смещение (рис. 9в). Но по значению AUC его невозможно определить (в частном случае кривые могут быть симметричны относительно диагонали $(0, 1) - (1, 0)$).

После построения кривой удобно выбирать порог бинаризации, удовлетворяющий ограничениям по долям ошибок I или II рода. Определенное значение порога соответствует одной точке на ROC-кривой. Если мы хотим избежать Fp ошибок, то следует выбрать точку как можно ближе к левой

стороне квадрата, если нежелательны F_n ошибки – ближе к верхней стороне. Все промежуточные точки отвечают за некоторые более сбалансированные соотношения между родами ошибок.

Часть из рассмотренных метрик качества классификации (например, \log_loss) может быть перенесена на задачи, где объекты относятся к более чем 2 классам. В случае, если затруднительно обобщить формулу метрики на несколько классов, такую задачу представляют в виде набора подзадач бинарной классификации, а обобщенную метрику получают путем некоторого усреднения (micro- или macro-среднее) метрик подзадач.

На практике всегда полезно визуализировать векторы предсказанных алгоритмом значений с целью понять, какие ошибки совершает модель при различных порогах и как используемая метрика реагирует на них.

Задание

- 1) Скачайте данные:



- 2) Обучите 4 классификатора, чтобы предсказать поле "Activity" (биологический ответ молекулы) из набора данных "bioresponse.csv":
 - мелкое дерево решений;
 - глубокое дерево решений;
 - случайный лес на мелких деревьях;
 - случайный лес на глубоких деревьях;

- 3) Рассчитайте следующие метрики, чтобы проверить качество ваших моделей:
- доля правильных ответов (*accuracy*);
 - точность;
 - полнота;
 - *F1-score*;
 - *log-loss*.
- 4) Постройте *precision-recall* и ROC-кривые для ваших моделей.
- 5) Обучите классификатор, который избегает ошибок второго рода и рассчитайте для него метрики качества.

Дополнительные вопросы и задания

1. *Какую метрику нужно оптимизировать, чтобы настроить алгоритм избегать ошибок первого рода (FP)?*
2. *На мелких или на глубоких деревьях лучше строить случайный лес с точки зрения качества алгоритма классификации?*
3. *Проанализируйте качество алгоритма классификации для алгоритма случайного леса на 5, 10, 25 и 50 деревьях. Как меняется точность решения? Почему?*

Литература

1. Евгений Соколов. Семинары по метрическим методам классификации. http://www.machinelearning.ru/wiki/images/9/9a/Sem1_knn.pdf
2. К. В. Воронцов. Метрические методы классификации и регрессии. Лекция. <http://www.machinelearning.ru/wiki/images/c/c3/Voron-ML-Metric-slides.pdf>

Лабораторная работа № 2. Предобработка данных. Отбор признаков.

Цель работы

Целью данной лабораторной работы является получение навыков предобработки данных, необходимых для качественной настройки моделей машинного обучения.

Краткие теоретические сведения

При использовании данных различной природы в машинном обучении зачастую приходится сталкиваться с зашумлёнными данными или данными, в которых встречаются выбросы и взаимозависимые признаки. Для эффективной настройки моделей машинного обучения необходимо заниматься предварительной обработкой данных (data preprocessing).

Существует несколько методик предобработки данных.

Масштабирование и нормализация (normalization, scaling). Для уменьшения влияния выбросов используют нормировку данных, когда количественные признаки отображают, например, на отрезок $[0,1]$ или $[-1,1]$.

Центрирование. Также для уменьшения влияния выбросов используют нормировку, делая матожидание равным нулю.

One-hot-encoding. Данный приём используется, когда признаки являются категориальными, то есть принимают значения, между которыми нельзя установить отношения порядка. Мы можем закодировать каждое из таких значений бинарным вектором, длина которого будет равна количеству возможных значений данного признака, и на всех его позициях будут стоять нули за исключением индекса, соответствующего текущему значению. Данная операция порой значительно увеличивает размерность задачи, но позволяет эффективно включать в модель категориальные признаки.

Отбор признаков. Некоторые признаки иногда не дают никакого вклада в улучшение качества работы алгоритма, а порой бывают даже вредными. Поэтому используют фильтрацию, отбрасывая ненужные признаки, с учётом

некоторого критерия (например, корреляции Пирсона между признаками и целевой переменной).

Также для эффективной настройки моделей машинного обучения и борьбы с переобучением используют технику кросс-валидации (cross-validation). Кросс-валидация - процедура эмпирической оценки обобщающей способности алгоритмов. С помощью кросс-валидации эмулируется наличие тестовой выборки посредством последовательного разделения всей выборки данных на тренировочную и тестовую, при этом последняя не участвует в обучении, но для неё известны правильные ответы.

Данные содержат некоторые атрибуты, которые могут быть либо излишними – сильно коррелирующими с другими, – либо незначимыми, т.е. слабо влияющими на целевую переменную, а потому могут быть удалены без существенной потери информации. Отбор признаков, особенно при большом их количестве в данных, нужен, потому что, во-первых, если признаков очень много (десятки или сотни), то увеличивается время обучения моделей; во-вторых, с увеличением количества признаков часто падает точность предсказания, особенно, если в данных много признаков, слабо коррелирующих с целевой переменной.

Есть три категории методов отбора: фильтрация (filter methods), оборачивание (wrapper methods) и встроенные методы (embedded methods).

Фильтрация параметров

Можно применить фильтрацию параметров по критерию увеличения информации (information gain), вычисляемой следующим образом:

$$IG(Y|X) = H(Y) - H(Y|X)$$

- разница между значением обычной энтропии признака Y и относительной энтропией (specific conditional entropy), для которой энтропия $H(Y)$ рассчитывается только для тех записей, для которых $X=x_i$. Т.е. это мера того, насколько более упорядоченной становится для нас переменная Y , если мы знаем значения X , или, говоря проще, существует ли корреляция между значениями X и Y , и насколько она велика.

$$H(Y) = - \sum_{y_i \in Y} p(y_i) \cdot \log_2 p(y_i)$$

$$H(Y|X) = \sum_{x_i \in X} p(x_i) \cdot H(Y|X = x_i)$$

где $p(x_i)$ — вероятность того, что переменная X примет значение x_i . В наших условиях эта вероятность считается как количество записей (примеров), в которых $X = x_i$, разделенное на общее количество записей. Чем больше параметр IG — тем сильнее корреляция. Таким образом, можно вычислить *information gain* для всех признаков и выкинуть те, которые слабо влияют на целевую переменную.

На рисунке 10 показан пример рассчитанных корреляций на данных для классификации мобильных телефонов по ценовым категориям¹. Можно видеть, что наибольшее влияние на целевую функцию (`price_range`) оказывает размер оперативной памяти (`ram`), в то время как вклад признака наличия двух сим-карт (`dual_sim`) незначителен.

На том же наборе данных можно определить 10 атрибутов, наиболее значимых для классификации (см. рисунок 11). Видно, что, как и в первом случае, вклад переменной `ram` в определение ценовой категории наибольший.

У методов фильтрации низкая стоимость вычислений, которая зависит линейно от общего количества признаков. Они значительно быстрее и `wrapping`, и `embedded` методов и хорошо работают даже тогда, когда число признаков превышает количество примеров в тренировочном наборе данных. Недостаток в том, что они рассматривают каждый признак изолированно, а наиболее коррелирующие признаки не всегда составляют подмножество, на котором точность предсказания будет наивысшей.

Wrapping.

Суть этой категории методов в том, что классификатор запускается на разных подмножествах признаков исходного тренировочного набора данных.

¹ <https://www.kaggle.com/iabhishekofficial/mobile-price-classification/version/1>

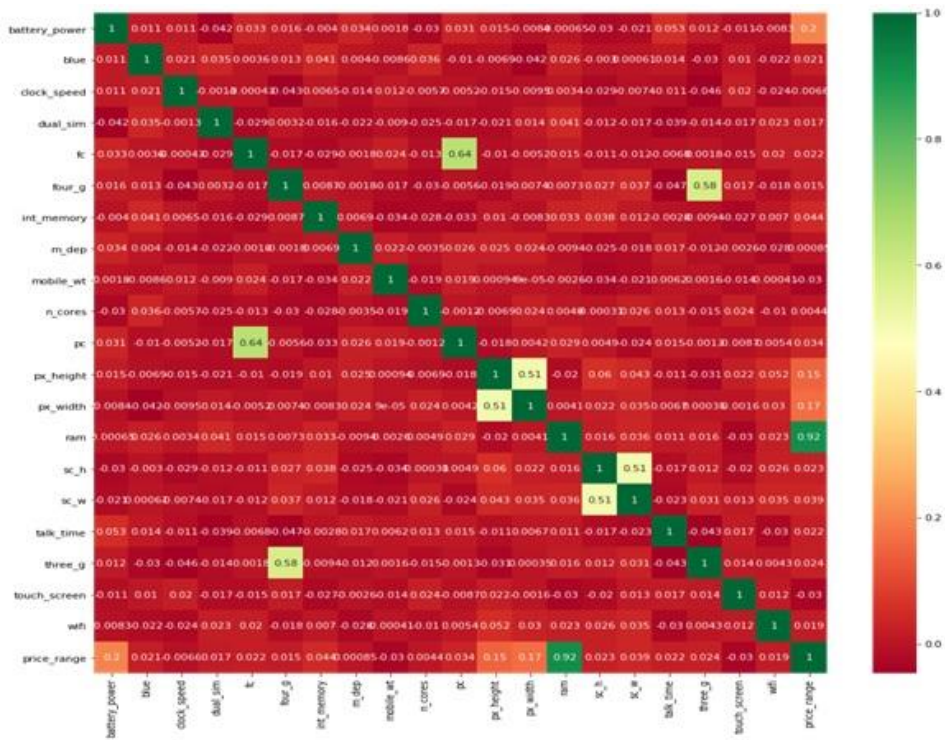


Рисунок 10 – Корреляция признаков между собой и целевой переменной

После этого выбирается подмножество признаков с наилучшими параметрами на обучающей выборке, а затем он тестируется на тестовом сете.

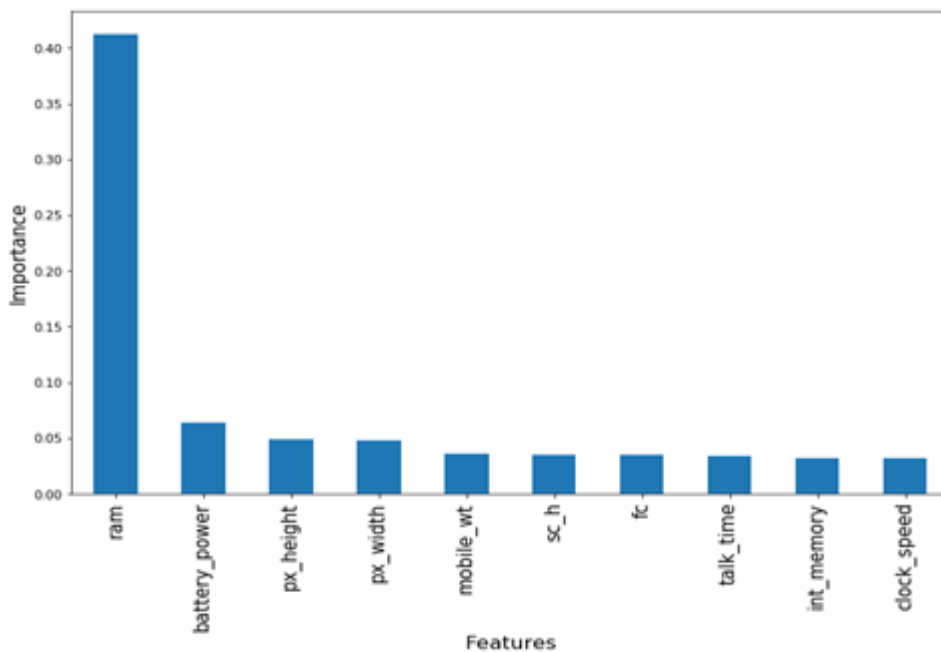


Рисунок 11 – Оценка значимости признаков по критерию χ^2

Существует два подхода в этом классе методов: методы включения (forward selection) и исключения (backwards selection) признаков. Первые стартуют с пустого подмножества, куда постепенно добавляются разные признаки (для выбора на каждом шаге оптимального добавления). Во втором случае метод стартует с подмножества, равного исходному множеству признаков, и из него постепенно удаляются признаки, с итерационным переобучением классификатора.

Встроенные методы (embedded)

Эти методы позволяют не разделять отбор признаков и обучение классификатора, а производят отбор внутри процесса расчета модели. Эти алгоритмы требуют меньше вычислений, чем wrapper methods (хотя и больше, чем методы фильтрации). Основным методом из этой категории является регуляризация.

a) L2 – метод регуляризации Тихонова (ridge regression)

В случае построения модели линейной регрессии, если в тестовом наборе данных задана матрица объектов-признаков A и вектор целевой переменной b , то мы ищем решение в виде $Ax=b$. В процессе работы алгоритма минимизируется следующее выражение:

$$\sum_{i=1}^n \left(y_i - \sum_{j=1}^p x_{i,j} \beta_j \right)^2 + \lambda \sum_{j=1}^p \beta_j^2$$

где первое слагаемое — это среднеквадратичная ошибка модели, а второе — регуляризирующий оператор (сумма квадратов всех коэффициентов, умноженная на λ). В процессе работы алгоритма размеры коэффициентов будут пропорциональны важности соответствующих признаков, а для тех признаков, которые дают наименьший вклад в устранение ошибки, будут близки к нулю. Параметр λ позволяет настраивать вклад регуляризирующего оператора в общую сумму. С его помощью мы можем указать приоритет: точность модели или минимальное количество используемых переменных.

б) *L1* – метод регуляризации *LASSO* (*Least Absolute Shrinkage and Selection Operator*)

Метод *L1* аналогичен предыдущему во всем, кроме отличия в регуляризирующем операторе. Он представляет собой не сумму квадратов, а сумму модулей коэффициентов:

$$\sum_{i=1}^n \left(y_i - \sum_{j=1}^p x_{i,j} \beta_j \right)^2 + \lambda \sum_{j=1}^p |\beta_j|$$

Несмотря на внешнюю схожесть, методы отличаются. Если в *Ridge* по мере роста λ все коэффициенты постепенно получают значения, близкие к нулевым, то в *LASSO* с ростом λ всё больше коэффициентов становятся нулевыми и совсем перестают вносить вклад в модель. Таким образом, реализуется отбор признаков.

Эти методы являются отличной альтернативой пошаговой регрессии и *wrаррег*-методам, когда необходимо работать с набором данным с большим количеством признаков.

Задание

- 1) Скачать данные для исследования:



- 2) Реализовать функции *one-hot-encoding* и *softmax* средствами базового Python 3.6. Разделить переменные на численные и категориальные, масштабировать и нормировать данные.
- 3) Реализовать модель логистической регрессии средствами базового Python для решения задачи бинарной классификации для полного набора

признаков из предобработанных данных и для непредобработанных данных, а также только для количественных признаков.

- 4) Сделать вывод об изменении качества работы модели в зависимости от применения предобработки данных и объёма признаков, на которых обучалась модель.

Дополнительные вопросы и задания

1. Для чего служит преобразование one-hot-encoding? Всегда ли использование этого метода будет повышать качество работы модели машинного обучения?

2. Почему регуляризатор L1 (Lasso) обнуляет веса при линейно зависимых признаках?

Литература

3. <https://towardsdatascience.com/feature-engineering-for-machine-learning-3a5e293a5114>
4. К. В. Воронцов. Отбор признаков. Лекция.
<http://www.machinelearning.ru/wiki/images/archive/4/4f/20111004204412%21Voron-ML-Modeling-slides.pdf>

Лабораторная работа № 3. Функции ошибок в машинном обучении

Цель работы

Получение знаний и критериев применимости основных используемых в современном машинном обучении функций ошибок (функций потерь).

Краткие теоретические сведения

Функция потерь — функционал, оценивающий величину расхождения между истинным значением оцениваемого параметра и модельной оценкой этого параметра.

Задачи регрессии

Выбирая функцию потерь для задач регрессии, следует решить, какое именно свойство условного распределения мы хотим восстановить. Наиболее частые варианты:

$$L(y, f) = (y - f)^2$$

– Gaussian loss (L_2), самый часто используемый и простой вариант, если нет никакой дополнительной информации или требований к устойчивости модели.

$$L(y, f) = |y - f|$$

– Laplacian loss (L_1); в некоторых задачах эта функция потерь предпочтительнее, так как она не так сильно штрафует большие отклонения, нежели квадратичная функция.

$$L(y, f) = \begin{cases} (1 - \alpha)|y - f| & \text{при } y - f \leq 0 \\ \alpha|y - f| & \text{при } y - f > 0 \end{cases}$$

– Quantile loss (L_q), функция асимметрична и больше штрафует наблюдения, оказывающиеся по нужную сторону квантили.

Графики перечисленных функций приведены на рисунке 12.

Задачи классификации

При классификации из-за принципиально другой природы распределения целевой переменной оптимизируются не сами метки классов, а их \log -

правдоподобие. Наиболее известные варианты таких классификационных функций потерь изображены на рисунке 13.

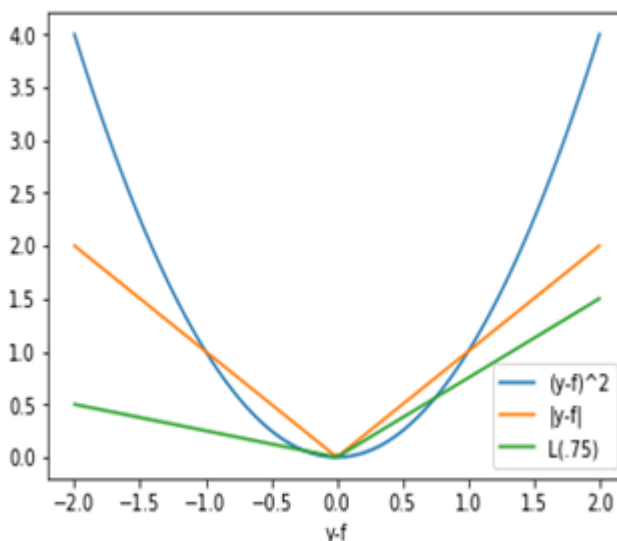


Рисунок 12 – Функции потерь для задач регрессии

Математические выражения для расчёта этих функций следующие:

$$L(y, f) = \ln(1 + \exp(-yf))$$

– Logistic loss (Bernoulli loss). Штрафуются даже корректно предсказанные метки классов, но, оптимизируя эту функцию потерь, можно улучшать классификатор, даже если все наблюдения предсказаны верно. Это самая стандартная и часто используемая функция потерь в бинарной классификации.

$$L(y, f) = \exp(-yf)$$

– Adaboost loss; имеет более жесткий экспоненциальный штраф на ошибки классификации и используется реже.

Для использования в задачах классификации применима также функция кросс-энтропии, которая определяет меру расхождения между двумя вероятностными распределениями. Если кросс-энтропия велика, разница между двумя распределениями велика, а если кросс-энтропия мала, распределения похожи друг на друга:

$$H(P, Q) = - \sum P(x) \cdot \log_2 Q(x),$$

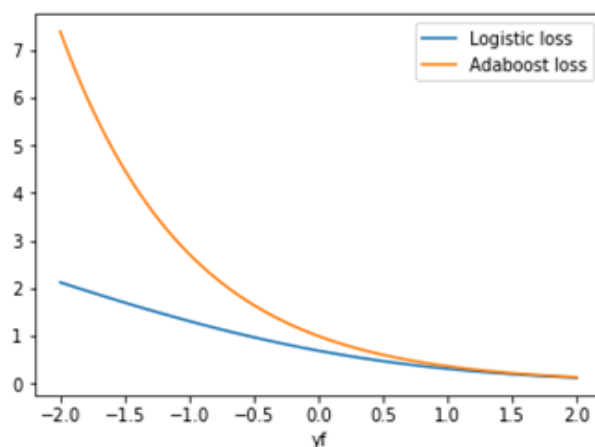


Рисунок 13 – Функции Logistic loss и Adaboost loss

где P – распределение истинных ответов, а Q – распределение вероятностей прогнозов модели.

В случае бинарной классификации формула для расчёта кросс-энтропии имеет следующий вид:

$$L = -y \cdot \log_2 p + (1 - y) \cdot \log_2(1 - p),$$

где y – двоичный индикатор (0 или 1) того, является ли метка класса правильной классификацией для текущего наблюдения, p – прогнозируемая вероятность класса, определённая моделью классификации.

При бинарной классификации каждая предсказанная вероятность сравнивается с фактическим значением класса (0 или 1) и вычисляется оценка, которая штрафует вероятность пропорционально величине отклонения от ожидаемого значения. Конфигурация выходного уровня модели представляет собой один узел с сигмоидальной функцией активации:

$$f(p_i) = \frac{1}{1 + \exp(-p_i)}$$

Чтобы классифицировать объект как принадлежащий одному из нескольких классов, задача формулируется как предсказание вероятности того, что пример принадлежит каждому классу. В случае, когда классов много ($M > 2$) берется сумма значений логарифмических функций потерь для каждого прогноза наблюдаемых классов – «categorical cross-entropy»:

$$CE = - \sum_{c=1}^M y_{o,c} \cdot \log_2 p_{o,c}.$$

Для расчёта взвешенного вектора вероятностей отнесения объекта к конкретным классам используется функция активации «softmax» — обобщение логистической функции для многомерного случая.

$$f(p_i) = \frac{\exp(p_i)}{\sum_{j=1}^M \exp(p_j)}.$$

Когда каждый из объектов должен классифицироваться однозначно, что чаще всего и требуется, можно отбросить слагаемые, которые являются нулевыми из-за значений целевых индикаторов y . Тогда:

$$CE = - \log_2 \frac{\exp(p_i)}{\sum_{j=1}^M \exp(p_j)},$$

где p_i — результат оценки принадлежности к соответствующему классу.

Ход работы

1. Скачать данные:



2. Реализовать модель логистической регрессии со следующими функциями потерь:
 - а) Logistic loss
 - б) Adaboost loss
 - в) binary crossentropy
3. Визуализировать кривые обучения модели бинарной классификации в виде динамики изменения каждой из функций ошибок п.2 на тренировочной и тестовой выборках.

4. Сравнить качество классификации по метрике ассурасу в каждом из трёх модификаций алгоритма.

Дополнительные вопросы и задания

1. Какую функцию потерь нужно применять в задаче регрессии, если вы хотите, чтобы модель больше штрафовала за выбросы в данных?
2. Как функция кросс-энтропии связана с дивергенцией Кульбака-Лейблера?

Литература

1. Основные функции потерь и примеры их реализации на Python:
<https://www.analyticsvidhya.com/blog/2019/08/detailed-guide-7-loss-functions-machine-learning-python-code/>
2. Алгоритм градиентного бустинга с разбором функций потерь для регрессии и классификации: <https://habr.com/ru/company/ods/blog/327250/#3-funkcii-poter>

Лабораторная работа № 4. Алгоритмы кластеризации

Цель работы

Целью данной лабораторной работы является получение навыков реализации классических алгоритмов кластеризации k-means и иерархической кластеризации.

Краткие теоретические сведения

Постановка задачи кластеризации (или обучения без учителя) формулируется следующим образом. Пусть имеется обучающая выборка $X^l = \{x_1, \dots, x_l\} \subset X$ и функция расстояния между объектами $\rho(x, x')$, введённая в соответствующем метрическом пространстве размерности l . Необходимо разбить выборку на непересекающиеся подмножества, называемые кластерами, так, чтобы каждый кластер состоял из объектов, близких по метрике ρ , а объекты разных кластеров существенно отличались. При этом каждому объекту $x_i \in X^l$ приписывается метка (номер) кластера y_i .

Алгоритм кластеризации – это функция $a : X \rightarrow Y$, которая каждому объекту $x \in X$ ставит в соответствие метку кластера $y \in Y$. В ряде случаев множество меток Y известно заранее, однако чаще ставится задача определить оптимальное число кластеров с точки зрения того или иного критерия качества кластеризации. В качестве метрики качества кластеризации можно взять, например, среднее (минимальное, максимальное) расстояние между объектами в разных кластерах, либо среднее взвешенное (с весами, взятыми пропорционально, например, размерам кластеров).

Цели кластеризации:

- а) Классификация объектов.

Попытка понять зависимости между объектами путем выявления их кластерной структуры. Разбиение выборки на группы схожих объектов упрощает дальнейшую обработку данных и принятие решений, позволяет применить к каждому кластеру свой метод

анализа (стратегия «разделяй и властвуй»). В данном случае стремятся уменьшить число кластеров для выявления наиболее общих закономерностей;

б) Сжатие данных.

Можно сократить размер исходной выборки, взяв один или несколько наиболее типичных представителей каждого кластера (например, вблизи центра масс). Здесь важно точно очертить границы каждого кластера, при этом их количество не является важным критерием.

в) Обнаружение выбросов.

Нахождение таких объектов в данных, которые выделяются из общей массы и не подходят ни одному кластеру. Обнаруженные объекты в дальнейшем обрабатывают отдельно.

Наиболее популярные алгоритмы кластеризации:

- а) Алгоритм k -средних и его модификации (k -means);
- б) Иерархические алгоритмы кластеризации;
- в) Вероятностные алгоритмы кластеризации (например, EM-алгоритм);
- г) Сдвиг среднего значения (англ. MeanShift);
- д) Пространственная кластеризация на основе анализа плотности данных (англ. Density-based spatial clustering of applications with noise, алгоритм DBSCAN).

Рассмотрим подробнее классический алгоритм k -means и класс иерархических алгоритмов.

Алгоритм k -means.

Алгоритм кластеризация с помощью алгоритма k -средних следующий:

- 1) Выбрать начальное приближение Y центров всех кластеров:

$$y \in Y: \mu_y$$

2) Отнести каждый объект x_i к одному из кластеров, исходя из минимума метрики расстояния $p(x_i, \mu_y)$:

do:

$$y_i := \underset{y \in Y}{\operatorname{argmin}} p(x_i, \mu_y), i = 1, \dots, l;$$

3) Вычислить новое положение центров каждого из кластеров, пока метки y_i не перестанут изменяться.

$$\mu_{yj} = \frac{\sum_{i=1}^l [y_i = y] f_i(x_i)}{\sum_{i=1}^l [y_i = y]}, y \in Y, j = 1, \dots, n$$

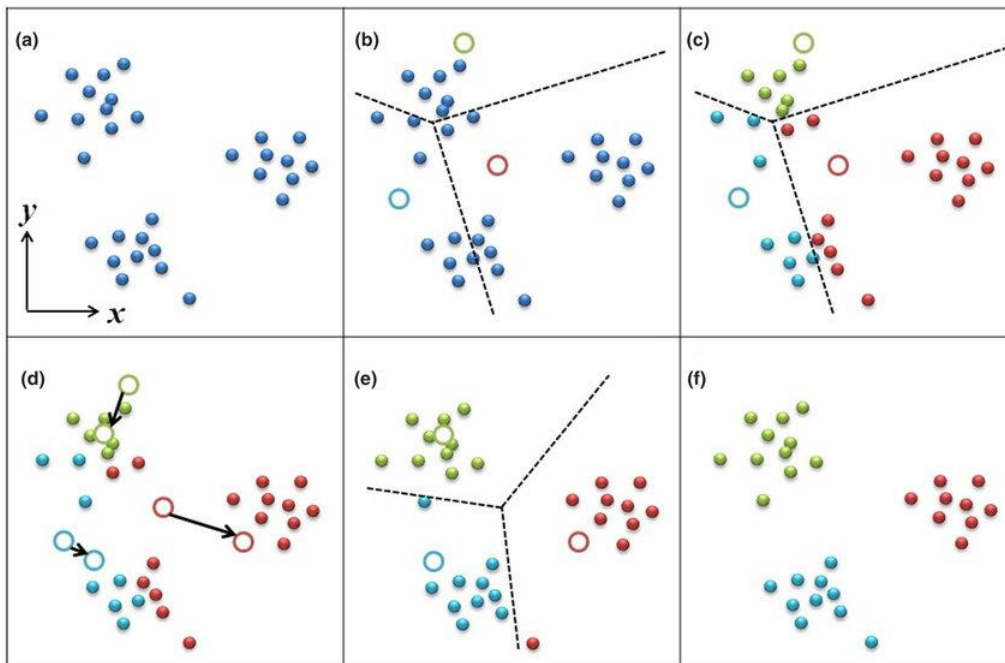


Рисунок 14– Схематическая иллюстрация выполнения последовательных итераций алгоритма k -means на двумерных данных с разделением на 3 кластера [1]

Из минусов данного алгоритма можно отметить крайнюю чувствительность к выбору начальных приближений центров. Случайная инициализация центров на шаге 1 может приводить к плохой работе алгоритма. Также k -means может показывать плохие результаты и в том случае, если изначально будет неверно угадано число кластеров. Стандартная рекомендация заключается в проведении кластеризации при различных значениях k и выборе того варианта, при котором достигается резкое улучшение качества

кластеризации по заданному функционалу (например, межкластерному расстоянию). Если перед началом работы точно неизвестно количество кластеров, можно использовать алгоритмы, которые самостоятельно определяют их количество (например, DBSCAN).

Иерархические алгоритмы кластеризации.

Алгоритмы иерархической кластеризации подразделяются на два основных типа: восходящие и нисходящие алгоритмы. Нисходящие алгоритмы работают по принципу «сверху-вниз»: вначале все объекты помещаются в один кластер, который затем разбивается на все более мелкие кластеры. Более распространены восходящие алгоритмы, которые в начале работы помещают каждый объект в отдельный кластер, а затем объединяют кластеры во все более крупные, пока все объекты выборки не будут содержаться в одном кластере. Таким образом строится система вложенных разбиений. Результаты таких алгоритмов обычно представляют в виде дерева – дендрограммы. Классический пример такого дерева – классификация животных и растений.

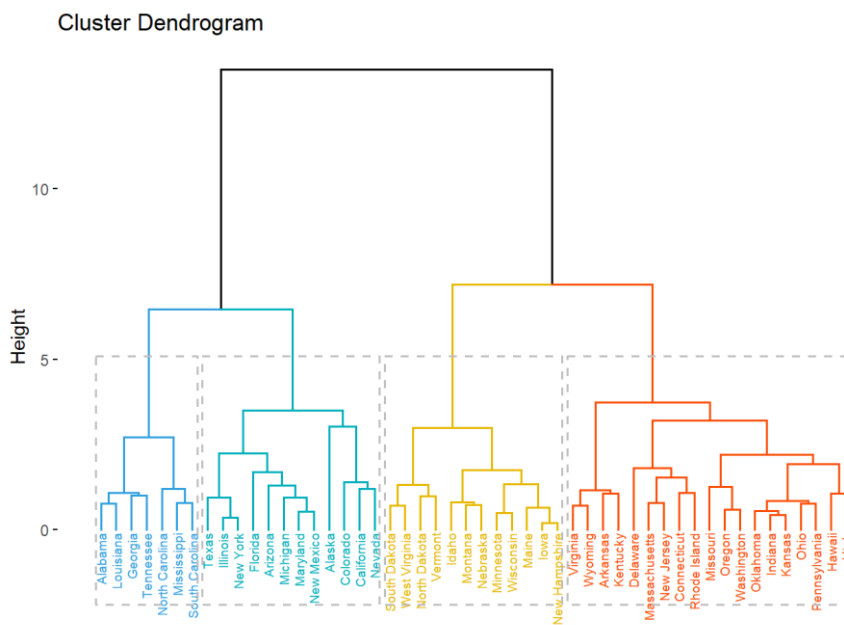


Рисунок 15 – Пример дендрограммы с последовательным объединением кластеров

К недостатку иерархических алгоритмов можно отнести систему полных разбиений, которая может являться излишней в контексте решаемой задачи.

Разберём восходящий алгоритм кластеризации. Вначале каждый объект считается отдельным кластером. Для одноэлементных кластеров естественным образом определяется функция расстояния $R(\{x\},\{y\})=\rho(x, y)$. Затем запускается процесс слияний. На каждой итерации вместо пары самых близких кластеров U и V образуется новый кластер $W = UV$. Расстояние от нового кластера W до любого другого кластера S вычисляется по расстояниям $R(U, V)$, $R(U, S)$ и $R(V, S)$, которые к этому моменту уже известны:

$$R(UV, S) = \alpha UR(U, S) + \alpha VR(V, S) + \beta R(U, V) + \gamma |R(U, S) - R(V, S)|,$$

где αU , αV , β , γ — числовые параметры. Эта универсальная формула для расчёта расстояний между кластерами, которая была предложена Лансом и Уильямсом в 1967 году. Самыми распространёнными её вариантами являются метод ближайшего и метод дальнего соседа, которые вычисляют расстояние между кластерами как расстояние между наименее (наиболее) удалёнными друг от друга их членами.

Ход работы

- 1) Скачать данные (MNIST): <http://yann.lecun.com/exdb/mnist/>



- 2) Реализовать в виде набора функций алгоритм k -means и алгоритм иерархической кластеризации (например, с использованием функции *linkage* модуля *scipy.cluster*) для разделения набора данных без меток на кластеры;

- 3) Построить кривую зависимости интеркластерного расстояния от числа кластеров для алгоритма иерархической кластеризации, выбрать оптимальный порог разделения.
- 4) Сравнить результаты двух выбранных алгоритмов по выбранной метрике оценки качества кластеризации.

Дополнительные вопросы и задания

1. *Каким образом следует выбирать порог разделения для иерархической кластеризации?*
2. *Как, по Вашему мнению, можно улучшить инициализацию центров кластеров в алгоритме *k-means* с целью нахождения наиболее оптимальных начальных приближений?*
3. *Реализуйте алгоритм DBSCAN на данных из лабораторной работы и сравните его качество с качеством работы алгоритма *k-means* и метода *linkage*.*

Литература

1. Документация модуля **sklearn.cluster**. библиотеки sklearn:
<https://scikit-learn.org/stable/modules/clustering.html>
2. Обзор методов обучения без учителя:
<https://habr.com/ru/company/ods/blog/325654/>
3. Lance G. N., Willams W. T. A general theory of classification sorting strategies. Hierarchical systems // Comp. J. – 1967. – v. 9. – Pp. 373–380.

Лабораторная работа № 5. Введение в обработку естественного языка

Цель работы

Целью данной лабораторной работы (ЛР) является получение студентом навыков реализации базовых методов обработки естественного языка, включая предобработку текста, формирование «мешка слов» («bag-of-words»), выделение стоп-слов и наиболее важных слов в документе, создание тематических моделей.

Краткие теоретические сведения

Задачи обработки естественного языка – одни из самых востребованных в современном машинном обучении. Они включают в себя такие области, как машинный перевод, аннотирование текстов, классификация документов, генерация текста, text-to-image и text-to-video задачи, построение чат-ботов и диалоговых систем и многие другие.

Решение любой задачи в сфере NLP (natural language processing) начинается с предобработки текста, которая обычно включает в себя:

- а) Удаление всех не относящихся к естественному языку символов из текста: @, #, & и т.д. (если это не противоречит цели исследования);
- б) Токенизация текста, т.е., разделение его на отдельные слова: слово = «токен»;
- в) Удаление стоп-слов, встречающихся во всех без исключения текстах и не несущих смысловой нагрузки для решения текущей задачи;
- г) Приведение текста к нижнему регистру, чтобы модель распознавала такие слова, как, например, «привет» и «Привет», одинаково;
- д) Стэмминг (обрезка слова до его основания) и лемматизация текста (приведение слов к единой форме, например, («красивая», «красивый», «красивое») → «красивый»).

Чтобы использовать методы машинного обучения на текстовых документах, нужно перевести текстовое содержимое (слова на естественном языке) в числовой вектор признаков. Наиболее интуитивно понятный способ сделать описанное выше преобразование — это представить текст в виде набора слов, после чего приписать каждому слову в тексте уникальный целочисленный индекс, соответствующий частоте его появления в документах обучающей выборки. Для этого в каждом документе i следует посчитать количество употреблений каждого слова w и сохранить это число в ячейке $X[i, j]$. Это будет соответствовать значению признака j , где j — это индекс слова w в словаре.

Такое преобразование текста в матрицу частот употреблений слов носит название «мешка слов» (или «bag of words»). Оно подразумевает, что вероятность появления слова в разных документах одинакова, и строит матрицу объекты-признаки исходя из предположения, что количество признаков соответствует количеству уникальных слов в корпусе документов. «Мешок слов» чаще всего является высокоразмерным разреженным набором данных (с большим количеством нулей).

D1 - "I am feeling very happy today"
 D2 - "I am not well today"
 D3 - "I wish I could go to play"

| | I | am | feeling | very | happy | today | not | well | wish | could | go | to | play |
|----|---|----|---------|------|-------|-------|-----|------|------|-------|----|----|------|
| D1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| D3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

Рисунок 16 – Пример построения матрицы частот упоминаний уникальных слов для корпуса документов из трёх предложений (источник изображения: deeplearning.ai by Andrew Ng)

Однако, даже если документы посвящены одной теме, в относительно длинных документах среднее количество словоупотреблений будет выше, чем в

коротких, что может приводить к некорректной настройке моделей машинного обучения. Чтобы избежать потенциальных несоответствий, применяется подход, называемый *TF-IDF* – «term frequency – inverse document frequency», который позволяет оценить «важность» слова для данного документа. Этот подход позволяет снизить влияние низкоинформативных слов и, наоборот, повысить «вес» важных с точки зрения оценки принадлежности документа к определённой тематике. Для каждого слова вычисляется следующая величина:

$$tf - idf(t, d, D) = tf(t, d) \times idf(t, D),$$

$$tf(t, d) = \frac{n_t}{\sum_k n_k},$$

$$idf(t, D) = \log \frac{|D|}{|\{d_i \in D | t \in d_i\}|},$$

где n_t - частота слова (токена) t в документе d , $|D|$ - количество документов в коллекции; $|\{d_i \in D | t \in d_i\}|$ - количество документов в коллекции, в которых встречается слово t .

Большое значение *TF-IDF* будут получать слова с высокой частотой внутри конкретного документа и с низкой частотой использования в других документах. Заполняя матрицу объекты-признаки значениями *TF-IDF*, можно эффективнее выделять важные «признаки» (слова) и проводить более качественную настройку моделей машинного обучения.

Более продвинутыми с точки зрения выделения семантики различных слов являются современные решения, полученные в результате обучения на больших корпусах документов. К ним относится, в частности, инструмент *word2vec*, разработанный в 2013 году компанией Google и получивший широкое распространение. *Word2vec* вычисляет векторное представление слов, обучаясь на входных текстах. Это векторное представление основывается на контекстной близости: слова, встречающиеся в тексте рядом с одними и теми же словами (а, следовательно, имеющие схожий смысл), будут иметь близкие координаты в многомерном пространстве (норма расстояния между их векторными представлениями будет мала).

| | Man (5391) | Woman (9853) | King (4914) | Queen (7157) |
|--------|---------------|-----------------|----------------|-----------------|
| Gender | -1 | 1 | -0.95 | 0.97 |
| Royal | 0.01 | 0.02 | 0.93 | 0.95 |
| Age | 0.03 | 0.02 | 0.70 | 0.69 |
| Food | 0.09 | 0.01 | 0.02 | 0.01 |

Рисунок 17 – Пример формирования векторного представления слов в методе word2vec (источник изображения: deeplearning.ai by Andrew Ng)

Сформированные таким образом вектора позволяют вычислять «семантическое расстояние» между словами: например, слова «король» и «королева» будут находиться в этом представлении близко друг к другу, а слова «король» и «яблоко» - далеко.

Задание

- 1) Скачать английскую книгу “Alice’s Adventures in Wonderland”
<http://www.gutenberg.org/files/11/11-0.txt>



- 2) Реализовать пайплайн обработки выбранного текста на английском языке, включая всю необходимую предварительную обработку текста, включая приведение слов к нижнему регистру, удаление стоп-слов, цифр/неалфавитных символов, знаков пунктуации.
- 3) Разделить текст на главы и в каждой главе отобразить Топ-20 слов с помощью алгоритма TF-IDF.

- 4) Реализовать LDA алгоритм и сравнить результаты с полученными ранее с помощью TF-IDF. Сделать выводы о применимости реализованных подходов.

Дополнительные вопросы и задания

1. Какое слово имеет максимальное значение метрики TF-IDF для двенадцатой главы под названием «Alice's Evidence»?
2. Как бы вы назвали главы книги «Alice in Wonderland», основываясь на найденных для каждой главы важных словах?

Литература

1. NLP с примерами на Python:
<https://habr.com/ru/company/Voximplant/blog/446738/>
2. Word2vec, презентация:
<http://www.machinelearning.ru/wiki/images/b/b3/Word2Vec.pdf>

Лабораторная работа № 6. Методы оптимизации в глубоком обучении

Цель работы

Целью данной лабораторной работы является получение навыков реализации современных алгоритмов оптимизации и модификаций алгоритма градиентного спуска, широко используемого для обучения глубоких нейронных сетей.

Краткие теоретические сведения

В общем случае задачу оптимизации можно записать в виде:

$$\text{minimize}_x f(x) \text{ при } \begin{cases} g_i(x) \leq 0, & i = 1, \dots, m \\ h_j(x) = 0, & j = 1, \dots, p \end{cases}$$

где $f: \mathbb{R}^n \rightarrow \mathbb{R}$ – целевая функция, минимизация которой осуществляется путем поиска значений n -мерного вектора x ;

$g_i(x) \leq 0$ – ограничения в виде неравенств;

$h_j(x) = 0$ – ограничения в виде равенств;

$m \geq 0, p \geq 0$.

В рамках лабораторной работы мы сосредоточимся на рассмотрении дифференциальных методов оптимизации заданной функции нескольких переменных и вариациях метода градиентного спуска.

Метод Ньютона

Метод Ньютона – метод поиска корней уравнения, использующий линейную аппроксимацию. Предполагается, что точка x_n – некоторое приближенное решение уравнения $f(x) = 0$. В точке производится расчет линейного приближения функции $f(x)$, после чего в качестве нового приближенного решения x_{n+1} берется пересечение графика аппроксимации с осью абсцисс (рисунок 18).

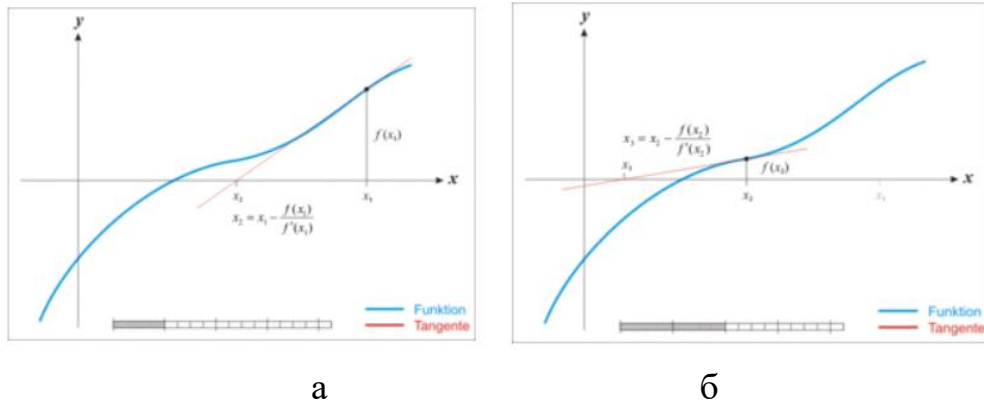


Рисунок 18 – Принцип работы метода Ньютона: (а), (б) – первая и вторая итерации метода соответственно

Например, методом Ньютона после 6 итераций было найдено решение $x \approx 1,466$ уравнения $x^3 - x^2 - 1 = 0$ при $x_0 = 1$ (рисунок 19).

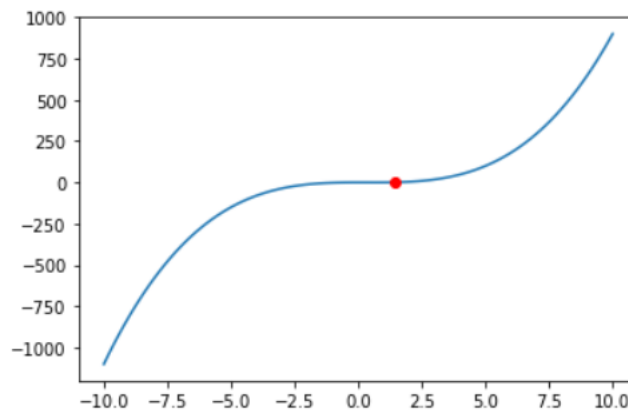


Рисунок 19 – Функция $f(x) = x^3 - x^2 - 1$ (синяя линия) и решение уравнения $f(x) = 0$ (красная точка), найденное методом Ньютона

Пакет `scipy.optimize` содержит в себе большое количество часто применяемых на практике алгоритмов оптимизации. Данный модуль предоставляет:

- а) возможность решения задач безусловной и условной минимизации скалярных функций нескольких переменных через метод `minimize()`, использующий такие алгоритмы, как BFGS (алгоритм Бroyдена-Флетчера-Гольдфарба-Шанно), Nelder-Mead simplex (симплекс-метод

Нелдера-Мида), Newton Conjugate Gradient (метод сопряженных градиентов) и другие;

- б) реализацию методов глобальной оптимизации грубой оценки (например, `anneal()` – алгоритм Метрополиса, `basinhopping()`);
- в) реализацию алгоритмов минимизации методами наименьших квадратов (`leastsq()`) и приближения с помощью кривых (`curve_fit()`);
- г) реализацию методов определения минимумов (`minimize_scalar()`) и корней (`newton()`) скалярных функций одной переменной.

Рассмотрим применение различных методов оптимизации к более интересному случаю, а именно, нахождению оптимума функции Розенброка. Функция Розенброка – невыпуклая функция, предложенная Ховардом Розенброком в 1960 г. для оценки производительности алгоритмов оптимизации.

Данная функция от двух переменных задаётся следующим уравнением:
 $f(x, y) = (1 - x)^2 + 100(y - x^2)^2$. Её график представлен на рисунке 20.

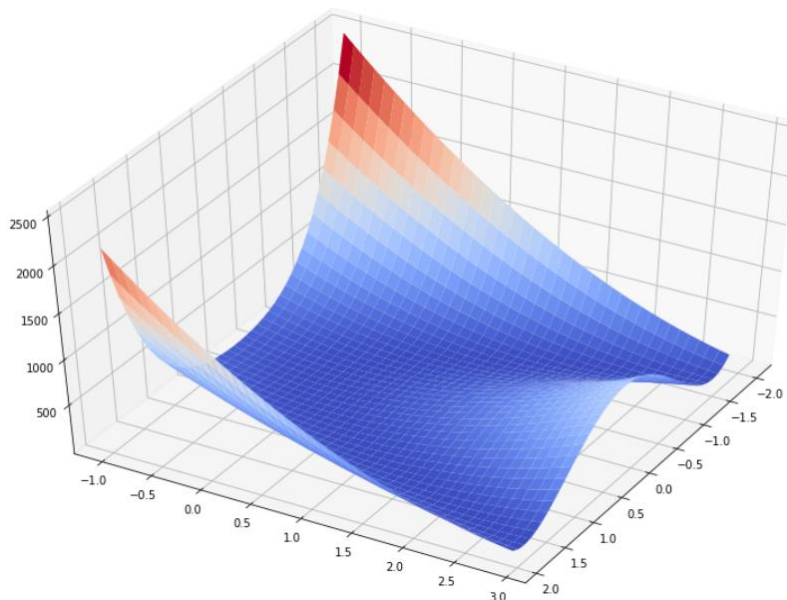


Рисунок 20 – График функции Розенброка от двух переменных

Функция Розенброка имеет минимум 0 в точке (1; 1).

Метод сопряженных градиентов

– итерационный метод для безусловной оптимизации в многомерном пространстве, являющийся расширением идей метода Ньютона, который ищет экстремум квадратичной формы, полученной из целевой функции. Проиллюстрируем результат применения этого метода для нахождения минимума функции Розенброка. Будем искать экстремум функции Розенброка из начальной точки (4; -4,1) функцией `scipy.optimize.minimize()` с аргументом `method='Newton-CG'` (рисунок 21).

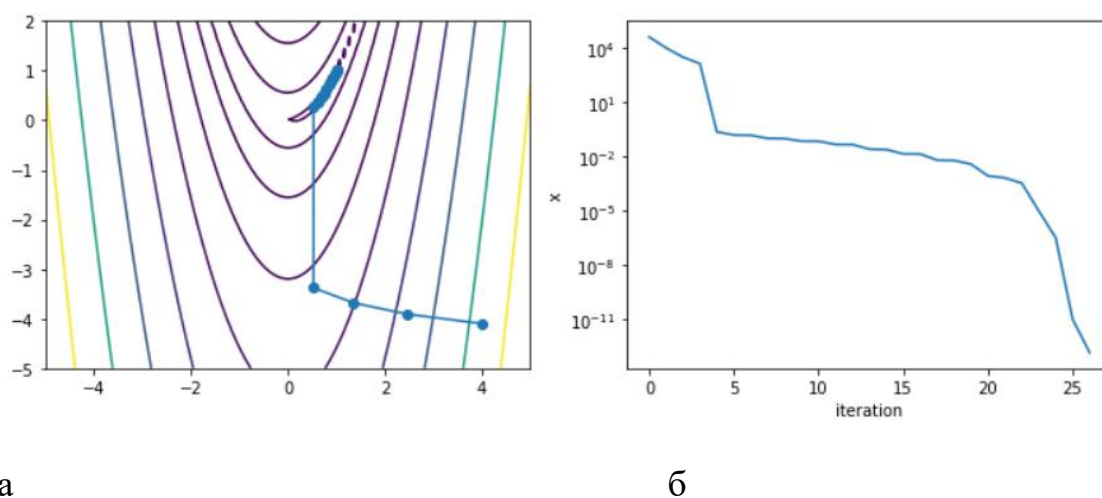


Рисунок 21– Поиск минимума функции Розенброка методом сопряженных градиентов: последовательность приближенных решений на различных итерациях алгоритма на 2D карте функции (а); график зависимости значения функции от номера итерации (б)

На 26-й итерации алгоритма было получено решение (0,99999963; 0,99999926).

Алгоритм Бroyдена-Флетчера-Гольдфарба-Шанно (BFGS)

Алгоритм BFGS - один из наиболее популярных квазиньютоновских методов. В квазиньютоновских методах не вычисляется напрямую гессиан (матрица вторых производных) функции, требуемый для расчёта шага оптимизационного алгоритма в многомерном пространстве. Вместо этого гессиан оценивается приближенно, исходя из сделанных до этого

итераций. Посмотрим на решение той же задачи оптимизации, что и при применении метода сопряженных градиентов. Воспользуемся функцией `scipy.optimize.minimize()` с аргументом `method='BFGS'` (рисунок 22).

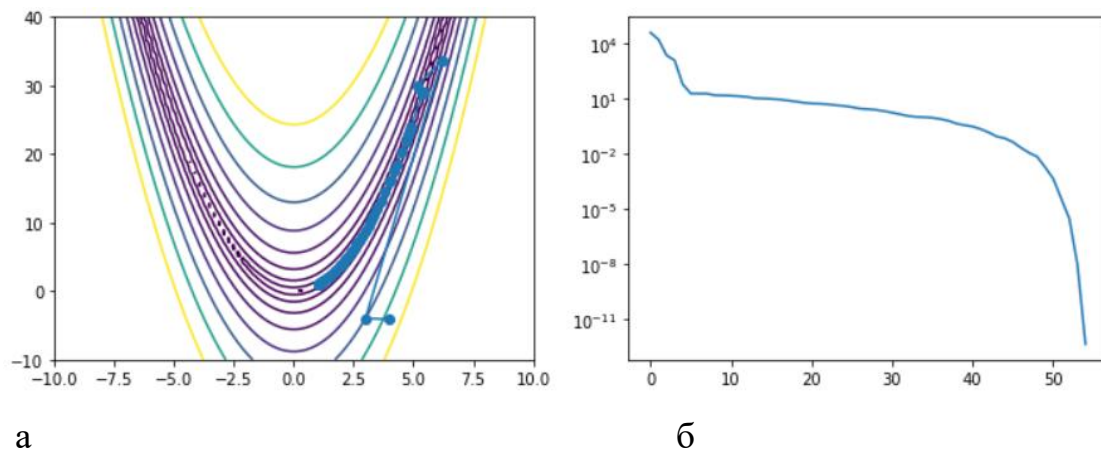


Рисунок 22 – Поиск минимума функции Розенброка алгоритмом BFGS: последовательность приближенных решений на различных итерациях алгоритма на 2D карте функции (а); график зависимости значения функции ошибки от номера итерации (б)

На 54-й итерации алгоритма было получено решение (0,99999939; 0,99999876). Из рисунка 24 (а) видно, что на втором шаге алгоритм «шагнул» в неправильном направлении, но затем последовательно начал движение к искомому минимуму функции.

Симплекс-метод Нелдера-Мида

Симплекс метод, называемый также методом деформируемого многогранника, является методом безусловной оптимизации функции нескольких переменных, не использующий градиентов функции. Это свойство позволяет применять его к негладким функциям. Суть метода заключается в последовательном перемещении и деформировании симплекса (чаще всего, треугольника) вокруг точки экстремума. Проиллюстрируем результат метода на той же задаче оптимизации. Будем использовать функцию `scipy.optimize.minimize` с аргументом `method='nelder-mead'`. На рисунке 23 визуализирован поиск точки минимума, а на рисунке 24 – примеры симплексов

в начале и конце работы итерационного алгоритма: посредством последовательного уточнения положения экстремума симплекс «шагает» по гиперплоскости, одновременно уменьшаясь в размерах, всё более приближаясь к целевой точке.

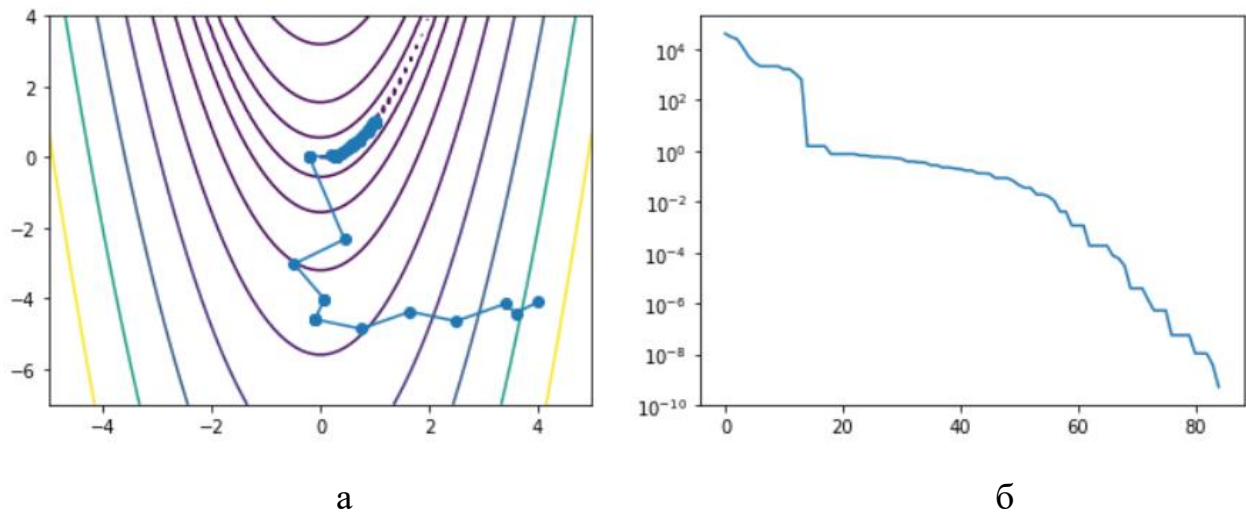


Рисунок 23 – Поиск минимума функции Розенброка симплекс-методом Нелдера-Мида: последовательность приближенных решений на различных итерациях алгоритма на 2D карте функции (а); график зависимости значения функции ошибки от номера итерации (б)

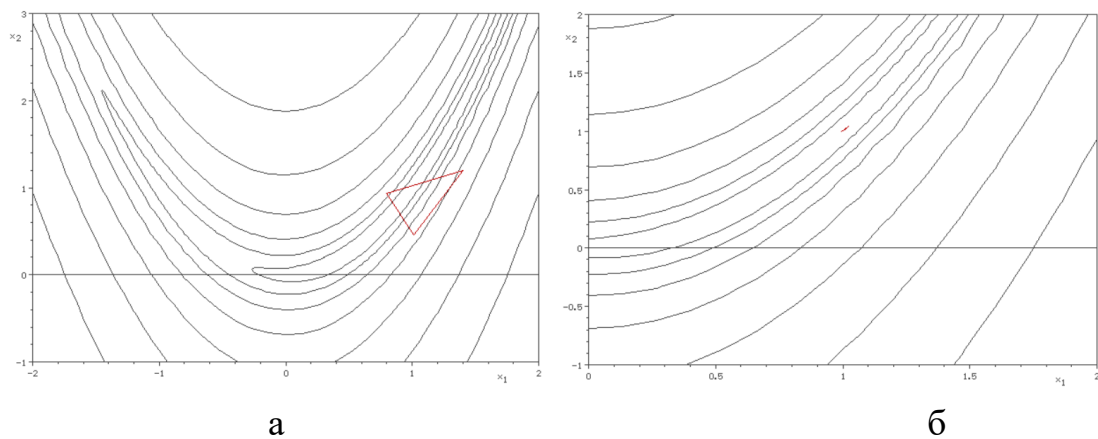


Рисунок 24 – Примеры симплексов (красные линии) на 2D карте функции Розенброка (черные линии) в начале (а) и конце (б) работы симплекс-метода Нелдера-Мида

На 85-й итерации алгоритма было получено решение (0,99998846; 0,99997494).

Градиентный спуск

Градиентный спуск – алгоритм, используемый для нахождения (в общем случае) локальных минимумов дифференцируемой функции. Для заданной дифференцируемой функции $f(x)$ алгоритм позволяет найти x^* такой, что $f'(x^*) = 0$ и x^* является точкой минимума $f(x)$. Функция может обладать несколькими локальными минимумами $x_1^*, x_2^*, \dots, x_k^*$, и алгоритм градиентного спуска будет сходиться к одному из них, в зависимости от выбора начальной точки и скорости обучения.

Предположим, что $f(x)$ – дифференцируемая функция от одной переменной. При текущем значении x_1 градиентный спуск описывает направление для сходимости к локальному минимуму x^* , где $f'(x^*) = 0$. Следующая точка определяется как $x_2 = x_1 - \lambda f'(x_1)$, где λ – коэффициент скорости обучения. Можем записать данную формулу в обобщенном виде:

$$x_{t+1} = x_t - \lambda f'(x_t),$$

где t – номер итерации. При заданном x_1 и большом количестве итераций T алгоритм генерирует последовательность точек x_1, x_2, \dots, x_T , где $x_T \approx x^*$. Таким образом, x_{t+1} сходится к x^* при очень большом t . Стоит заметить, что при сходимости алгоритма $f'(x_t) \approx 0$, и, следовательно, $|x_{t+1} - x_t| \approx 0$. Таким образом, общепринятым критерием остановки работы градиентного спуска является уменьшение величины $|x_{t+1} - x_t|$ до какого-либо малого значения. Например, можно задать алгоритму работать до момента, когда $|x_{t+1} - x_t| < 0,001$.

Теперь пусть имеется дифференцируемая функция $f(x_1, x_2, \dots, x_n)$ от нескольких переменных. Наша цель – с помощью градиентного спуска найти точку минимума $(x_1^*, x_2^*, \dots, x_n^*)$. Функция имеет частные производные, хранящиеся в векторе градиента $(\frac{df(x)}{dx_1}, \frac{df(x)}{dx_2}, \dots, \frac{df(x)}{dx_n})$. Направление градиента

задает направление наибольшего подъема, а длина вектора – угол наклона. Можно легко выписать обобщенное выражение градиентного спуска для функций от нескольких переменных:

$$\begin{bmatrix} x_1^{t+1} \\ \vdots \\ x_n^{t+1} \end{bmatrix} = \begin{bmatrix} x_1^t \\ \vdots \\ x_n^t \end{bmatrix} - \lambda \begin{bmatrix} \frac{df(x_1^t)}{dx_1} \\ \vdots \\ \frac{df(x_n^t)}{dx_n} \end{bmatrix},$$

где t – номер итерации. В данном случае критерий остановки связан с евклидовым расстоянием между текущей и предыдущей итерациями, например, можно задать: $\sqrt{(x_1^{t+1} - x_1^t)^2 + \dots + (x_n^{t+1} - x_n^t)^2} < 0,001$.

Пример: минимизация функции одной переменной

Целевая функция: $f(x) = 0,1x^2 + \sin(0,1x^2)$ (рисунок 25).

Алгоритм градиентного спуска требует расчета первой производной функции: $f'(x) = 0,2x + 0,2x \cos(0,1x^2)$.

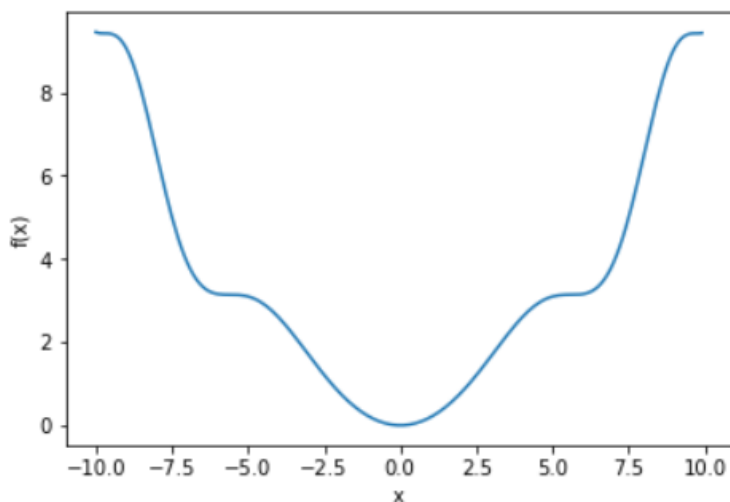


Рисунок 25 – График функции $f(x) = 0,1x^2 + \sin(0,1x^2)$

При коэффициенте скорости обучения $\lambda = 1$ и при начальной точке $x_0 = 8$ получаем схождение к минимуму функции, представленное на рисунке 26:

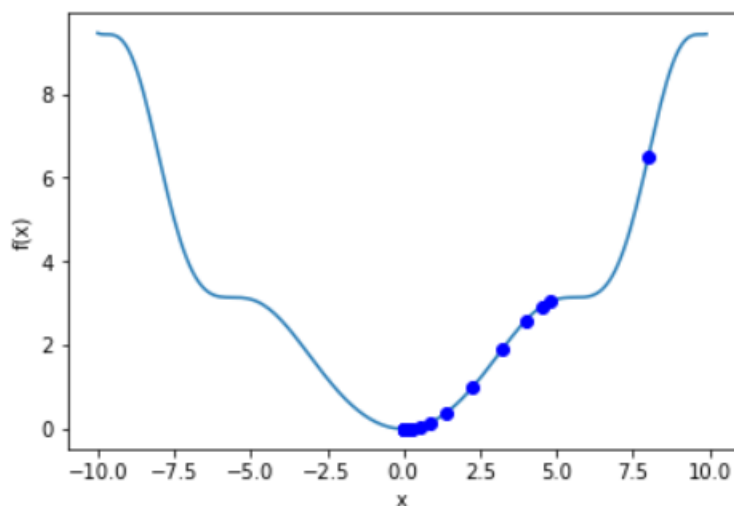


Рисунок 26 – Приближенные решения на различных итерациях градиентного спуска при поиске минимума функции $f(x) = 0,1x^2 + \sin(0,1x^2)$

Порог для критерия останова был задан $\varepsilon = 0,001$, в результате после 20-й итерации было найдено решение $x \approx 0,0011$.

Пример: минимизация функции нескольких переменных

Целевая функция: $f(x, y) = x^2 + y^2 + 1$ (рисунок 27), – частные производные которой $\frac{df(x)}{dx} = f_x = 2x$ и $\frac{df(y)}{dy} = f_y = 2y$.

$f(x, y) \geq 1$ и $f(0,0) = 1$, то есть $(0; 0)$ – глобальный минимум функции.

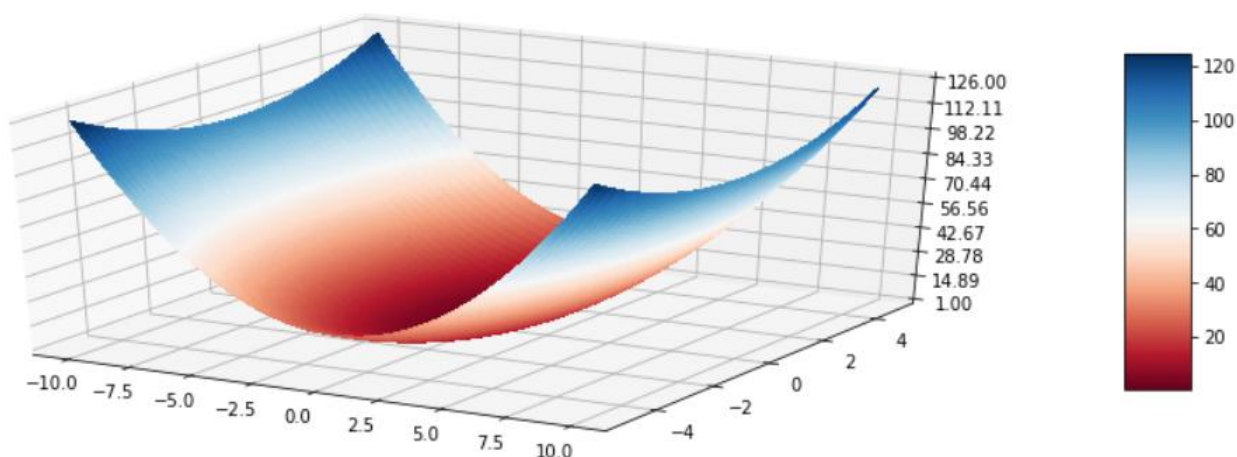


Рисунок 27 – График функции $f(x, y) = x^2 + y^2 + 1$

Для работы алгоритма были заданы параметры: $\lambda = 0,2$, $x_0 = (6; 2)$, $\varepsilon = 0,001$. Схождение градиентного спуска к точке минимума на 2D карте функции визуализировано на рисунке 28.

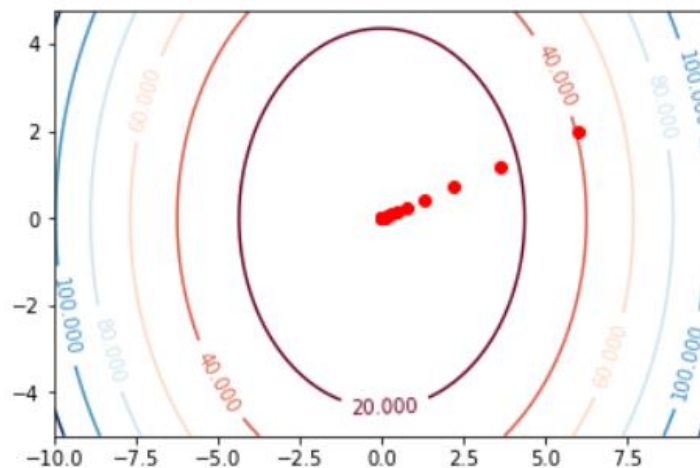


Рисунок 28 – Приближенные решения на различных итерациях градиентного спуска при поиске минимума функции $f(x) = x^2 + y^2 + 1$

Стохастический градиентный спуск

Применение алгоритма градиентного спуска на тренировочном датасете большого размера может вызывать затруднения, связанные со скоростью сходимости алгоритма и требуемых вычислительных мощностей. На одном шаге классического градиентного спуска выполняется обновление параметров модели в соответствии с правилом:

$$\theta_t := \theta_{t-1} - \eta \nabla_{\theta} J(\theta_{t-1}),$$

где η – коэффициент скорости обучения, θ – параметры модели.

Необходимо пройти по всем данным, чтобы рассчитать градиент $\nabla_{\theta} J(\theta_{t-1})$ и новое значение θ_t . В случае большого объема данных это может быть вычислительно дорогой операцией. Кроме того, такой подход не может обойти проблему «падения» в локальные минимумы. Стохастическая модификация алгоритма позволяет отчасти решить обе эти задачи.

Стохастический градиентный спуск производит обновление параметров на каждом поднаборе данных (i):

$$\theta_t := \theta_{t-1} - \eta \nabla_{\theta} J(\theta_{t-1}^{(i)}),$$

где $J(\theta)$ – целевая функция (функция ошибок), θ – параметры модели, η – коэффициент скорости обучения. Для этого, как видно из формулы, для обновления весов не требуется считать градиент по всему набору данных, что позволяет значительно экономить вычислительные ресурсы. При этом, если этот поднабор данных содержит только один элемент, то мы получаем классический вариант стохастического градиентного спуска, а если $1 < i < N$, то это промежуточный вариант, который в английской литературе называется “mini batch gradient descent”. Размер «минибатча» - поднабора данных – в каждом случае нужно подбирать отдельно в зависимости от свойств оптимизируемой функции и других требований к процессу обучения модели.

Градиентный спуск с инерцией (Momentum)

Данный метод ускоряет движение градиентного спуска в сторону экстремума и уменьшает осцилляции в неверных направлениях. В алгоритме используется доля β вектора градиента от предыдущей итерации и доля $(1 - \beta)$ текущего вектора градиента. Это полный аналог так называемой функции экспоненциального сглаживания:

$$V_t = \beta V_{t-1} + (1 - \beta) g_t$$

$$\theta_t := \theta_{t-1} - \eta V_t,$$

где g_t – градиент на текущей итерации. Обычно β устанавливают равным 0,9, что позволяет в большей степени учитывать инерцию движения, накопленного за предыдущие итерации, и в меньшей степени обращать внимание на новые изменения. Отсюда и аналогия с физикой: мы «по инерции» движемся в выбранном направлении, постепенно уточняя его, получая информацию от новых данных.

RMSprop

Алгоритм RMSprop (Root Mean Square propagation) обновляет параметры с учётом квадратов градиентов на текущем шаге и имеет несколько изменённое правило обновления весов:

$$V_t = \beta V_{t-1} + (1 - \beta) g_t^2$$
$$\theta_t := \theta_{t-1} - \eta \frac{g_t}{\sqrt{V_t} + \varepsilon}.$$

где ε – маленькая добавка во избежание деления на 0. Адаптивный коэффициент скорости обучения с квадратным корнем в знаменателе в последней формуле обеспечивает умеренный сдвиг в нужном направлении к точке локального минимума. Другими словами, чем больше «накопленный» градиент V_t «текущего» градиента g_t , тем меньше будут изменяться веса на каждом шаге.

Adam

Adam (Adaptive momentum algorithm) – один из самых популярных оптимизационных алгоритмов и содержит в себе элементы методов Momentum и RMSprop. В нём производится расчет адаптивного коэффициента скорости обучения и сохраняются экспоненциальные скользящие средние градиентов и квадратов градиентов, а также могут вводиться скорректированные градиенты для «замедления» скорости движения к экстремуму по мере увеличения номера итерации t :

$$V_t^{corr} = \frac{V_t}{1 - \gamma^t}.$$

где γ – число от 0 до 1. Гиперпараметры алгоритма Adam: скорость обучения η , коэффициенты β_1 , β_2 , число ε .

Скользящие средние градиентов и квадратов градиентов, V_t и S_t соответственно, рассчитываются следующим образом:

$$V_t = \beta_1 V_{t-1} + (1 - \beta_1) g_t$$

$$S_t = \beta_2 S_{t-1} + (1 - \beta_2) g_t^2.$$

Обновление весов модели в алгоритме Adam производится по формуле:

$$\theta_{t+1} := \theta_t - \frac{\eta}{\sqrt{S_t^{corr}} + \varepsilon} V_t.$$

Предложенные авторами алгоритма значения (которые в большинстве фреймворков глубокого обучения можно менять вручную) : $\beta_1 = 0,9$, $\beta_2 = 0,999$, $\varepsilon = 10^{-8}$.

Пример: распознавание цифр

Рассмотрим пример применения рассмотренных градиентных алгоритмов оптимизации для настройки весов полносвязной нейронной сети. Построим модель распознавания цифр по графическим черно-белым изображениям размера 28 на 28 пикселей (рисунок 29), взятым из базы данных MNIST.

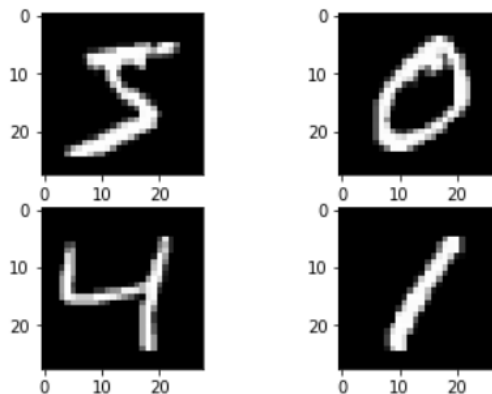


Рисунок 29 – Примеры изображений из базы данных MNIST

Для обучения будем использовать простую нейронную сеть с одним скрытым слоем. Проведём обучение три раза, с разными алгоритмами оптимизации из `tensorflow.keras.optimizers`: `SGD()` (стохастический градиентный спуск), `RMSprop()` и `Adam()`. Значение коэффициента скорости обучения η возьмём равным 0,0001. На рисунке 30 можно видеть динамику изменения функции ошибок за 10 эпох обучения модели с разными

оптимизаторами. Можно видеть преимущество использования алгоритма Adam для данной задачи.

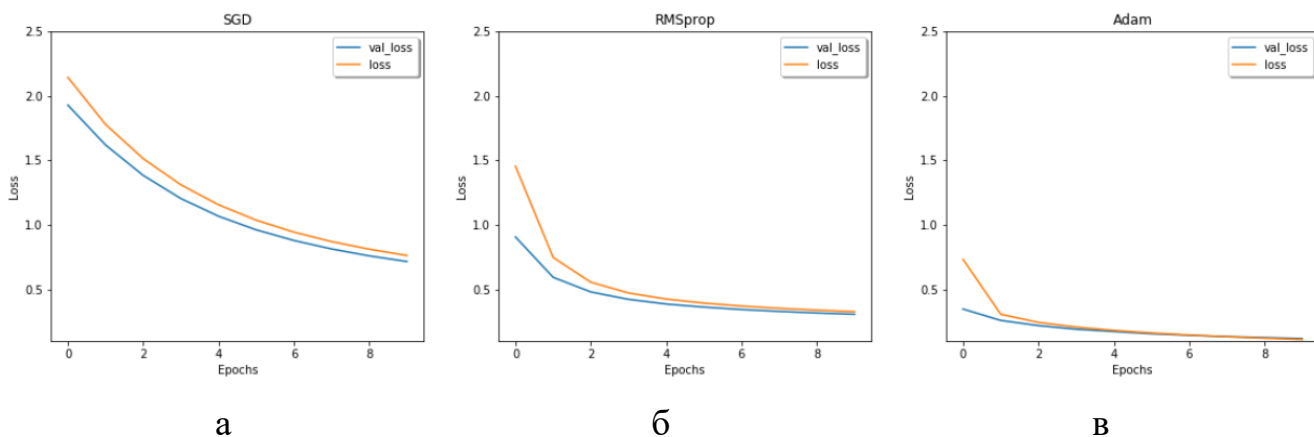


Рисунок 30 – Значения функции ошибок по эпохам обучения модели распознавания цифр при использовании в качестве алгоритма оптимизации: стохастического градиентного спуска (а), RMSprop (б), Adam (в)

Ход работы

1. Скачать данные



2. Реализовать функцию для алгоритма обратного распространения ошибки в виде градиентного спуска для трёхслойной полносвязной сети с 32-16-10 нейронами в слоях соответственно и среднеквадратичной функции ошибок для задачи бинарной классификации.
3. Визуализировать процесс обучения сети, построив график изменения лосс-функции.

4. Реализовать алгоритм стохастического градиентного спуска и его модификации:
 - а) метод моментов;
 - б) RMSprop;
 - в) Адам;
5. Сделать сравнительный анализ точности решения оптимизационной задачи с помощью методов, реализованных в п.4.

Дополнительные вопросы и задания

1. Почему стохастический градиентный спуск работает быстрее, чем классический градиентный спуск?
2. Какие существуют методы обхода локальных минимумов?
3. Чем, по вашему мнению, должен определяться размер *mini-batch* для реализации градиентного спуска в конкретном случае?
4. Обучите свёрточную нейронную сеть разными алгоритмами оптимизации для решения задачи из текста лабораторной работы. Какой алгоритм оптимизации для настройки весов свёрточной сети работает лучше в этом случае и почему?

Литература

- 1) Николенко С., Кадурын А., Архангельская Е. Глубокое обучение. Погружение в мир нейронных сетей. – Изд-во «Питер». – 2018. – 476 с.;
- 2) Shiliang Sun, Zehui Cao, Han Zhu, and Jing Zhao, Survey of Optimization Methods from a Machine Learning Perspective, 2019.
- 3) <https://docs.scipy.org/doc/scipy/reference/tutorial/optimize.html>

Лабораторная работа № 7. Свёрточные сети и работа с изображениями

Цель работы

Целью данной лабораторной работы является получение навыков реализации свёрточных нейронных сетей и метода переноса обучения.

Краткие теоретические сведения

Архитектура свёрточной нейронной сети

При попытке применить обычную полносвязную нейронную сеть для обработки изображений с целью решения какой-нибудь задачи, например, классификации изображений собак и кошек, мы столкнёмся со следующими проблемами:

Потеря важной информации при преобразовании изображения в вектор

Действительно, при подаче на вход полносвязной сети изображения в виде одномерного вектора (например, с применением метода `reshape()` библиотеки `numpy`) мы неизбежно потеряем информацию о взаимном расположении объектов на изображении и их топологической структуре;

Вычислительная неэффективность: действительно, при преобразовании одноканального изображения размером всего лишь 28 x 28 пикселей размерность входного вектора будет (784,1), что с точки зрения полносвязной сети будет соответствовать 784 признакам изображения. С учётом того, что для картинок размером больше 1 Мб размерность входного вектора превысит 10^6 , становится очевидной неэффективность использования такого подхода.

В свёрточной нейронной сети основным составным блоком является слой свёртки, состоящий из нескольких (обычно от единиц до нескольких десятков) фильтров, каждый из которых настраивается в процессе обучения для выявления характеристических признаков на изображении. Эти фильтры в режиме «скользящего окна» проходят по всему изображению, записывая результат свёртки с элементами изображения в соответствующую ячейку выходного изображения. Выходное изображение в данном случае называется

«картой признаков», так как соответствует выделенным с помощью данного фильтра признакам. Сама операция свёртки, которая реализуется с каждым фильтром в свёрточном слое, выражается в попарном перемножении элементов фильтра с элементами входного изображения, причем размер окна в точности равен размеру фильтра.

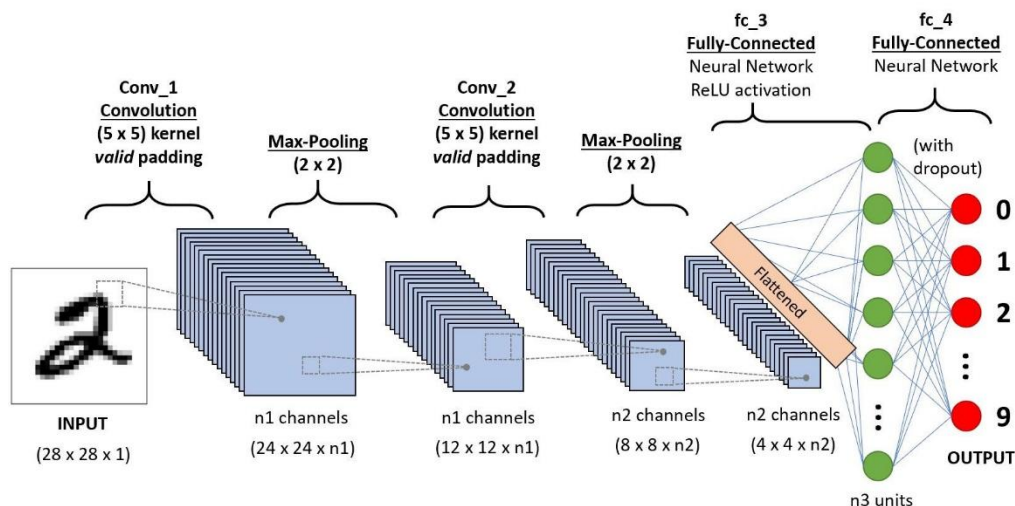


Рисунок 31 – Пример классической архитектуры сверточной нейронной сети (картинка из <https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53>)

Результат операции свёртки можно выразить следующей формулой:

$$(f * g)[m, n] = \sum_{k, l} f[m - k, n - k] * g[k, l],$$

где:

f – исходная матрица изображения;

g – фильтр свёртки.

Фильтры в первых слоях сети будут активироваться базовыми признаками, наподобие линий, углов, блоков, при этом при движении к более глубоким слоям свёрточной сети фильтры в них будут выделять всё более сложные признаки (см. рисунок 34). Размер ядра обычно берут в пределах от 3x3 до 7x7. Если размер ядра маленький, то оно не сможет выделить какие-либо признаки, если слишком большое, то увеличивается количество связей между

нейронами. Каждый фильтр представляет собой матрицу весов, настраиваемых в процессе обучения модели: это одна из главных особенностей сверточной нейронной сети, заключающаяся в принципе «shared weights» (общих весов), которая позволяет сократить число связей и позволяет находить один и тот же признак по всей области изображения.

При этом в зависимости от метода обработки краев исходной матрицы результат свёртки может быть меньше исходного изображения («valid»), такого же размера («same»). На практике, чтобы не терять информацию с пограничных пикселей изображения, чаще используют свёртку с сохранением размера входного изображения, для этого исходную матрицу дополняют одним или несколькими слоями пикселей. Эта операция называется паддинг (“padding”) и описывается параметром p , который отвечает за «толщину» добавленного слоя (см. рисунок 32). Чаще всего дополнительные пиксели инициализируются нулевыми значениями.

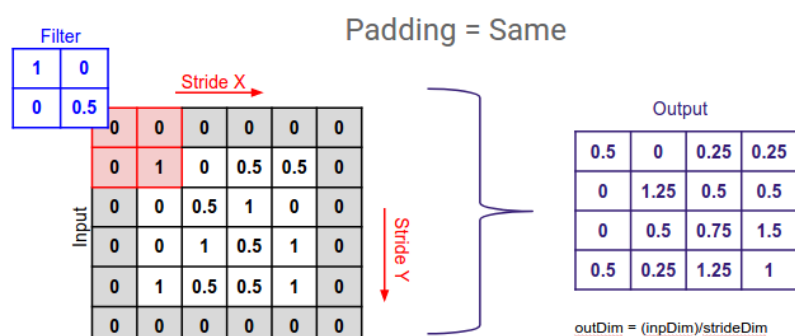


Рисунок 32 – Иллюстрация операции «padding» (изображение из <https://medium.com/@ayeshmanthaperera/what-is-padding-in-cnns-71b21fb0dd7>)

Размер карты признаков можно вычислить по следующей формуле:

$$n_{out} = \left\lfloor \frac{n_{in} + 2p - k}{s} \right\rfloor + 1,$$

где:

n_{in} – размер входного изображения;

n_{out} – размер выходного изображения (карты признаков);

k – размер фильтра;

p – размер паддинга;

s – страйд.

За слоем свёртки после применения функции активации к получившимся картам признаков (в свёрточных сетях – это чаще всего ReLU и её модификации) почти всегда следует слой субдискретизации или пуллинга (см. рисунок 33). Задача этого блока - уменьшение размерности карт признаков предыдущего слоя. Это делается для снижения числа параметров модели и во избежание переобучения. Также при уменьшении размерности карт признаков мы осуществляем переход к другому масштабу признаков, что в конечном итоге позволяет переходить от точек, линий и пятен на первых слоях к высокоуровневым признакам, содержащим части реальных объектов на последних слоях сети (см рисунок 34). Размер окна пуллинга – обычно 2×2 , при этом применяют два варианта выбора значения в окне: выбор максимального элемента - “MaxPooling”) либо среднего элемента - (“AveragePooling”), которое затем записывают в соответствующую ячейку выходной матрицы.

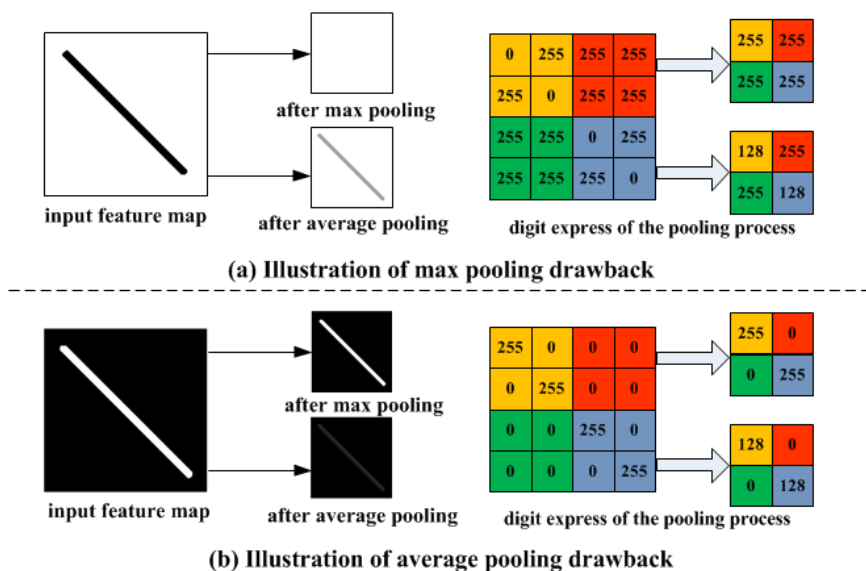


Рисунок 33 – Иллюстрация операций субдискретизации MaxPooling и AveragePooling (изображение из Yu, Dingjun & Wang, Hanli & Chen, Peiqiu & Wei, Zhihua. (2014). Mixed Pooling for Convolutional Neural Networks)

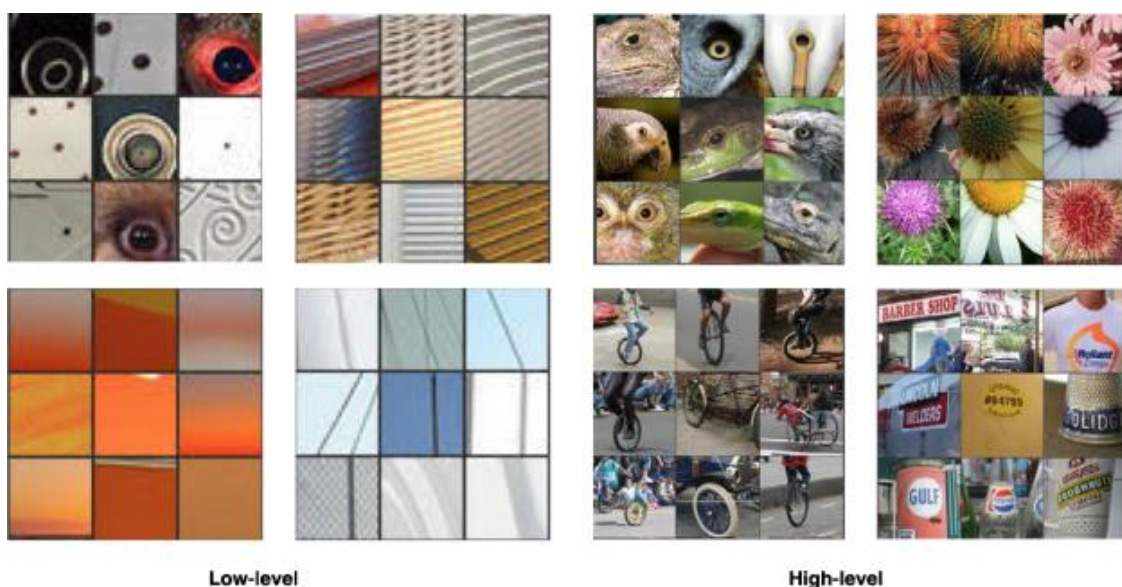


Рисунок 34 – Признаки низкого уровня (а), максимизирующие активацию нейронов на первых слоях свёрточной сети, и признаки высокого уровня (б) (максимизирующие активацию нейронов на последних слоях свёрточной сети) (картинка из <https://medium.com/the-school-of-ai-official/developing-an-intuition-for-better-understanding-of-convolutional-neural-networks-17812fe4722a>)

За последние несколько лет в задачах классификации изображений свёрточные нейросети добились точности, сравнимой с точностью, достигаемой человеческим мозгом, а в некоторых задачах они существенно превосходят человеческий мозг. Если первая большая нейросеть из группы университета Торонто, показавшая результат, превзошедший лучшие модели классического компьютерного зрения, содержала чуть более десятка слоев, то современные свёрточные архитектуры содержат свыше сотни слоёв. Разумеется, для обучения таких глубоких сетей, показывающих сейчас state-of-the-art результаты в задачах анализа изображений, требуется огромное вычислительное время с использованием десятков GPU-процессоров.

Перенос обучения

В реальных задачах компьютерного зрения часто встречаются ситуации, когда требуется, например, обучить классификатор изображений с объектами, которые не присутствуют в базовых датасетах, использовавшихся для обучения

state-of-the-art моделей. В таких случаях можно использовать уже настроенные веса моделей, обученных на большом наборе данных, таких как ImageNet, и затем осуществлять тонкую настройку дополнительных параметров на новые данные, относящиеся к текущей задаче. Чем больше новые данные будут отличаться от тех, на которых обучалась базовая модель, тем больше параметров (слоев нейронной сети) необходимо будет «переобучить», чтобы получить хорошую точность в новом домене данных. Интуиция здесь заключается в том, что модель уже научилась выделять необходимые признаки в большом наборе данных, ее нужно только «поднастроить» для выполнения конкретной задачи запоминания новых высокоуровневых признаков целевого домена. Такой подход носит название «перенос обучения» (“transfer learning”) и широко применяется в современном машинном обучении. Метод позволяет эффективно использовать веса «больших» моделей, для переобучения которых понадобилось бы использование существенных вычислительных ресурсов. Большинство фреймворков глубокого обучения позволяет загружать веса предобученных моделей для переиспользования и дообучения на целевом домене данных. На рисунке 35 проиллюстрирована схема метода переноса обучения.

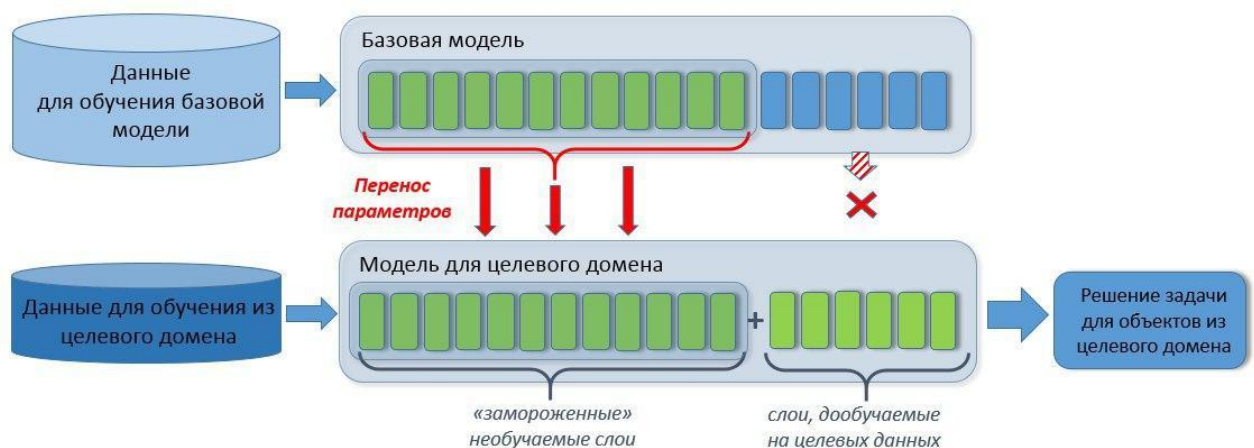


Рисунок 35 – Схема переноса обучения.

Задание

1) Скачайте данные для обучения моделей:



- 2) Постройте модель классификации собранных в датасете изображений на собак и кошек. Для этого последовательно реализуйте:
- а) полносвязную сеть с тремя скрытыми слоями для классификации изображений (на вход – одномерный вектор)
 - б) сверточную нейронную сеть с двумя блоками свёртки и субдискретизации для той же цели.
- 3) реализуйте перенос обучения для моделей VGG19 и ResNet, воспользовавшись весами предобученных моделей, «заморозив» полносвязные слои и переобучив их на новых данных.
- 4) Сравните производительность моделей.
- 5) Увеличьте число эпох обучения для моделей (а) и (б) и постройте кривые обучения, демонстрирующие явление переобучения.

Дополнительные вопросы и задания

1. Какой будет размер RGB-изображения $128 \times 128 \times 3$ на выходе блока свёрточной сети с размером фильтра (kernel) (3×3) и слоя субдискретизации (MaxPooling) с окном (2×2) с шагом (stride) равным 2?
2. Сколько обучаемых параметров у сверточной нейронной сети, изображенной на рисунке 33?
3. Зачем в свёрточной сети используются слои субдискретизации (пулинга)? Как бы работали модели без его использования?

4. Почему свёрточным сетям нужны тысячи изображений для достижения приемлемого качества классификации, тогда как человеку достаточно всего нескольких примеров?

Литература

1. Goodfellow I., Bengio Y., Courville A. Deep Learning. – MIT Press. – 2016. – [<http://www.deeplearningbook.org>];
2. Николенко С., Кадурин А., Архангельская Е. Глубокое обучение. Погружение в мир нейронных сетей. – Изд-во «Питер». – 2018. – 476 с.;
3. Портал – [<https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53>];

Лабораторная работа № 8. Анализ и предсказание временных рядов

Цель работы

Целью данной лабораторной работы является получение навыков анализа временных рядов, оценки стационарности ряда и классических методов прогнозирования временных рядов.

Краткие теоретические сведения

По определению временной ряд – последовательные значения какого-либо признака $\{y_1, \dots, y_T\}$, $y_t \in R$, измеренные через постоянные временные интервалы. Временные ряды встречаются во всех сферах человеческой деятельности – от экономики до астрофизики, поэтому владение навыками анализа и, в особенности, прогнозирования временных рядов принципиально важно для эффективной работы аналитика данных. Среди главных характеристик временных рядов выделяют: тренд - плавное долгосрочное изменение уровня ряда; сезонность - циклические изменения уровня ряда с постоянным периодом; цикл - изменения уровня ряда с переменным периодом (цикл жизни товара, экономические волны, периоды солнечной активности); шум (или ошибка) - непрогнозируемая случайная компонента ряда. Примеры различных временных рядов представлены на рисунке 36.

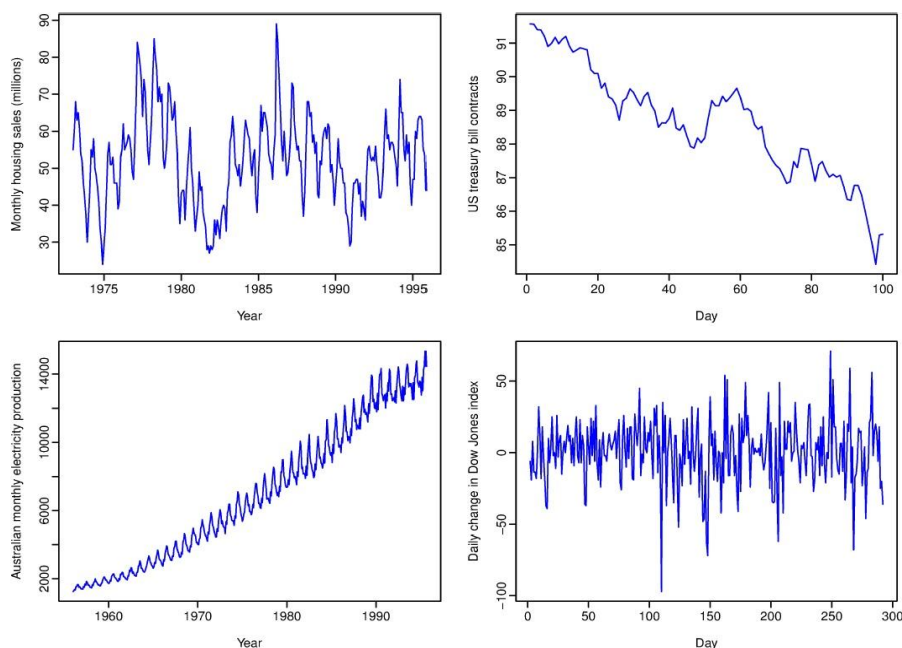


Рисунок 36 – Примеры временных рядов [3]

Важным свойством ряда также является его стационарность. Ряд (y_1, \dots, y_T) стационарен, если для любого s распределение (y_t, \dots, y_{t+s}) не зависит от t , т. е. его свойства не зависят от времени. Следует отметить, что ряды с трендом или сезонностью нестационарны, а ряды с непериодическими циклами стационарны, поскольку нельзя предсказать заранее, где будут находиться максимумы и минимумы их значений.

Для проверки временного ряда на стационарность часто используется статистический тест Дики-Фуллера, заключающийся в проверке нулевой гипотезы о нестационарности временного ряда путём поиска единичного корня в соответствующем авторегрессионном уравнении первого порядка. Для приведения временного ряда к стационарности применяют различные техники, в том числе дифференцирование временного ряда (преобразование ряда к ряду последовательных разностей), сезонное дифференцирование (преобразование ряда к ряду разностей между значениями, отстоящими друг от друга на величину периода) и преобразование Бокса–Кокса, которое выражается следующей формулой:

$$x_i(\lambda) = \begin{cases} \frac{x_i^\lambda - 1}{\lambda}, & \lambda \neq 0 \\ \ln(x_i), & \lambda = 0 \end{cases}$$

где λ – параметр, подбираемый исходя из максимизации правдоподобия. При $\lambda = 0$ преобразование Бокса–Кокса представляет собой операцию логарифмирования исходного ряда.

Модели *ARIMA* (или в общем виде, с учётом сезонной («seasonal») составляющей, *SARIMA*) – Autoregressive Integrated Moving Average – класс одних из самых популярных классических моделей прогнозирования временных рядов. Такие модели (интегрируемые модели авторегрессии и модели скользящего среднего) – достаточно гибкие и могут описывать множество характеристик ряда. В модели авторегрессии каждое значение ряда находится в линейной зависимости от p предыдущих значений. Модель скользящего среднего же предполагает, что в ошибках модели за q предшествующих шагов сосредоточена информация о предыстории ряда. В

зависимости от свойств изучаемого показателя, модели *ARIMA* могут включать в себя сразу обе модели, или каждую по отдельности (*AR* и *MA*). Если добавить в ряд модели *ARMA* P слагаемых авторегрессии, отстоящих друг от друга на интервал, равный значению периода ряда, и, аналогично, Q слагаемых скользящего среднего, то модель будет включать в себя сезонные компоненты и называться *SARMA*(p, P, q, Q).

Если процесс оказывается нестационарным и для приведения его к стационарному виду потребовалось взять несколько разностей, то модель становится моделью *SARIMA*(p, d, q), где d – порядок разности. Если бралось несколько сезонных производных, то в модель добавляется параметр D , отвечающий за число взятых сезонных производных. В общем виде модель *SARIMA*(p, P, q, Q, d, D) для предсказания на один шаг вперёд выглядит следующим образом:

$$y_t = \alpha + \theta_1 y_{t-1} + \theta_2 y_{t-2} + \dots + \theta_p y_{t-p} + \epsilon_t + \varphi_1 \epsilon_{t-1} + \varphi_2 \epsilon_{t-2} + \dots + \varphi_q \epsilon_{t-q} + \theta_S y_{t-S} + \theta_{2S} y_{t-2S} + \dots + \theta_{PS} y_{t-PS} + \varphi_S \epsilon_{t-S} + \varphi_{2S} \epsilon_{t-2S} + \dots + \varphi_{QS} \epsilon_{t-QS}.$$

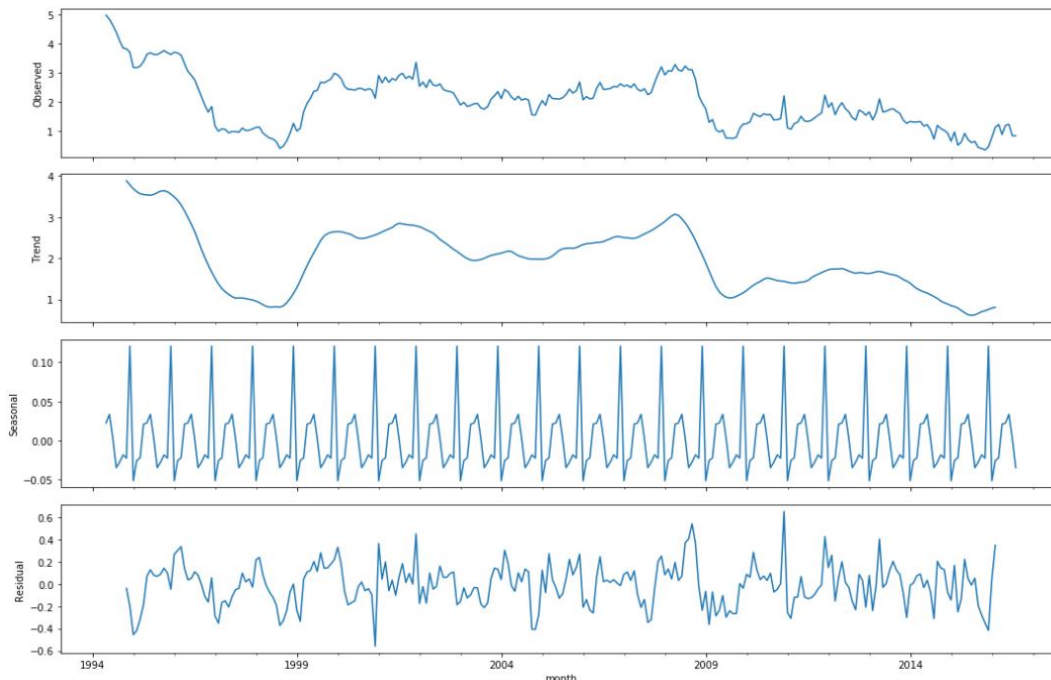


Рисунок 37 – Декомпозиция временного ряда. Сверху вниз: исходный ряд, тренд, сезонная компонента, остатки (шум) [3]

Параметры $\{\theta_i\}, \{\varphi_i\}$ и α настраиваются в процессе обучения модели.

В общем случае для сравнения различных моделей прогнозирования с точки зрения баланса между точностью предсказания и сложностью (количеством параметров модели) применяются критерий Акаике (*AIC*):

$$AIC = 2 \ln L + 2k,$$

где k – число параметров модели (в случае модели *SARIMA*, $k=p+P+q+Q+d+D$), L – соответствующее значение функции правдоподобия модели.

Критерий соответствует компромиссу между точностью и сложностью для одной модели относительно нескольких других. В частности, он может быть применён для поиска оптимального набора параметров (p, P, q, Q, d, D) в классе моделей *ARIMA*.

Для оценки параметров модели *SARIMA* строят графики автокорреляции и частичной автокорреляции временного ряда и вычисляют значения параметров следующим образом (см. рисунок 39):

- q - последний несезонный лаг со значительной автокорреляцией;
- p - последнее несезонное лаг со значительной частичной автокорреляцией;
- $Q = Q'/S$, где Q' - последний сезонный лаг со значительной автокорреляцией;
- $P = P'/S$, где P' - последний сезонный лаг со значительной частичной автокорреляцией.

Метрики качества прогнозирования

Чаще всего для оценки качества модели предсказания временных рядов используются следующие метрики:

- *MAE* – Mean Absolute Error:

$$MAE = \frac{1}{n} \sum_{t=1}^n |y_t - \hat{y}_t|,$$

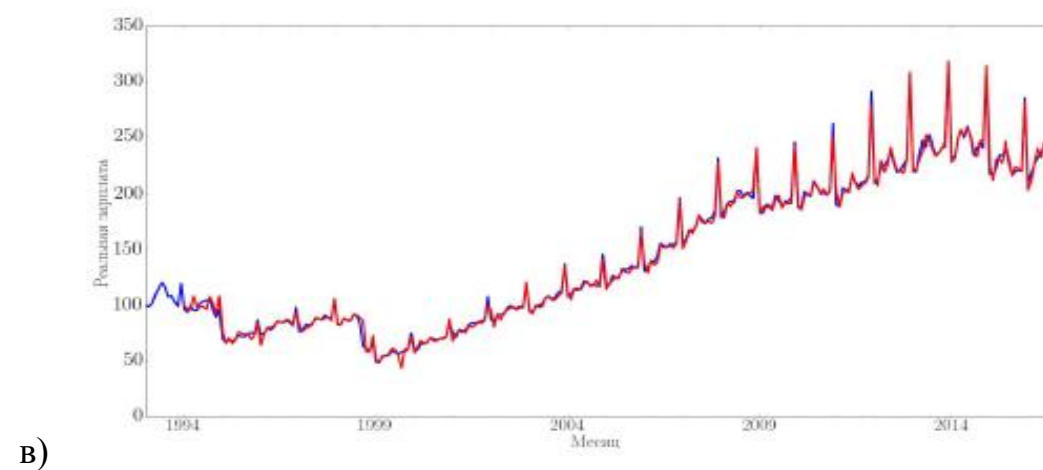
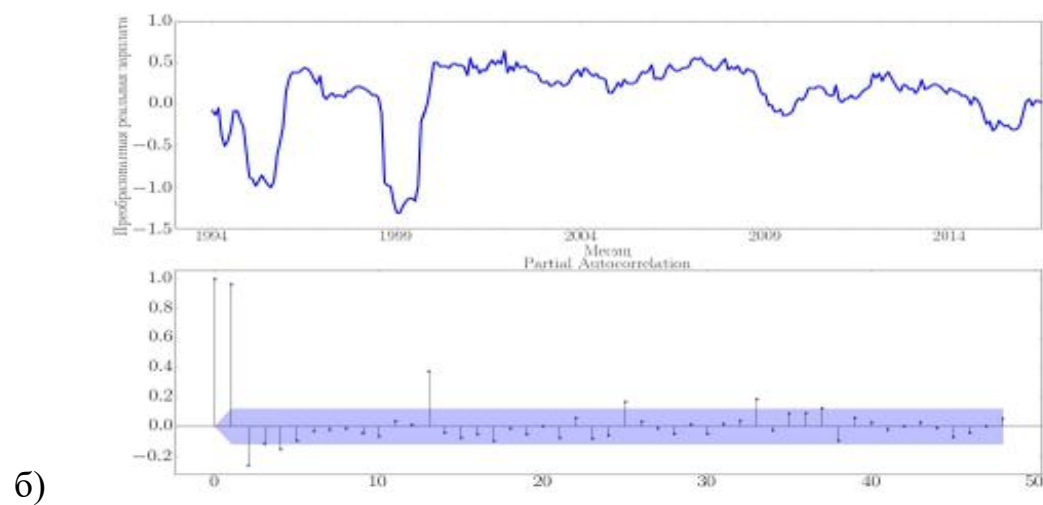
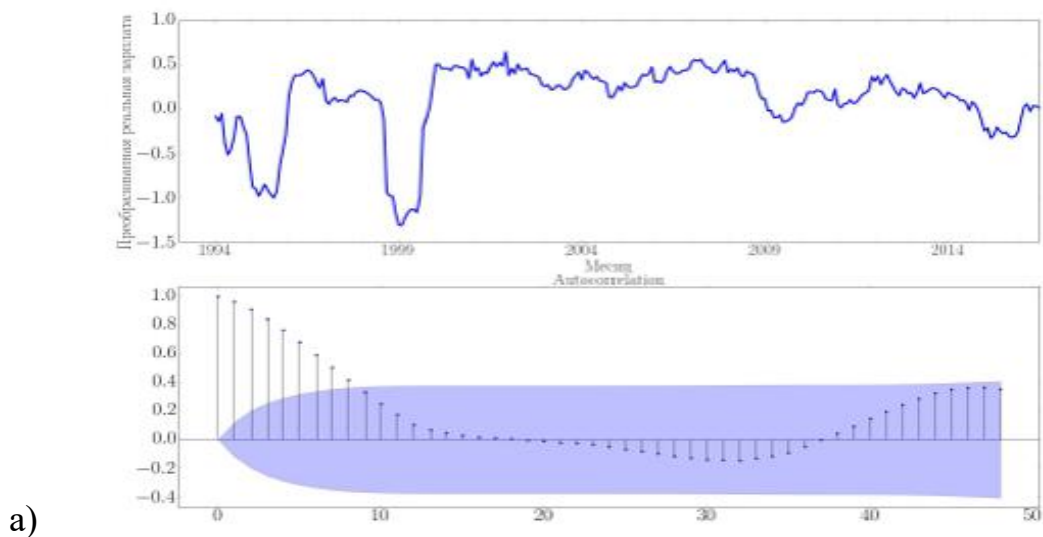


Рисунок 38 – (а) Коррелограмма со значениями автокорреляций временного ряда с удалённым трендом; (б) график частичных автокорреляций временного ряда; (в) исходный временной ряд (синяя кривая) и предсказания модели ARMA (2,2) (красная кривая) [3]

– *RMSE* – Root Mean Squared Error:

$$RMSE = \sqrt{MSE} = \sqrt{\frac{1}{n} \sum_{t=1}^n (y_t - \hat{y}_t)^2}$$

– *MAPE* – Mean Absolute Percentage Error:

$$MAPE = \frac{100\%}{n} \sum_{t=1}^n \left| \frac{y_t - \hat{y}_t}{y_t} \right|,$$

– *SMAPE* - Symmetric Mean Absolute Percentage Error:

$$SMAPE = \frac{100\%}{n} \sum_{t=1}^n \frac{|\hat{y}_t - y_t|}{\frac{1}{2} * (|y_t| + |\hat{y}_t|)}.$$

где

y_t – истинное значение временного ряда;

\hat{y}_t – предсказанное моделью значение временного ряда;

n – длина рассматриваемого участка временного ряда.

Также часто вычисляют коэффициент детерминации или R^2 («эр-квадрат»), который показывает долю объяснённой дисперсии в данных:

$$R^2 = 1 - \frac{RSS}{TSS},$$

где

$$RSS = \sum_{t=1}^n e_t^2 = \sum_{t=1}^n (y_t - \hat{y}_t)^2,$$

$$TSS = \sum_{t=1}^n (y_t - \bar{y}_t)^2,$$

где \bar{y}_t – среднее значение участка временного ряда, для которого рассчитывается метрика. Максимально достижимое значение коэффициента детерминации равно 1.0, что соответствует идеальному случаю предсказательной модели.

Ход работы

- 1) Скачать данные с временным рядом:



- 2) Провести тест Дики-Фуллера для проверки стационарности временного ряда;
- 3) Реализовать декомпозицию временного ряда, воспользовавшись, например, средствами библиотеки statsmodels, а также дифференцирование и сезонное дифференцирование (при необходимости) средствами библиотеки pandas.
- 4) Провести преобразование Бокса Кокса (при необходимости) и провести тест Дики Фуллера для проверки стационарности временного ряда.
- 5) Обучить модель *ARIMA* с выбранным по критерию *AIC* параметрами и сделать предсказание на следующие 12 отсчётов вперёд.
- 6) Вычислить значения метрик *MAPE*, *SMAPE* и *MAE*. Для тестовой выборки (предварительно разделив временной ряд на тренировочную и тестовую части).
- 7) Сделать вывод о качестве настроенной модели *ARIMA*.

Дополнительные вопросы и задания

- 1) *Когда, по Вашему мнению, следует применять метрику MAE для оценки качества предсказания временного ряда? Приведите не менее двух примеров.*
- 2) *Каким образом можно оценить количество регрессионных компонент в модели SARIMA?*

- 3) *Сделайте предсказание временного ряда, использованного в лабораторной работе на 24 отсчёта в будущее и сравните качество предсказания в случае с горизонтом равным 12 шагам.*
- 4) *Обучите модель ARMA(2, 2) на использовавшемся временном ряду и сравните качество предсказания с лучшей моделью, построенной на основании критерия AIC.*

Литература

1. *Афанасьев В.Н., Юзбашев М.М. Анализ временных рядов и прогнозирование — М.: Финансы и статистика, 2001. — 228 с.:*
2. Портал <https://machinelearningmastery.com/>
3. Курс лекций «Прикладной статистический анализ данных» НИУ ВШЭ http://wiki.cs.hse.ru/Прикладной_статистический_анализ_данных

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО»

Отчет

о выполнении лабораторной работы № Х
«Тема работы»

Работу выполнил:

ст. группы <Номер группы> Фамилия И.О.

Работу принял:

Фамилия И.О.

Санкт-Петербург

2020

Цель работы

Какая цель преследуется при выполнении лабораторной работы (0.1 – 0.2 стр.).

Постановка задачи

Задача, которая решается при выполнении этой лабораторной работы (0.2 – 0.3 стр.).

Краткая теоретическая часть

Краткие теоретические сведения о теме, по которой выполняется лабораторная работа. Основы используемых методов и алгоритмов: свойства, достоинства, недостатки (не более 1 стр.).

Результаты

Представление результатов (промежуточные и итоговые выкладки, графики), краткое обсуждение результатов, оценка качества алгоритмов (2–3 стр.).

Заключение

Выводы на основе достигнутых результатов, оценка возможности применения приобретённых навыков и умений на практике (0.2 – 0.3 стр.).

Гладилин Петр Евгеньевич
Боченина Клавдия Олеговна

Технологии машинного обучения

Учебно-методическое пособие

В авторской редакции

Редакционно-издательский отдел Университета ИТМО

Зав. РИО

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Кафедра «Информационно-аналитическое обеспечение управления
в социальных и экономических системах»

004.8(07)
К681

А.М. Коровин

ИНТЕЛЛЕКТУАЛЬНЫЕ СИСТЕМЫ

Текст лекций

Челябинск
Издательский центр ЮУрГУ
2015

УДК 004.89(075.8)
К681

*Одобрено
учебно-методической комиссией
факультета компьютерных технологий,
управления и радиоэлектроники*

*Рецензенты:
П.П. Переверзев, В.Г. Попов*

Коровин, А.М.

К681 Интеллектуальные системы: текст лекций / А.М. Коровин. – Челябинск: Издательский центр ЮУрГУ, 2015. – 60 с.

В тексте лекций в обзорной форме изложены основные понятия, методы и технологии, используемые в современных интеллектуальных системах управления социально-экономическими и сложными техническими объектами. Дана классификация основных способов представления знаний в интеллектуальных системах. Приведены характеристики методов интеллектуального анализа данных и программных средств их реализации в современной компании.

Текст лекций предназначен для магистрантов, обучающихся в рамках направления подготовки 09.04.01 «Информатика и вычислительная техника», а также будет полезен студентам других родственных кафедр и направлений подготовки. Рекомендуется для первоначального ознакомления с основами построения и применения интеллектуальных систем и технологий.

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А.И. Долгов

МЕТОДОЛОГИЯ
НАУЧНЫХ ИССЛЕДОВАНИЙ

Ростов-на-Дону
2013

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ
УЧРЕЖДЕНИЕ ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ
«ДОНСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

А.И. Долгов

МЕТОДОЛОГИЯ НАУЧНЫХ ИССЛЕДОВАНИЙ

Учебное пособие

Ростов-на-Дону
2013

УДК 001.11: 001.4: 001.818

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Д 64 Методология научных исследований: учеб. пособие /
А.И. Долгов. – Ростов н/Д: издательский центр ДГТУ, 2013. –
161 с.

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В пособии даются определения и углубленные трактовки основных понятий, используемых в исследовательской деятельности. Приводятся конкретные рекомендации по решению проблемных вопросов, возникающих при получении, публикации, реализации и экспертизе научных результатов, а также по практическому выполнению требований нормативных документов к изложению результатов научных исследований и разработок при оформлении диссертации и автореферата. Материалы пособия будут полезны для соискателей учёных степеней, их научных руководителей и научных консультантов, официальных оппонентов, членов диссертационных советов, а также членов экспертных советов ВАК Министерства образования РФ.

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1. ОСНОВНЫЕ ПОНЯТИЯ И СТРУКТУРНЫЕ ЭЛЕМЕНТЫ НАУКИ

1.1. Общие сведения

Наука представляет собой деятельность по получению нового знания и результаты этой деятельности в виде системы полученных к данному моменту знаний¹ [1].

В более узком смысле под наукой понимают лишь систему знаний, учение. Например, "**Военная наука** – система знаний о характере, законах войны, подготовке вооружённых сил и страны к войне и способах её ведения" [2].


Присущее науке как системе знаний выражение наиболее общих закономерностей строения по аналогии с традиционным понятием "архитектоника" [3] можно назвать **архитектоникой науки**.

В виде закономерности проявляется то обстоятельство, что наука, рассматриваемая как общая система знаний, на разных ступенях познания декомпозируется на множества относительно самостоятельных наук, обладающих существенными признаками аналогии (табл.1).

Таблица 1

Иерархия наук

| Ступени познания | Виды наук | Стадии познания | Частные науки |
|-------------------|-------------|--|------------------------------|
| II ФИЛОСОФСКАЯ | философские | 4 – методологическая 3 – предметная | Всеобщая М Философские ПН |
| I ПРИКЛАДНАЯ | прикладные | 2 – методологическая 1 – предметная | М предметной обл. ПНиУ |



Предметные области

Примечание: ПНиУ – предметные науки и учения; М – методология.

¹ Деятельность по получению нового знания (**научная деятельность**), объединяя (в качестве своих видов) исследовательскую, организаторскую и обеспечивающую деятельность, представляет собой **практику науки**, в отличие от **практики** любой конкретной **предметной области** человеческой деятельности, являющейся именно тем, ради чего развивается сама наука.

На прикладной ступени познания получают знания, имеющие непосредственное предназначение для практики той или иной предметной области. Результатом является развитие множества частных наук, относящихся к прикладным наукам.

На философской ступени познания изучаются наиболее общие законы природы и общества. При этом развиваются разнообразные философские науки, интегрирующиеся в общее понятие "философия".

Чёткой границы между множествами прикладных и философских наук не существует.

Как на прикладной, так и на философской ступенях познания могут быть выделены две стадии познания – предметная и методологическая. Предметное познание приводит к появлению так называемых предметных наук (или учений), а методологическое познание – к возникновению методологических наук, называемых методологиями, при этом на любой из стадий особая роль принадлежит познанию методов познания.

На нижней (первой) стадии **прикладного предметного** познания предметной области возникают **предметные науки и предметные учения**, которые занимаются изучением объектов, не являющихся методами. Тем не менее, в каждой предметной науке процессы познания распространяются и на методы, в результате чего в предметной науке складываются собственные научно-методические основы.

На более высокой (второй) стадии **прикладного методологического** познания в каждой предметной области на основе обобщения достижений отдельных предметных наук развиваются **методологии** как науки, изучающие закономерности возникновения и развития методов познания данной предметной области.

На следующей (третьей) стадии **философского предметного** познания возникает философия (как обобщённая система знаний) в виде **философских предметных наук и философских учений**, изучающих результаты и методы познания того или иного множества родственных предметных областей с целью познания тех или иных наиболее общих законов окружающего мира.

Наконец, на высшей (четвёртой) стадии **философского методологического познания** на основе обобщения результатов, полученных в ходе развития предметных наук и предметных учений в самых различных предметных областях, а также достижений философских предметных наук (учений) и методологических наук (учений) философского уровня, философия выходит на уровень **всеобщей методологии научного познания**.

Закономерности строения науки, как общей системы знаний, проявляются в весьма существенной структурной аналогии элементов знаний внутри каждой отдельной науки, независимо от ступени и стадии познания, на которой она образуется.

В структуре научных знаний могут быть выделены **процедурные знания** и **фактографические знания**, апробированные на практике, прошедшие экспертизу специалистов, официально признанные и опубликованные, обладающие обоснованной степенью достоверности.

Элементами **процедурных знаний** являются (научные) методы² (способы, приёмы, научно-методические подходы, методики³) решения научных и практических задач, а также конкретные реализации этих методов в виде *средств* (вычислительных, моделирующих, испытательных и др.) *теоретического и экспериментального исследования*.

Элементами **фактографических знаний** являются научные факты⁴, обоснования, объяснения, доказательства, формализованные описания, модели и вытекающие из них **научные положения**, в том числе **научные выводы, гипотезы, соотношения, принципы, концепции, закономерности, законы** и обусловленные ими **научные рекомендации**.

Любой факт есть проявление свойств реальных или идеальных объектов, процессов и явлений (далее – объектов познания) рассматриваемой предметной области и в этом смысле является элементом «дискретного куска действительности».

² **Метод** – совокупность приёмов или операций практического или теоретического освоения действительности, подчинённых решению конкретной задачи [1].

³ **Метод** – совокупность приёмов или операций практического или теоретического освоения действительности, подчинённых решению конкретной задачи [1].

⁴ **Факт** – реальное событие, происшедшее или происходящее явление (процесс).

Подчёркивая исключительное значение фактов для науки, уместно напомнить замечательные слова великого русского физиолога И.П. Павлова (1849-1936): "Как ни совершенно крыло птицы, оно никогда не смогло бы поднять её ввысь, не опираясь на воздух. Факты – воздух учёного, без них он никогда не сможет взлететь".

Научный факт – это факт, имеющий описание и обоснование в результате обобщения определённого класса событий, явлений, процессов.

Научный факт является особым типом знания, связанным с непосредственным истолкованием наблюдений или экспериментов. Существенными чертами научного факта являются его воспроизводимость и/или постоянство, теоретическая нагруженность научной интерпретацией и инвариантность относительно индивидуальных особенностей наблюдателя.

Научные положения – это выраженные в виде чётких формулировок тезисы, утверждения, научные идеи (как ранее известные, так и вновь выдвинутые в процессе проведенного исследования), имеющие научное объяснение или обоснование.

К наиболее важным видам научных положений относятся объяснения, обоснования, доказательства, выводы, предложения, научные рекомендации⁵. Одни научные положения по отношению к

⁵ **Объяснение** – этап, форма научного исследования, состоящие в раскрытии сущности изучаемого объекта [4].

Обоснование – цепь рассуждений, приводящих к неопровержимым выводам.

Доказательство – рассуждение, имеющее целью обосновать истинность (или ложность) какого-либо утверждения [4].

Научные выводы – итоговые утверждения, имеющие научное обоснование.

Соотношение – взаимная связь между чем-нибудь [5].

Принцип – основное исходное положение теории, учения, науки, мировоззрения и т.д. [1].

Концепция – определённый способ понимания, трактовки какого-либо предмета (явления, процесса), основная точка зрения на предмет.

Теория – в наиболее общем случае это совокупность обобщённых положений, образующих какую-либо науку или раздел её [3]. Особую ценность представляют научные выводы, приводящие к формулированию ранее неизвестных закономерностей и законов.

Закономерность – это объективно существующая, повторяющаяся, существенная связь явлений, описанная, как правило, на качественном, содержательном уровне.

Закон – необходимое, существенное, устойчивое, повторяющееся соотношение между явлениями (необходимая связь явлений) [1].

Научные рекомендации – научные выводы предписывающего типа.

другим могут выступать в роли предваряющих и/или вытекающих (в том числе итоговых).

Рассмотрим основные стадии познания более подробно.

1.2. Основные стадии познания

1.2.1. Прикладное предметное познание

На низшей стадии прикладного предметного познания каждой предметной области соответственно множеству выделяющихся основных объектов изучения образуются относительно самостоятельные устойчивые системы знаний в виде так называемых предметных наук и предметных учений.

Предметная наука (предметное учение) как система знаний представляет собой науку об объектах познания соответствующей предметной области, не являющихся методами и теориями.

Предметная область – это «дискретный кусок действительности», объединяющий вполне конкретную совокупность взаимосвязанных объектов, процессов и явлений, на которые направлена познавательная деятельность человека.

Предметная наука на основе анализа фактов занимается изучением свойств рассматриваемых объектов познания, выявлением закономерностей и законов развития этих свойств, а также разработкой научных методов и рекомендаций по оценке, синтезу, оптимизации⁶ требуемых свойств объектов и по их практическому применению.

Предметные науки, как правило, получают названия типа "предметология" (зоология, филология, стоматология, экология, социология и т.д.), "предметика" (физика, ботаника, информатика и др.), либо получаемые по иным правилам словообразования (предметоведение и т.д.), обычно позволяющие явно подчеркнуть основной предмет познания. Предметные учения получают наименования по фамилии автора (учение Павлова, учение Дарвина и пр.). Возникновение предметных наук и учений характерно как для прикладной, так и для философской ступеней познания.

⁶ **Оптимизация** – это выбор наилучшего варианта среди возможных [3].

1.2.2. Прикладное методологическое познание

На стадии прикладного методологического познания в каждой предметной области образуются относительно самостоятельные устойчивые системы знаний в виде методологий.

Методология как частная система знаний, возникающая на методологических стадиях познания, является учением о методах (и теориях), возникающих на соответствующих ступенях познания.

Методологию не следует сводить к совокупности методов, подобно тому, как не сводится метрология к совокупности измерений, зоология к совокупности зверей и т.д.

Движущими факторами развития науки является создание и совершенствование методов решения научных и практических задач и проблем на основе проведения научного исследования.

Методология формирует представление о последовательности выполнения научного исследования: даёт научное обоснование основных компонент проводимого исследования – его объекта и предмета⁷, методы анализа специфических особенностей задач (проблем) исследования, методы формирования совокупности исследовательских средств, необходимых для решения задачи (проблемы) заданного типа и проверки их применимости.

Наиболее важные точки приложения методологии:

- выявление объекта и предмета исследования;
- постановка научной задачи или проблемы (именно здесь чаще всего совершаются методологические ошибки, приводящие, например, к выдвиганию псевдопроблем, что существенно затрудняет получение результата);
- построение метода (или теории) решения рассматриваемой научной задачи (проблемы) и оценка его применимости;
- решение проблемы выбора между конкурирующими методами и теориями, поиск критерия истинной теории;

⁷ **Объект исследования** – это вполне определённая часть познаваемой предметной области (процесс, явление и т.п.), изучение которой является целью исследования.

Предмет исследования – та сторона объекта, которая рассматривается в данном исследовании.

– анализ обоснованности и оценка достоверности получаемых выводов;

– оценка научно-технического уровня и значимости получаемых научных результатов.

Один и тот же объект может быть предметом ряда различных исследований. Пример, относящийся к военной науке:

объект исследования – боевые действия (БД) войск;

предмет исследования (варианты):

- 1) планирование БД,
- 2) ведение БД,
- 3) обеспечение БД и т.д.

Предмет одного исследования может превратиться в объект другого исследования. В нашем случае:

объект исследования – обеспечение БД;

предмет исследования (варианты):

- 1) боевое обеспечение,
- 2) техническое обеспечение,
- 3) тыловое обеспечение и т.д.

Приведенные примеры представляют собой объекты и предметы исследования на предметном уровне познания. Примеры объекта и предметов исследования на методологическом уровне познания:

объект исследования – методы обеспечения БД;

предмет исследования (варианты):

- 1) методы боевого обеспечения,
- 2) методы технического обеспечения,
- 3) методы тылового обеспечения и т.д.

1.2.3. Философское предметное познание

Философские предметные науки и теории ищут ответы на вопросы о происхождении и наиболее общих закономерностях развития объектов (процессов, явлений) природы. К философским, например, относятся наука о происхождении Земли и наука о происхождении жизни.

Философскими предметными теориями являются теория относительности Эйнштейна, общая теория систем, абстрактная теория поля, синергетика (теория самоорганизации).

На философском уровне познаются свойства и отношения объектов, инвариантные относительно того или иного множества предметных областей, а также закономерности возникновения, применения и развития методологий и их составных элементов. Это обеспечивает всеобщность эмпирических и теоретических основ философского уровня.

Именно в рамках философского предметного познания возникают задачи распространения научных результатов между предметными областями и задачи развития наук на стыках той или иной предметной области (например, физики) с другими (так возникли ядерная физика, биофизика, геофизика, астрофизика и т.д.).

1.2.4. Философское методологическое познание

По мере накопления знаний создается всё больше условий для развития философских наук вне рамок конкретных предметных областей на методологическом уровне и выхода их на высший уровень **философского познания**, теоретические достижения которого характеризуются появлением философских теорий. Примеры философских теорий – теория планирования эксперимента, теория идентификации ("подгонки" моделей). Эти теории инвариантны относительно предметной области экспериментирования и моделирования.

Результаты расширения и углубления познания окружающего мира на предметной стадии философской ступени познания находят выражение в возникновении философских учений как систем знаний о наиболее общих законах и закономерностях развития окружающего мира (например, дедуктивная логика Декарта, аристотелевская логика).

Относительно самостоятельное философское учение представляет собой диалектика, интегрирующая ряд философских предметных наук (диалектика природы, диалектика познания и др.) и сама интегрирующаяся с другими философскими науками и учениями (так, например, возникла материалистическая диалектика).

Возникающие философские учения претендуют на высший уровень познания окружающего мира (см. табл. 1), соответствующий ***всеобщей методологии научного познания***.

Среди претендентов, последовательно побеждавших друг друга (в глазах существенной части философов), можно назвать, по крайней мере, философии Гегеля, Фейербаха, философию диалектического материализма, и этой борьбе, посвящённой поискам истин, вряд ли суждено завершиться из-за безграничности познания.

1.3. Модельное описание частной науки

К частным наукам мы относим все предметные науки, в том числе и философские, а также методологии – как предметных областей, так и всеобщую методологию научного познания.

В наиболее общем случае частная наука проходит развитие на двух основных уровнях – эмпирическом и теоретическом, результатом чего является создание эмпирических и теоретических основ соответствующей частной науки (табл. 2).

1.3.1. Эмпирические основы

Период эмпирического познания знаменует первое вторжение науки в область, где прежде безраздельно властвовало только искусство. Эмпирический уровень познания реализует лишь возможности описания и предсказания фактов, свойств и явлений рассматриваемой предметной области, но не даёт им объяснения

Таблица 2

Состав элементов частной науки

| Уровень познания | Интегрированные научные основы | Составляющие интегрированных научных основ |
|------------------|---|--|
| Теоретический | <p><i>Теоретические основы науки</i></p>  | <p><i>исходные научные основы</i> (первичные знания): <i>исходные эмпирические основы</i> <i>исходные теоретические основы</i></p> <hr/> <p><i>научно-методические основы</i> (в основном процедурные знания): научно-методический аппарат + <i>методологические основы</i></p> <hr/> <p>теоретические результаты (вторичные фактографические знания): <i>логические основы</i> + теоретические данные</p> |
| Эмпирический | <p><i>Эмпирические основы науки</i></p> | <p>эмпирические факты (первичные знания) методы получения эмпирических знаний эмпирические данные (вторичные знания)</p> |

На начальном этапе эмпирического познания знания обретают форму содержательного описания объектов и процессов на уровне введения и использования только качественных показателей и суждений, а также чисто практических рекомендаций типа "в такой-то ситуации целесообразно делать это и не следует делать то", при этом вообще не применяются какие-либо количественные методы анализа и оценки.

Последующее развитие науки эмпирического уровня познания характеризуется всё большим использованием количественных методов, но в простейших формах в виде статистических данных – значений количественных показателей, полученных в практике предметной области, а также в виде эмпирических формул, непосредственно связывающих значения статистических данных, принятых в качестве входных переменных, со значениями статистических данных, являющихся выходными переменными, при этом существен-

ное значение приобретают вопросы обоснования достоверности получаемых результатов.

В итоге развития любой (частной) науки на уровне эмпирического предметного познания формируются **эмпирические основы** предметной науки, включающие в свой состав элементы, указанные в табл. 2.

Эмпирические факты – факты, приводящие к эмпирическим выводам.

На основе эмпирических фактов, представляющих собой первичные фактографические знания соответствующей стадии познания, с помощью познавательных *методов* (а иногда и реализующих их средств), представляющих процедурные знания эмпирического уровня, образуется массив вторичных знаний в виде **эмпирических данных**.

Методы получения эмпирических знаний, как правило, являются простейшими познавательными. В их перечень обычно входят измерение, сравнение, анализ, синтез, индукция, дедукция, абдукция⁸.

⁸ **Измерение** – познавательный процесс, имеющий целью определение характеристик материальных объектов с помощью соответствующих измерительных приборов [4].

Сравнение – сопоставление объектов с целью выявления признаков сходства или различия между ними [4].

Анализ – метод исследования, состоящий в том, что изучаемый предмет мысленно или практически расчленяется на составные элементы (признаки, свойства, отношения), каждый из которых затем исследуется в отдельности как часть расчленённого целого [6].

Синтез – мысленное или практическое соединение частей предмета, расчленённого в процессе анализа, установление взаимодействия и связей частей и познание этого предмета как единого целого [6].

Индукция – форма мышления, посредством которой мысль наводится на какое-либо общее правило, общее положение, присущее всем единичным предметам какого-либо класса [6].

Дедукция – форма мышления, посредством которой новая мысль выводится чисто логическим путём из некоторых данных мыслей-посылок [6].

Абдукция – метод исследования, заключающийся в генерировании и проверке новых научных гипотез на основе имеющихся фактов [6].

Гипотеза (научная) – научное предположение, выдвигаемое для объяснения каких-нибудь явлений [5].

Эмпирические данные (так называют *научные данные эмпирического уровня*) представляют собой совокупность элементов вторичных фактографических знаний – эмпирические выводы, эмпирические гипотезы, предсказанные (вторичные) факты и др., относящиеся к рассматриваемым объектам, предметам, ступеням и стадиям познания.

Эмпирические научные результаты, получаемые на философской ступени познания, оказываются применимыми не только по отношению к различным предметным наукам, возникающим на стадии прикладного предметного познания, но и к разнообразным предметным областям. Польза науки, даже если она не достигает своего совершенства, как правило, оказывается настолько ощутимой, что побуждает дальнейшее её развитие, а недостатки используемых научных методов восполняются за счёт искусства тех, кто занимается практической деятельностью.

Дальнейшее познание выводит науку на более высокий уровень теоретического познания.

1.3.2. Теоретические основы

Развитие науки неразрывно связано с непрерывным совершенствованием методов.

Для теоретического познания характерны такие общенаучные познавательные методы исследования, как абстрагирование, выдвижение гипотез, моделирование, идеализация, обобщение, мысленный эксперимент и др.

Абстрагирование – процесс мысленного выделения, вычленения отдельных или общих интересующих в данный момент признаков, свойств и отношений предмета и мысленного отвлечения от множества других признаков, свойств и отношений этого предмета [6].

Моделирование – метод исследования, основанный на построении моделей.

Идеализация – мыслительный акт, связанный с образованием некоторых абстрактных объектов, которые не могут быть созданы на практике опытным путём [4].

Обобщение – логический процесс перехода от единичного к общему, от менее общего к более общему знанию, а также результат этого процесса: обобщённое понятие, суждение, закон науки, теория [4].

Модель – объект, который отображает или воспроизводит свойства другого объекта (оригинала) и используется для его исследования.

Особая роль при выполнении исследований принадлежит математическим моделям - аналитическим и имитационным.

Математическая модель – это модель, представленная в виде совокупности математических соотношений.

Математическое соотношение – математическая структура, отображающая взаимосвязь понятий (конкретных или абстрактных), представленных в символической форме.

Аналитическая модель – математическая модель, представленная в виде совокупности математических утверждений.

Математическое утверждение – математическое соотношение, описывающее взаимное соответствие (равенства, неравенства, принадлежности, истинности, ложности и др.) понятий, представленных в символической форме.

Имитационная модель – математическая модель, представленная в виде совокупности математических предписаний.

Математические предписания – математические соотношения, устанавливающие последовательность операций (арифметических, логических и др.) над понятиями, представленными в символической форме.

Результатом теоретического познания является развитие **теоретических основ предметных наук и теоретических основ методологических наук**, возникающих как на прикладной, так и на философской ступенях познания (см. табл. 1).

В составе теоретических основ как предметной, так и методологической науки в наиболее общем случае могут быть выделены следующие основные **элементы** (см. табл. 2):

- исходные научные основы (эмпирические и теоретические);
- научно-методические основы;
- теоретические результаты.

Исходные научные основы – это множество относящихся к предмету изучения данной науки элементов первичных фактографических и процедурных знаний, необходимых для выполнения теоретических построений.

Исходные эмпирические основы представляют собой неопровергаемые (на данном этапе развития науки) знания, воспринимаемые как отправные от науки эмпирического уровня, выступающей в роли предшественницы, к науке более высокого – теоретического уровня.

Исходные теоретические основы – это первичные фактографические знания, включающие **понятийный аппарат**, множества первичных идеализаций ("абсолютно твёрдое тело", "точечный объект поражения"), **теоретических гипотез** и **концепций** (представление об электрическом токе как о жидкости, о группировке оборонительных средств как системе массового обслуживания), **исходных допущений, аксиом (постулатов)**, а также формализованные (в понятиях и терминах данной теории) формулировки решаемых задач⁹.

Научно-методические основы науки включают два элемента:

– **научно-методический аппарат** (научно-методический аппарат методологической науки может быть назван научно-методологическим);

– **методологические основы** данной науки.

⁹ **Понятийный аппарат** – совокупность специфических терминов, понятий, категорий и определений, вводимых в рамках создания теоретических основ соответствующей науки.

Термин – слово или словосочетание, являющееся названием определённого понятия какой-нибудь специальной области науки, техники, искусства [5].

Понятие – целостная совокупность суждений об отличительных признаках исследуемого объекта [6].

Категория – основное понятие, отражающее наиболее общие свойства, стороны, отношения явлений действительности и познания [4].

Определение – пояснение, раскрывающее смысл понятия, даваемое, как правило, в виде одного повествовательного предложения.

Аксиома – отправное, исходное положение какой-либо теории, лежащее в основе доказательства других положений этой теории, в пределах которой они принимаются без доказательства [3].

Постулат – исходное положение, допущение, принимаемое без доказательства [5].

Научно-методический аппарат – часть теории в виде арсенала процедурных знаний, основными элементами которых являются методы, алгоритмы¹⁰, методики, имитационные модели, технологии¹¹ решения научных и практических задач.

В сущности, элементы научно-методического аппарата представляют собой совокупность научно-инструментальных средств, разработанных и разрабатываемых в ходе развития науки и соответствующей ей практики, реально апробированных, прошедших экспертизу специалистов, официально признанных, опубликованных или материально воплощённых, приводящих к получению научных (в том числе и практических) результатов в интересах научной и практической деятельности в соответствующей предметной области науки и практики, обладающих обоснованной степенью достоверности.

Элементы научно-методического аппарата создаются с учётом вполне определённых ограничений¹² и допущений¹³, что влияет на область их применимости и на целесообразное разнообразие.

Допущения и ограничения, характеризующие границы, определяющие масштаб исследования в целом (по времени, простран-

¹⁰ **Алгоритм**

общенаучное понятие: предельно формализованное описание метода (или методики) в виде совокупности точных предписаний, задающих конечную последовательность действий, приводящих при одинаковых варьируемых исходных данных к одному и тому же результату;

в вычислительной технике: совокупность точных предписаний, задающих конечную последовательность действий, которые надо выполнить при варьируемых исходных данных для получения требуемого результата (такое определение содержал ныне не действующий ГОСТ 19.781-74. Машины вычислительные. Программное обеспечение. Термины и определения).

В различных видах деятельности алгоритмы, как и методы, реализуются в виде технологий.

¹¹ **Технология** – комплекс знаний о способах, методах, приёмах и средствах осуществления того или иного процесса или вида деятельности в интересах достижения заданного результата.

В простейших случаях: предельно строгая технология соответствует алгоритму, а нестрогая технология – методике.

¹² **Ограничения** – требования к форме представления и пределам изменения варьируемых данных, вводимые при исследовании.

¹³ **Допущения** – предположения, положенные в основу упрощения описания реального объекта (процесса), используемые при исследовании.

ву, исходным данным), называют **рамками исследования** (например, рассматривается класс линейных систем, прогнозируемые перспективы развития техники – до ... года ...).

Термины «теоретические основы», «научно-методические основы», «научно-методический аппарат», «методологические основы» обычно не упоминаются в энциклопедических изданиях, но применяются в практике названия учебных дисциплин (например, «Теоретические основы радиотехники») и в научной деятельности, особенно при экспертизе научных работ, потому что при частом обращении к ассоциируемым с ними совокупностям элементов требуются краткие названия.

Методологические основы¹⁴ предметной науки объединяют в своём составе методы научного обоснования конкретных элементов научно-методического аппарата и сами обоснования (см. табл.2).

Теоретические результаты (как предметной, так и методологической науки) это арсенал вторичных (главным образом фактографических) знаний, полученных исходя из исходных первичных знаний с применением располагаемого научно-методического аппарата.

Теоретические результаты включают в свой состав логические основы науки и теоретические данные.

Логические основы – множество допустимых правил логического вывода, обоснования и доказательства.

Фактически логические основы предметной науки представляют собой совокупность обоснований (и доказательств) вторичных знаний.

¹⁴ Следует акцентировать внимание на диалектической взаимосвязи и частичном пересечении методологических основ предметной науки с методологией предметной области (ПО). Создание, анализ, оценка, выбор, совершенствование элементов научно-методического аппарата предметной науки осуществляются методами, развиваемыми в рамках методологии ПО (иногда и с привлечением философии). При этом обоснование применимости некоторого (например, математического) метода в конкретной предметной науке – знания, относящиеся к методологическим основам данной предметной науки, в то время как обоснование применимости того же метода в различных предметных науках – это знания, относящиеся к методологии данной предметной области.

Теоретические данные представляют собой вторичные знания об основных объектах изучения и их элементах, полученных с применением научно-методического аппарата науки как в интересах непосредственной отдачи практике, так и в целях дальнейшего развития самой науки.

К основным элементам теоретических данных относятся теоретические конструкции в виде общих и частных моделей, формульных описаний, расчётных соотношений, а также научные положения, в том числе научные выводы, гипотезы, соотношения, принципы, концепции, закономерности, законы и обусловленные ими научные рекомендации.

Наиболее совершенными формами организации знаний в рамках создания научно-методического аппарата любой науки являются методы, а в рамках возникновения (путём систематизации различных элементов знаний) **научных основ** (в том числе теоретических, методических, методологических и др.) различных уровней познания – **теории**.

Теория – высшая, самая развитая форма организации научного знания, дающая целостное представление о закономерностях и существенных связях определённой области действительности – объекта данной теории [1].

Теория и метод не представляют собой два совершенно различных, независимых объекта [1,3], так как понятие теории может быть рассмотрено с двух точек зрения, одна из которых тяготеет к отражению формы, а другая – к выражению содержания.

С точки зрения **содержания** теория есть систематизированные и обобщённые знания о закономерностях и особенностях развития явлений рассматриваемой предметной области.

Например, **"Теория военная - систематизированные и обобщённые знания о явлениях войны и военного дела, закономерностях и особенностях их развития"** [2].

Всякая теория создается при вполне определённых допущениях и ограничениях, что влияет на область её применимости: она описывает, объясняет и предсказывает вполне определённую совокупность фактов, свойств и явлений той предметной области, к науке которой эта теория относится.

С точки зрения **формы** теория¹⁵ есть метод (или некоторая совокупность методов) объяснения и предсказания явлений в рассматриваемой области.

Подводя итог сравнению теории и метода, следует особо отметить, что теория во многом представляет собой описывающие, объясняющие и доказывающие (декларативные, непроцедурные) знания, отвечающие на вопросы "*каково то или иное: что, зачем и почему*".

Метод – это предписывающие (процедурные) знания, дающие ответ на вопросы "*как, каким образом: что за чем и когда*". Каждый метод воплощает соответствующую теорию (либо теории). Каждая теория в качестве своей важнейшей составной части включает ту или иную совокупность методов (объяснения, доказательства и др.).

Методы предметной науки, возникая (как правило, с привлечением методологии или философии) в процессе развития данной науки в качестве необходимого инструмента получения и применения знаний, обычно оказываются среди важнейших научных результатов предметного исследования, определяющих последующее развитие предметной науки.

В наиболее развитом виде теория включает в качестве **элементов** своего **научно-методического аппарата** набор взаимосвязанных методов, охватывающих все основные этапы познания, который, согласно ленинской формуле "*от живого созерцания к абст-*

¹⁵ Как отмечено в [1], "*любая теория по существу выступает в функции метода при построении других теорий в данной или даже в иных областях знаний или в функции метода, определяющего содержание и последовательность экспериментальной деятельности. Поэтому различие между методом и теорией носит функциональный характер*".

К необходимым признакам теории следует отнести:

нетривиальность, т.е. неочевидность теоретических положений, способов получения результатов и/или самих получаемых результатов, исключающая ситуации, когда "*и без теории все ясно*";

прагматичность - теория как метод должна быть приложима к практике, т.е. должна давать научные обоснования выводов и рекомендаций, полезных для практической деятельности.

рактному мышлению и от него к практике", может быть представлен следующей классификацией:

- методы наблюдения, сбора и регистрации научных фактов с требуемыми измерениями и расчётами;

- методы содержательного, формализованного и формального описания¹⁶ научных фактов, вытекающих из них свойств идеализированного объекта исследования, а также параметров и факторов, определяющих развитие исследуемых явлений (процессов);

- методы анализа, оценки, сопоставления, сравнения, классификации, упорядочения, систематизации и моделирования исследуемых научных фактов, свойств, параметров, факторов и явлений (процессов) по тем или иным показателям и критериям;

- методы обоснования, оценки, построения (синтеза), моделирования, выбора, оптимизации, интерпретации, экспериментальной проверки и технико-экономической (военно-экономической) оценки научных выводов и рекомендаций.

Процесс перехода от содержательного к формализованному и формальному описанию (**процесс формализации**) развивается от использования первичных идеализаций через выдвижение теоретических концепций к построению на основе располагаемого научно-методического аппарата (или вновь создаваемого) более или менее общей теоретической модели рассматриваемых явлений (процессов).

Понятия **факторы, параметр, показатель и критерий** неоднозначно трактуются в энциклопедической, справочной и учебной литературе и даже в ГОСТах, поэтому акцентируем на них особое внимание.

¹⁶ **Содержательное описание** – это описание на естественном (профессиональном или литературном) языке.

Формальное описание – описание в специфических терминах и символических обозначениях той или иной теории.

Формализованное описание – содержательное описание с элементами формального описания.

Факторы – это причины, обстоятельства, движущие силы, определяющие причинно-следственные связи в рассматриваемом явлении (процессе).

Параметр – это показатель с пределами допустимых значений, определяемыми конкретной семантической интерпретацией.

Показатель – качественная или количественная характеристика, вводимая для оценки отдельного свойства или совокупности свойств рассматриваемого объекта (процесса).

Показатель обычно имеет наименование, обозначение и значение.

Различают количественные показатели (значение – численная величина) и качественные показатели (значение – словесное, неколичественное описание меры проявления рассматриваемого свойства или свойств).

Критерий – правило, необходимый и/или достаточный признак выбора чего-либо.

Используемые в критериях показатели называют критериальными.

Обычно критериальный выбор осуществляется на основе оценки значения одного критериального показателя либо нескольких частных критериальных показателей (многокритериальный выбор).

Соотношение, в соответствии с которым вычисляется значение критериального показателя, называется **целевой функцией**.

Очень часто наблюдается неоправданное смешивание понятий показателя и критерия, проникшее в большое количество солидных научных и учебных публикаций. Возникающая при этом семантическая путаница проявляется, например, в высказываниях об оптимальном значении критерия (спрашивается: оптимальном по какому критерию?), когда нужно говорить о значении критериального показателя.

В общем случае на начальном этапе теоретического познания теоретические основы представляют собой элементы незрелых

теорий. По мере созревания в науке может появиться то или иное множество теорий как созревших элементов теоретических основ.

Так, математика включает теорию дифференциального и интегрального исчисления, теорию чисел и т.д. В некоторых науках в рамках единых научных основ возникают альтернативные теории (например, теории света – корпускулярная и волновая) и осуществляются попытки создания единой теории.

Для науки в целом исходные эмпирические основы, исходные теоретические основы, научно-методические и методологические основы, а также логические основы и теоретические данные выглядят как объединение соответствующих элементов теорий.

Таким образом, **научные основы** – это характерные структурные элементы знаний любой частной науки, не только предметной, но и методологической, причём как на прикладной, так и на философской ступенях познания.

К научным основам, в первую очередь, относятся **теоретические основы**, которые **являются интегрирующими и объединяют** в своём составе (в наиболее развитой форме в виде теории или теорий) **исходные эмпирические** и **исходные теоретические** основы данной предметной науки, а также её **научно-методические** основы, содержащие в качестве своей составляющей методологические основы частной науки и, кроме того, **логические** основы, составляющие важнейшую часть теоретических результатов рассматриваемой частной науки.

Естественным образом понятия *научные, эмпирические, теоретические, научно-методические и методологические основы, а также научно-методический аппарат* распространяются с частных наук на науку в широком смысле.

Кроме того, вполне допустимо говорить о *теоретических, научно-методических, методологических основах* и *научно-методическом аппарате* конкретного научного исследования (в том числе диссертационного) или научной разработки, а также той отрасли знаний, к которой относится исследование или разработка.

В рамках развития методологических наук наиболее совершенной формой организации знаний является *методологическая теория*. Основным объектом изучения методологической теории, в отличие от предметной, является та или иная совокупность методов.

Методологическая теория включает некоторую совокупность взаимосвязанных частных **методологических методов**, применяемых по отношению к методам и теориям, выступающим в качестве объекта методологической теории, при этом изучаются факты, факторы и получаются выводы и рекомендации методологического характера.

Примером методологической теории, возникшей в довольно широкой предметной области, а именно в области технических наук, является теория принятия технических решений.

Результатом наиболее глубокого развития методологических теорий является возникновение метатеорий.

Метатеория – теория, анализирующая структуру, методы и свойства другой, так называемой **содержательной теории**.

При этом фактическим объектом рассмотрения в метатеории оказывается, как правило, не сама по себе та или иная содержательная теория, а её формальный аналог [1].

2. ЗАДАЧИ И ПРОБЛЕМЫ ПРИ ИССЛЕДОВАНИЯХ И РАЗРАБОТКАХ

Вся наша сознательная жизнь протекает в многомерном пространстве постоянно решаемых задач и проблем.

Решаемые задачи (проблемы) могут быть из самых различных областей знаний и предметных областей. Проснувшись утром, мы решаем задачу принятия решения – встать немедленно или некоторое время понежиться. Мы вынуждены решать множество задач: каким именно транспортом добраться на работу, на работе мы решаем профессиональные задачи и т. д. Довольно часто то, что требуется решить, оказывается проблемой.

Задачи и проблемы могут решаться либо научными методами, либо без их использования. Умение решать задачи и проблемы без использования научных методов – это искусство.

Такова истина, что любое искусство за счёт развития науки постепенно вытесняется, и ввиду этого количество задач и проблем, решаемых научными методами, с течением времени возрастает. Однако, вытесняясь, а в ряде случаев и полностью отмирая в тех или иных предметных областях, искусство не исчезает в целом, так как постоянно находит в окружающем нас поистине необъятном для познания мире всё более новые области приложения и тем самым открывает новые горизонты для разработки задач и проблем, решаемых научными методами.

2.1. Основные понятия, термины и определения

Рассматривая далее в основном задачи, решаемые научными методами, в качестве исходных используем следующие известные определения.

Задача – то, что требует исполнения, разрешения [5].

Проблема – сложный вопрос, задача, требующие разрешения, исследования [5].

Метод – совокупность приёмов или операций практического или теоретического освоения действительности, подчинённых решению конкретной задачи [1].

Научный метод – разработанный в процессе развития науки как системы знаний.

Согласно Федеральному закону о науке и государственной научно-технической политике [7]:

"Научная (научно-исследовательская) деятельность (далее – научная деятельность) – деятельность, направленная на получение и применение новых знаний, в том числе:

фундаментальные научные исследования – экспериментальная или теоретическая деятельность, направленная на получение новых знаний об основных закономерностях строения, функционирования и развития человека, общества, окружающей природной среды;

прикладные научные исследования – исследования, направленные преимущественно на применение новых знаний для достижения практических целей и решения конкретных задач.

Научно-техническая деятельность – деятельность, направленная на получение, применение новых знаний для решения технологических, инженерных, экономических, социальных, гуманитарных и иных проблем, обеспечения функционирования науки, техники и производства как единой системы.

...Научным работником (исследователем) является гражданин, обладающий необходимой квалификацией и профессионально занимающийся научной и (или) научно-технической деятельностью.

Правовые основы оценки квалификации научных работников ... и критерии этой оценки определяются в порядке, устанавливаемом Правительством Российской Федерации, и обеспечиваются государственной системой аттестации.

...Специалистом научной организации (инженерно-техническим работником) является гражданин, имеющий среднее профессиональное или высшее профессиональное образование и способствующий получению научного и (или) научно-технического результата или его реализации.

...Научный и (или) научно-технический результат – продукт научной и (или) научно-технической деятельности, содер-

жащий новые знания или решения и зафиксированный на любом информационном носителе”.

В наиболее общем случае:

исследование – процесс выработки новых научных знаний, один из видов познавательной деятельности [1];

разработка – комплекс взаимообусловленных работ (исследовательских, опытно-конструкторских, экспериментальных и др.), осуществляемых профессиональными методами, включающий как сам процесс разработки, так и его результат, выраженный в конкретной форме.

Конкретные формы результатов исследований и разработок могут быть самыми различными – от чисто прагматических (практически полезные решения – технические, экономические, технологические или др. и их реализации) и вплоть до чисто теоретических (научные положения и выводы, модели, теории и т.п.).

Исследования и разработки диалектически взаимосвязаны – любое **исследование включает разработку** тех или иных его результатов, а любая **разработка немыслима без исследования** (в частности, в виде анализа) вариантов разрабатываемого.

Каждое исследование и каждая разработка соответствует некоторой цели.

Цель исследования (разработки) – основной результат, которого стремятся достигнуть.

Далее будет идти речь о целях научного исследования, вытекающих из целей развития науки в соответствующей области.

Если говорят, что цель развития науки – разработка методов, моделей и т.п. научно-методических построений, то не следует ли согласиться с тем, что в данном случае речь идёт о развитии науки ради науки?

Определение цели научного исследования с точки зрения развития науки ради науки (научной цели) является весьма важным и вполне справедливо в отношении целей в области теоретического исследования и в области фундаментальной науки.

Примеры научных целей:

разработка метода (методики и т.п.) ...;

обоснование рекомендаций ...;

доказательство ...

В области же прикладной науки цель её развития не может быть иной, кроме как отдача практике, а разработка методов, моделей и т.п. научно-методических построений превращается в средство достижения цели.

Определение цели научного исследования с точки зрения отдачи практике (прагматической цели) является (если это осуществимо) не менее (а может быть, и более) важным, чем определение “чисто” научной цели.

Примеры прагматических целей:

повышение точности (помехоустойчивости и т.п.)...;

сокращение экономических затрат...

Цель формулируется в отношении рассматриваемого объекта исследования (разработки).

Объект исследования – вполне определённая часть исследуемой предметной области (процесс, явление и т.п.), на познание и преобразование которой направлено проводимое исследование.

Объект разработки – объект, для которого осуществляется разработка.

Цель исследования (разработки) может достигаться разными путями (способами), при этом каждый путь достижения цели может быть пройден по-разному посредством решения той или иной общей задачи, соответствующей достигаемой цели, которое обычно сводится к решению того или иного множества частных задач.

Так, например, цель «*Повышение оперативности управления изделием*» может быть достигнута, по крайней мере, двумя путями – модернизацией имеющегося изделия либо созданием нового изделия, при этом различные варианты как модернизации изделия, так и его создания приводят к необходимости решения существенно различающихся задач технико-экономического обоснования, проектирования, экспериментальной проверки и т.п.

Путь достижения цели при документальном оформлении результатов исследования или разработки выражается:

– в предельно компактной форме – в названии общей задачи исследования (разработки), которое обычно переходит в название документа, в котором излагаются описание процесса исследования (разработки) и его результатов;

– в более развёрнутом виде – в краткой формулировке задачи.

Кроме того, в ещё более развёрнутом виде цель чаще всего раскрывается в перечне (названиях) частных задач, определяющих основные вопросы, подлежащие исследованию (разработке).

Все реальные, относительно самостоятельные исследования (разработки) лежат в широком спектре – от выполняемых на самом высоком уровне, вызванном потребностями науки и практики (например, диссертация на соискание учёной степени, опытно-конструкторская разработка), до таких, которые имеют весьма ограниченное, например, учебно-воспитательное значение (курсовая задача или дипломный проект в вузе).

Следует особо отметить, что сложные задачи обычно решаются путём их декомпозиции на более простые частные задачи. Это обстоятельство вынуждает далее формулировать основные определения применительно к самому широкому кругу задач.

Будем исходить из универсального понятия, приводимого в словаре русского языка [8]: задача – "*то, что дано, предложено для выполнения, разрешения; то, что требует выполнения, разрешения*". В таком случае вполне естественными являются следующие определения.

Задача исследования (разработки) – это **что дано** и **что требуется** в отношении предмета исследования (разработки), при этом, по крайней мере одно решение задачи известно (опубликовано).

Предмет исследования – та сторона объекта, которая является ключевой с точки зрения познания и преобразования объекта исследования.

Предмет разработки – та часть объекта, которая непосредственно разрабатывается.

Проблема исследования (разработки) – это **что дано** и **что требуется** в отношении предмета исследования (разработки), при этом решение проблемы, обеспечивающее получение того, **что требуется**, не известно (не опубликовано).

Проблема после нахождения хотя бы одного её решения, по определению, превращается в задачу.

Приведенные определения задачи и проблемы являются альтернативными: либо это задача, либо проблема. Однако, как свиде-

тельствует практика, в большинстве случаев выяснение вопроса “это задача или проблема?” ввиду субъективности суждений оказывается неоднозначным, в связи с чем множество проблем расширяется за счёт подмножества задач, называемых сложными (когда ориентируются на то, что “*проблема* – сложный вопрос, задача, требующие разрешения, исследования” [5]).

При решении задач и проблем

что дано характеризуется перечислением исходных данных, используемых при решении задачи (проблемы), а также (при наличии) учитываемых условий (в том числе допущений и ограничений).

что требуется излагается путём перечисления требуемых результатов – вычисляемых величин, доказываемых утверждений и др.

Решение задачи (проблемы) – это тройка:

что требуется + что дано + способ решения.

Каждому решению задачи соответствует конкретный (один из известных) способ решения. Проблема, не имеющая решения, после нахождения хотя бы одного её решения превращается в задачу.

Способ решения задачи (проблемы) – метод, методика или алгоритм, с помощью которого получается результат решения задачи (проблемы).

Последующие определения и пояснения даются для задачи, но полностью относятся и к проблеме, т.е. везде, где говорится «задача», следует понимать и «проблема».

Во введении документа, в котором даётся описание процесса исследования (разработки) и его результатов, как правило, приводится краткая формулировка задачи.

Краткая формулировка задачи – компактное содержательное описание основных элементов её постановки.

По существу требуемых результатов задачи исследований и разработок разделяются на оценочные и оптимизационные, к которым сводятся все другие задачи (анализа, синтеза, обоснования, доказательства и пр.).

Оценочная задача – в которой требуется определение количественного и (или) качественного значения целевого показателя с использованием целевой функции.

Оптимизационная задача – в которой требуется оптимизация критериального показателя.

В данном случае понятие оптимизации (в том числе максимизации и минимизации) используется не в смысле поиска экстремума, а в научно-прикладном смысле.

Частным случаем оптимизации является нахождение экстремума – теоретического максимума или минимума.

Среди оптимизационных задач можно выделить:

– задачи максимизации (минимизации) значения целевой функции;

– задачи нахождения значения варьируемого показателя, обеспечивающего максимизацию (минимизацию) значения целевой функции.

Постановка задачи – чёткая формулировка, конкретизирующая все существенные элементы того, **что дано** и **что требуется**.

Предварительная постановка задачи – её компактная формулировка с применением символических обозначений как для исходных данных, так и для целевой функции (без указания формульных соотношений).

Предварительная постановка задачи при документальном оформлении результатов исследования (разработки) приводится в первом разделе, посвящённом обоснованию сущности и актуальности задачи.

Целевая функция – соотношение, в соответствии с которым вычисляется значение **целевого показателя**, используемого при оценке результата, соответствующего цели решения оценочной задачи, либо значение критериального показателя, оптимизация которого является целью решения оптимизационной задачи.

Строгая постановка задачи – компактное описание постановки задачи в терминах той или иной теории, содержащее исходные данные, целевую функцию и дополнительные сведения (ограничения и требуемые данные для применения конкретно выбранного метода решения), необходимые и достаточные для существования решения.

Строгая постановка задачи приводится в одном из основных разделов описания полученных результатов перед получением результата решения задачи выбранным или разработанным методом.

Математическая постановка задачи – строгая постановка задачи в абстрактных терминах математики.

Развитие науки на различных уровнях познания приводит к возникновению разных, в том числе производных, предметов и методов исследования.

Изучение предмета исследования окружающего мира, не являющегося методом или теорией – *объекта исследования предметного уровня*, – происходит на *предметном (предметологическом) уровне познания* и приводит к появлению **метода** (а в более общем случае – методов, методик и теорий) **предметного уровня**.

В свою очередь, изучение в качестве предмета исследования *методов предметного уровня* происходит на *методологическом уровне познания* и приводит к появлению **методов методологического уровня**.

В дальнейшем на методологическом уровне познания происходит изучение в качестве предмета исследования *методов методологического уровня*, что приводит к появлению производных **методов** более высоких **методологических уровней**.

Соответственно уровню познания, *предмет и цель исследования (разработки), способ решения научной задачи, а также рассматриваемая задача в целом*, может быть *предметного или методологического уровня*.

Задачи предметного уровня решаются предметными методами в отношении объектов (определяющих, **что дано** и **что требуется**), не являющихся методами.

Задачи методологического уровня решаются методологическими методами в отношении объектов, являющихся методами (как предметными, так и методологическими).

Все задачи, решаемые при выполнении исследований и разработок, можно разделить на технические, научно-технические и научные.

Техническая задача – это задача, непосредственно возникающая в конструктивно-преобразовательной (в отличие от познавательной) деятельности человека.

Решение технических задач – это удел специалистов-практиков. Результаты решения таких задач являются вполне конкретными, полученными при вполне определённых исходных данных.

Технические задачи, в свою очередь, могут быть разделены на чисто технические и на научно-технические.

Чисто техническая задача решается без использования научных методов.

К техническим относятся и вспомогательные задачи, решаемые в интересах обеспечения конкретного вида деятельности, в том числе при выполнении исследований и разработок.

Технические задачи решаются с помощью умения, эрудиции и интуиции (например, личное изучение архива, изготовление документа по заранее известной форме и др.).

Решение научно-технических и научных задач и проблем в основном осуществляется в процессе двух видов деятельности, относящихся к научным – научная деятельность и научно-техническая деятельность.

Определения видов деятельности, которые в статье 2 «Закона о науке ...» [7] сформулированы применительно к научным организациям, целесообразно привести к следующему виду, применимому к любым организациям, в которых решаются задачи и проблемы научными методами (целесообразные отличия формулировок указаны прямым шрифтом):

"Научная (научно-исследовательская) деятельность (далее научная деятельность) – деятельность, направленная на получение и применение новых научных знаний, в том числе:

научная деятельность в области фундаментальных научных исследований – теоретические (или) экспериментальные исследования, направленные на получение новых научных знаний об основных закономерностях строения, функционирования и развития человека, общества, окружающей природной среды;

научная деятельность в области прикладных научных исследований – теоретические (или) экспериментальные исследования,

направленные преимущественно на получение новых научных знаний для достижения практических целей и решения конкретных задач.

Научно-техническая деятельность – деятельность, направленная на получение новых практических знаний и их применение для достижения практических целей”.

Научные знания – совокупность полученных в процессе развития науки как системы знаний научных результатов, апробированных на практике, прошедших экспертизу специалистов, официально признанных и опубликованных.

Практические знания – совокупность знаний, получаемых в практике научно-технической деятельности.

Каждый из названных видов деятельности – научной и научно-технической – выполняется работником соответствующей профессии, решающим характерные для него задачи и проблемы и получающим специфические результаты.

Инженерно-технический работник решает научно-технические задачи известными методами.

Научный работник занимается научной деятельностью, которая обычно вынужденно сочетается и с научно-технической деятельностью.

Научная деятельность является исследовательской, преимущественно познавательной, основу которой составляет решение научных (а иногда и научно-технических) задач и проблем (в зависимости от того, что именно требуется). При этом, с одной стороны, в процессе деятельности научного работника возможно как одновременное решение научных и научно-технических задач (например, научно-техническая задача является частной задачей некоторой более общей научной задачи, и решение частной задачи одновременно является частью решения общей задачи), а с другой стороны, возможно и последовательное решение научной и научно-технической задачи (после решения научной задачи по разработке метода решения некоторой научно-технической задачи осуществляется в порядке эксперимента проверочное решение научно-технической задачи).

Однако, учитывая, что, как доказано в теории организации, разделение труда с соответствующей специализацией – лучший способ использования индивидуумов и групп людей, чтобы произвести

больше продукции с лучшими качественными характеристиками при одних и тех же затратах, лучше всего, если научный работник (исследователь) сосредотачивается на решении научных задач с получением *новых научных результатов*, а инженерно-техническому работнику передать решение научно-технических задач с получением *новых практических результатов*.

Научно-техническая задача – это задача предметного уровня, решение которой осуществляется известными научными методами предметного уровня (например, инженерный расчёт эффективности конструируемого изделия).

Соответственно различным видам деятельности это может быть инженерно-техническая, экономическая, технологическая, юридическая, гуманитарная или какая-либо другая задача.

В научно-технической задаче (в отличие от чисто прагматической типа “измерить температуру тела”) значения исходных данных и требуемые результаты обычно являются конкретными, получаемыми в интересах практической деятельности:

– **что дано** характеризуется исходными данными в виде конкретных количественных и качественных значений задаваемых величин (показателей);

– **что требуется** излагается путём перечисления названий величин, конкретные значения которых должны быть определены в результате решения задачи (проблемы);

– **способ решения** задачи (проблемы), решаемой с использованием математических методов, может представлять собой метод, методику, алгоритм или технологию.

Что касается **способа решения**:

– для специалиста-практика, решающего научно-техническую задачу, он является известным либо доступным для освоения (может быть взят из справочника, учебного пособия и других доступных документов).

– для специалиста-практика, решающего научно-техническую проблему, отсутствие способа решения преодолевается за счёт искусства нахождения решения при конкретных условиях обстановки.

Исходные данные при решении научно-технических задач основываются на фактах.

Факт – реальное событие, происшедшее или происходящее явление (процесс).

Результат решения научно-технической задачи (проблемы) представляет собой вполне конкретный практический результат.

Конкретные практические результаты решения задач и проблем научными методами характеризуются вполне определёнными значениями переменных, полученными при тех или иных заданных значениях исходных данных.

Научная задача (проблема) – задача (проблема), требующая поиска или разработки метода решения при заданных исходных данных.

Особенностью научной задачи (проблемы) является весьма существенная чёткость и конкретность:

1) заданных исходных данных (**что дано**): нет исходных данных – нет научной задачи (научной проблемы), иные (изменились) исходные данные – другая задача (проблема);

2) требуемых результатов (**что требуется**): научная задача (проблема) может быть только оценочной или(и) оптимизационной (к таковым относятся все научные задачи и проблемы анализа, синтеза, доказательства и др.).

В научной задаче (проблеме) **что дано** и **что требуется** задаются в формализованном виде, причём обычно:

что дано характеризуется исходными переменными величинами;

что требуется характеризуется указанием:

в задаче предметного уровня – что именно оценить либо оптимизировать (минимизировать или максимизировать);

в задаче методологического уровня – что разработать (в области технических наук обычно метод, методы, методику, научно-методические основы), обеспечивающее оценку либо оптимизацию объекта предметного уровня.

В простейшем случае поиск решения научной задачи сводится к научно обоснованному выбору наиболее подходящего метода или методики из множества известных. Методы и методики относят к известным (не известным), если они опубликованы (не опубликованы).

В более сложных случаях поиск решения научной задачи (проблемы) сводится к попыткам найти искомое решение комбинированием известных и (или) усовершенствовать известные решения, иначе остаётся единственный путь – разработка нового метода (методики).

Исходными данными для многих научных задач являются научные факты.

Научный факт – факт, имеющий описание и обоснование в результате обобщения определённого класса событий, явлений, процессов. Научный факт представляет дискретный элемент знания, связанный с непосредственным истолкованием наблюдений или экспериментов.

Существенными чертами научного факта (в отличие от обычного факта, например: Ленин умер в 1924 году) являются его воспроизводимость и/или постоянство, инвариантность относительно индивидуальных особенностей исследователя (примеры научных фактов: люди рождаются и умирают).

Результат решения научной задачи (проблемы) представляет собой научный результат.

К сожалению, в «Законе о науке ...» приведено процитированное в начале подраздела 3.1 гибридное определение **научного и (или) научно-технического результата** с многовариантной возможностью прочтения.

Если опираться на приведенные перед этим определения **научной деятельности** и **научно-технической деятельности**, то оказывается, что, например, **научный (научно-исследовательский) результат может быть продуктом научно-технической (не научно-исследовательской) деятельности, «направленной на получение... новых знаний для решения технологических, инженерных, экономических, социальных, гуманитарных и иных проблем, обеспечения функционирования науки, техники и производства как единой системы»** [9].

Просматривающиеся нелогичности в возможных вариантах выборочного прочтения служат расплатой за игнорирование принци-

па разделения труда и являются следствием недостаточной научной проработки определений, попавших в нормативный документ.

Поскольку какова деятельность, таков и результат, крайне целесообразно дать (как это и сделано в данном пособии) для научного и для научно-технического результатов отдельные определения.

Что касается результата решения научной задачи, то следует исходить из того, что он является научно-методическим (метод или совокупность взаимосвязанных методов, либо методика) и может быть ориентирован на использование как в практической, так и в научной деятельности.

Научные задачи возникают в процессе познавательной (научной) деятельности и в своей формулировке характеризуются переменными значениями исходных данных.

Решение научных задач – это, как правило, дело научных работников. Поиск решения научных задач осуществляется путём анализа известных решений (опубликованных в доступной литературе) и выбора той или иной подходящей их комбинации. При отсутствии подходящего (в том числе комбинированного) решения поиск продолжается в рамках творческой разработки решения (на уровне вклада в науку).

При поиске решения сложных задач используют методический приём, сформулированный Рене Декартом: *«Расчлените каждую изучаемую задачу на столько частей, сколько сможете, и на сколько это потребуется вам, чтобы их было легко решить»*.

Речь идёт о сведении решения задачи к множеству частных задач, имеющих известные решения. Если для какой-то задачи это не удаётся, то остаётся прибегнуть к поиску способа решения на уровне вклада в науку, имеющего практическую значимость. Может возникнуть ситуация, когда в результате декомпозиции общей задачи получаются не только частные научные задачи исследования и разработки, но и проблемы. Нахождение решения научной задачи обычно порождает решение научно-технической задачи.

Уровень сложности, новизны и практической значимости решаемой научной задачи или проблемы характеризует научную квалификацию того, кто занимается решением задачи (проблемы).

Так, например, в соответствии с действующими нормативными требованиями [9], к важнейшим из основных вариантов научно-квалификационных работ относятся:

«Диссертация на соискание ученой степени доктора наук должна быть научно-квалификационной работой, в которой... решена крупная научная проблема, имеющая важное социально-культурное или хозяйственное значение...»;

«Диссертация на соискание ученой степени кандидата наук должна быть научно-квалификационной работой, в которой содержится решение задачи, имеющей существенное значение для соответствующей отрасли знаний...»;

из положения о том, что *«Диссертация должна быть написана единолично, содержать совокупность новых научных результатов и положений, выдвигаемых автором для публичной защиты, иметь внутреннее единство и свидетельствовать о личном вкладе автора в науку»* следует то, что, во-первых, общая задача, как и общая проблема диссертационного исследования должна быть научной, а во-вторых, довольно частые утверждения о том, что диссертация удовлетворяет предъявляемым требованиям, так как содержит решение актуальной научно-технической задачи, свидетельствует о непонимании того, что решение задачи (даже если она является важной, прагматически актуальной и сложной), осуществляемое известными методами без элементов новизны, не приводит к вкладу в науку.

В качестве дополнения к изложенному следует указать класс учебных задач всех рассмотренных видов, решаемых при обучении практической и научной деятельности.

2.2. Методические рекомендации по формулированию целей и задач научных исследований и разработок

Анализ большого количества документально оформленных результатов исследований и разработок показывает, что в подавляющем большинстве случаев исследователи и разработчики не приводят кратких и чётких формулировок цели и решаемой общей задачи, иногда полагая их очевидными из приводимого перечисления частных задач и описанных их решений. Если же формулировки при-

водятся, то они обычно не выдерживают даже благожелательной критики. По мнению многих специалистов краткое и чёткое, правильное формулирование цели и общей задачи исследования (разработки), в частности, например, в диссертации или даже в дипломном проекте, является довольно непростым делом.

Возможно, это происходит из-за того, что в существующей энциклопедической, справочной и научно-методической литературе рекомендации, на которые можно было бы опереться, практически отсутствуют, и поэтому правила формулирования цели и общей задачи исследования (разработки) каждый себе представляет и трактует по-своему. Эти обстоятельства придают актуальность составлению рекомендаций по формулированию целей и задач при выполнении исследований и разработок, которые будут изложены применительно к диссертационному исследованию.

2.2.1. Формулировка цели

Типичной ошибкой является стремление неопытного автора сформулировать цель исследования так, чтобы она выражала сложность исследования (разработки) и всесторонне характеризовала основные научные результаты, которых стремятся достигнуть, при этом фактически общая цель подменяется множеством частных целей, что нарушает её единство.

Надо исходить из того, что сложность и всесторонность исследования (разработки) характеризуется не целью, а отдельно излагаемыми формулировками предмета и общей задачи исследования (разработки), перечнем частных задач, а также описаниями результатов решения частных задач и общей задачи в целом.

Приведение в формулировке цели сведений о путях и условиях её достижения (характеризуемых словами «на основе ...», «с учётом ...» и т.п.) сводится к дублированию других элементов изложения.

Пример неудачной формулировки цели из реальной диссертации:

*«**Целью диссертационного исследования** является развитие теории приёма световых сигналов в оптических информационных системах, работающих в режиме счёта фотонов, на основе ам-*

плитудных методов селекции одноэлектронных импульсов и совершенствование технической базы приёмных комплексов оптических телекоммуникационных систем».

Здесь содержится, как минимум, две частных цели.

Формулирование цели существенно упрощается и чаще всего превращается в рутинную задачу, если руководствоваться некоторыми требованиями.

Требования к формулировке цели:

1) единство цели, отсутствие элементов, указывающих пути и методы её достижения;

2) возможность оценки степени достижения цели.

Сформулированные требования заслуживают некоторых пояснений на примерах и перевода на язык рекомендаций.

Для обеспечения требования единства цель целесообразно формулировать как целостный результат целенаправленного изменения объекта исследования (разработки).

Цель, имеющая практическое значение, должна выражать основной результат в виде прагматического эффекта (например, технического, экономического, организационного и т.п.).

Цель, имеющая теоретическое значение, должна выражать основной результат в виде наращивания или развития знаний (формулировки типа «обоснование ...», «доказательство ...» и т.п.).

С учётом сказанного, не следует излагать цель как множественную (в виде совокупности частных целей и задач) и отягощать её второстепенными деталями (выражаемыми словами «с учётом», «на основе» и т.п.), сковывающими рамки творческого поиска.

Очень часто формулировку прагматической цели пытаются начать с названий этапов опытно-конструкторских работ (разработка, выбор, проектирование, оценка, ...). Такие формулировки акцентируют внимание не на основном результате целенаправленного изменения объекта, к чему следовало бы стремиться, а лишь указывают некоторый путь достижения цели.

Интуитивно осознавая этот недостаток, довольно часто прибегают к более расширенным формулировкам, таким как «Разработка (объекта), позволяющего (нечто)», «Проектирование (объекта), обеспечивающего (нечто)».

Поскольку в таких случаях цель выражается лишь тем, что названо «нечто», формулировку следует сократить, убрав из неё элементы, навязывающие путь достижения цели.

Так, например, вместо цели *«разработка метода обработки данных, обеспечивающего сокращение сроков выполнения информационно-вычислительных работ»* предпочтительней использовать формулировку *«сокращение сроков выполнения информационно-вычислительных работ»*, в которой исключено указание о пути её достижения.

Для обеспечения второго требования (возможность оценки степени достижения цели) следует стремиться к тому, чтобы оценка могла быть выполнена с помощью одного интегрального показателя, предпочтительно количественного. Цель *«повышение эффективности управления изделием»* в случае, если становится ясным, что эффективность будет оцениваться показателем оперативности, должна быть заменена на *«повышение оперативности управления изделием»*.

Учитывая требование пункта 9 Положения о порядке присуждения учёных степеней [9]: *«В диссертации, имеющей прикладное значение, должны приводиться сведения о практическом использовании полученных автором научных результатов, а в диссертации, имеющей теоретическое значение, – рекомендации по использованию научных выводов»*, необходимо чётко различать цель диссертационного исследования прагматическую и научную.

Цель диссертационного исследования *«разработка (либо обоснование) рекомендаций по ...»* – это явная претензия на диссертацию, имеющую теоретическое значение.

2.2.2. Постановка и краткая формулировка задачи

Без чётких требований к изложению задачи выбор какого-либо варианта формулировки как общей, так и частной задачи исследования (разработки) из практически бесчисленного множества

напрашивающихся вариантов, также как и в случае цели, превращается в весьма серьёзную проблему.

Рассмотрим пример неудачного выбора краткой содержательной формулировки задачи, содержащейся в ранее цитировавшейся диссертации.

*«**Научная задача исследования.** Развитие теории приёма световых сигналов в оптических информационных системах, работающих в режиме счёта фотонов, на основе амплитудных методов селекции одноэлектронных импульсов (ОИ), разработка и научное обоснование модели многопорогового фотоэлектронного счётчика, разработка алгоритмов и программных средств как элементов обработки потока ОИ, совершенствование технической базы приёмных комплексов телекоммуникационных систем за счёт разработки фотоэлектронных датчиков с амплитудными методами селекции ОИ и методик расчёта их характеристик».*

Такая формулировка не выражает конкретно, что требуется оценить или оптимизировать и что дано в качестве исходных данных. Приведенная формулировка, частично дублируя цель, представляет перечень частных задач исследования и пути их решения, а сама решаемая общая научная задача так и осталась несформулированной. Кстати, в данной диссертации частные задачи сформулированы в виде шести пунктов (отдельно).

Соответственно ранее приведенным трактовкам основных понятий, целесообразны следующие **требования к (краткой содержательной) формулировке общей задачи исследования (разработки):**

1) наличие указания о том, что требуется получить в результате решения задачи для достижения цели в отношении объекта исследования (разработки);

2) наличие сведений о том, что дано в качестве исходных данных о предмете исследования (разработки);

3) отсутствие элементов, указывающих путь (в том числе частные задачи) и способ решения.

Не рекомендуется в постановку общей задачи включать дополнительные требования, сковывающие элементы творческого поиска и навязывающие, что именно надо делать для решения задачи.

В отличие от цели, которая формулируется перед началом исследования (разработки) и в последующем лишь уточняется, краткая формулировка общей задачи, а также предварительная и строгая постановка обычно формулируются по реально полученным результатам.

Если общая цель исследования (разработки) и постановки частных научных задач сформулированы правильно, а при решении основных частных задач широко использованы формальные (например, математические) методы, то выявление строгой постановки общей научной задачи утрачивает элементы субъективизма.

В процессе объективного выявления строгой постановки задачи на основе реально располагаемых материалов исследования (разработки) устанавливают:

1) основной критериальный либо целевой показатель оценки степени достижения общей цели, характеризующий, что требуется;

2) перечень исходных данных для решения общей задачи исследования (разработки), характеризующий, что дано. Такой перечень получается в результате спуска по имеющейся иерархии постановок частных задач к тем исходным данным, которые не оказываются промежуточными с точки зрения решения общей задачи.

После этого оформляется строгая постановка общей задачи исследования (разработки), которая может быть дополнена допущениями и ограничениями, вводимыми и обосновываемыми при решении частных задач.

Целесообразно для исключения противоречий после получения строгой постановки общей задачи доработать окончательный вариант предварительной постановки задачи, который должен представлять собой "сжатие" с исключением целевой функции, но с сохранением символов для всех переменных строгой постановки задачи.

После этого можно перейти от предварительной постановки задачи к краткой (содержательной) формулировке задачи "сжатием" за счёт отказа от символических обозначений и применения при целесообразности обобщающих названий для групп показателей, характеризующих исходные данные.

В диссертации по техническим наукам, как правило, формулируется в качестве основной общая научная задача (проблема) научно-методического уровня.

Рассмотрим конкретные примеры (имеющие схематический смысл) цели, краткой формулировки, предварительной постановки и строгой постановки общей задачи.

«**Цель** – повышение устойчивости управления движением летательного аппарата».

«**Общая задача:** разработка метода управления, обеспечивающего максимизацию устойчивости управления движением летательного аппарата при заданных исходных данных о дестабилизирующих факторах и ограничении на ресурсные затраты».

В данном случае максимизация понимается не в узко математическом смысле (как поиск экстремума), а в научно-прикладном смысле, как часто говорят о минимизации экологического ущерба, о максимизации прибыли предприятия, когда оптимизация осуществляется, но в рамках достижимых результатов.

В первом разделе диссертации после анализа существующих постановок и методов решения рассматриваемой задачи приводится предварительная постановка задачи, которая, как уже говорилось, содержит только символические обозначения как для исходных данных, так и для целевой функции (без указания формульных соотношений). Продолжим примеры:

«Постановка задачи: разработка метода управления, обеспечивающего максимизацию показателя **P** при заданных исходных данных о дестабилизирующих факторах **D1, D2** и ограничении на ресурсные затраты **R ≤ R0**:

$$P(D1, D2, R, R0) \rightarrow \min».$$

Приведенная постановка задачи, являющаяся предварительной, не может считаться строгой постановкой, так как не содержит выражения для целевой функции.

Обычно целевая функция (которая может обладать научной новизной) строится, и метод (как правило, обладающий научной новизной) разрабатывается в последующем разделе диссертации.

После этого в интересах оценки степени достижения цели диссертационного исследования (за счёт новизны либо целевой

функции, либо метода) формулируется строгая постановка задачи предметного уровня. В строгой постановке могут быть добавлены элементы, связанные с выбранным или предлагаемым методом решения. Например, при рекуррентном методе: «Запишем решаемую задачу в строгой постановке: *Найти максимум функции $P = \dots$ (указывается выражение), описывающей устойчивость управления движением летательного аппарата, при заданных исходных данных о дестабилизирующих факторах $D1, D2$, ограничении на ресурсные затраты $R \leq R0$ и величине ϵ , определяющей требуемую точность вычислений*».

Сформулированные методические рекомендации распространяются на случаи формулирования не только общей задачи, но и общей проблемы исследования (разработки), а также на случаи формулирования получаемых в результате их декомпозиции предварительных и строгих постановок частных задач и проблем.

2.3. Типичные недостатки оформления цели и задачи диссертационного исследования

1. ***Цель диссертационного исследования является множественной*** – не обладает единством, сведена к частным целям и/или к частным задачам, ***подменена*** явно ***подчинённой целью***, либо ***сформулирована*** (в рамках допустимых вариантов) ***в виде, недостаточно конкретном***, не позволяющем количественно оценить ожидаемую или реальную степень её достижения в результате исследования; ***в диссертации, имеющей прикладное значение, сформулирована не как прагматическая.***

2. ***Цель в диссертации сформулирована с указанием пути её достижения или других требований, сковывающих рамки научного поиска***, либо ***в диссертации, имеющей прикладной характер, сформулирована как разработка рекомендаций по использованию научных выводов***, что, согласно п. 8 Положения о порядке присуждения учёных степеней, соответствует ***диссертации, имеющей теоретический характер.***

3. **Общая научная задача (проблема), решение которой содержится в диссертации** (имеющая юридический смысл при определении, в соответствии с какими именно требованиями п.8 Положения о порядке присуждения учёных степеней должна оцениваться диссертация), **не оформлена**: во введении **отсутствует краткая содержательная формулировка задачи** и/или в первом разделе диссертации **нет постановки задачи** в формализованном виде.

4. **Общая научная задача (проблема) диссертационного исследования сформулирована неудачно**:

- как чисто практическая (прагматическая);
- неконкретно: представлена лишь названием, не относящим её к научной (оценочной либо оптимизационной), не отражён показатель, подлежащий оценке или оптимизации, определяющий, что требуется, не указан или недостаточно охарактеризован состав исходных данных, отражающий, что дано;
- подменена формулировкой, адекватной цели диссертационного исследования, или изложением перечня названий частных научных задач диссертационного исследования.

3. ВИДЫ НАУЧНЫХ РЕЗУЛЬТАТОВ

3.1. Понятие "научный результат"

Научный результат в самом широком смысле – это выраженный в том или ином виде фрагмент системы знаний и/или эффект от применения знаний; в более узком смысле – результат исследования или разработки, полученный научными методами на основе применения того или иного научно-методического аппарата.

Среди всех научных результатов наряду с результатами, получаемыми в процессе конкретного исследования (разработки), выделяют исходные посылки.

Исходные посылки – это полученные ранее научные результаты, являющиеся, отправными, начальными, обеспечивающими полноту и всесторонность исследования (разработки).

Деление результатов исследований (разработок) на исходные посылки и получаемые результаты не является абсолютным в том смысле, что ранее полученные научные результаты исследований (разработок) могут служить исходными посылками для последующих исследований (разработок), а с другой стороны, вновь предлагаемые исходные посылки, ведущие к новому решению научной задачи, сами по себе могут явиться важным новым научным результатом.

Для соискателя исходными посылками для проведения диссертационного исследования являются ранее полученные научные результаты в рассматриваемой предметной области.

При оценке научных работ проявляется стремление к явному разделению научных результатов на **теоретические** и на **практические** по ряду признаков: *способ получения* (теоретический, экспериментальный), *форма представления* (идеальная – теоретические положения, материальная – реальный объект или процесс), *значимость* (теоретическая, практическая). Обычно, даже в случае чёткого указания конкретного признака выделения, сделать это затруднительно, так как между соответствующими результатами всегда существует весьма тесная диалектическая взаимосвязь. Эта взаимосвязь является настолько глубокой, что довольно часто даже вполне

теоретический результат называют практическим, например, когда говорят о теоретически полученных практических рекомендациях. Следовательно, реально речь может идти лишь об условном, более или менее строгом выделении явно теоретических и явно практических результатов.

Примеры крупных теоретических научных результатов – теория, методология, а также теоретические положения, совокупность которых можно квалифицировать как новое крупное достижение в развитии какого-либо научного направления. Примеры крупных практических научных результатов – политические, экономические и сложные технические системы, технологические процессы. Примеры менее крупных практических результатов – технические устройства и комплексы, научно обоснованные технические, экономические и технологические решения и разработки. Ещё более мелкие теоретические результаты и практические результаты-сведения находят выражение в виде *научных положений* той или иной теории, методологии, а также научного труда или публикации.

Среди научных положений можно выделить понятия, категории, термины, определения, гипотезы, принципы, правила¹⁷, математические предложения, допущения, ограничения и некоторые другие, в том числе теоретические и практические выводы и рекомендации.

Среди научных результатов исследований наряду с теоретическими и практическими можно более или менее чётко выделить ***результаты методического характера*** (методики, методы, экспериментальные установки, технологии и другие элементы, образующие научно-методический аппарат) и ***результаты фактографического характера*** (научные факты, научные эффекты, термины,

¹⁷ ***Правило*** - положение, в котором отражена закономерность, постоянное соотношение каких-либо явлений [5].

Математические предложения – это всякого рода расчётно-логические обоснования и доказательства (в простейшем виде – цепочка взаимосвязанных расчётных соотношений, а в наиболее развитом виде – та или иная совокупность взаимосвязанных аксиом, лемм, теорем и тому подобных строгих математических предложений).

Теорема – теоретическое утверждение, которое может быть логически доказано на основании аксиом или на основании ранее доказанных положений [3].

Лемма - вспомогательная теорема.

определения, не имеющие методической направленности научные выводы и научные рекомендации, разработанные для практики той или иной проблемной области технические устройства и др.).

Научные эффекты являются практическими научными результатами-событиями, получаемыми (обнаруживаемыми) в практике науки или в практике предметной области в виде явлений, предсказанных и/или объяснённых наукой. Научный эффект может быть обнаружен, зафиксирован с помощью тех или иных технических средств, описан.

В практике науки результаты-эффекты характерны для научных разработок, экспериментальных исследований, а также для процессов моделирования. Пример подобного эффекта – выявленное при статистическом моделировании увеличение эффекта при переходе от варианта А построения технического устройства к варианту Б.

В практике конкретной предметной области научные результаты-эффекты отражают то, опираясь на что можно получить отдачу от науки практике. Пример эффекта такого рода – повышение эффективности технической системы за счёт внедрения научно обоснованных рекомендаций.

При научных исследованиях и разработках результаты-эффекты, получаемые в ходе экспериментов, являются всегда промежуточными, предваряющими вытекающие из них (на основе анализа и обобщения) результаты-сведения (научные положения), которые сначала обычно выражаются в форме описанных фактов (научных фактов), потом (после теоретической проработки), как правило, в форме выводов и рекомендаций (предложений), реализация которых приводит к получению ожидаемых научных эффектов в практике рассматриваемой предметной области.

Основные требования, по которым оценивается любой научный результат, – *новизна, достоверность и значимость*.

Новизна состоит в отличиях полученного научного результата от известных (опубликованных).

Достоверность (правильность, справедливость) научного результата определяется как его соответствие объективной реальности – причинно-следственным связям, присущим соответствующей предметной области.

Значимость характеризует реальный и потенциальный эффект от реализации (внедрения, применения) научного результата в *теоретических и практических исследованиях и разработках*.

Достоверность результатов исследования зависит главным образом от точности представления данных и адекватности используемых методов и моделей.

Точность – характеристика данных, оцениваемая величиной погрешности.

Адекватность – соответствие анализируемых объектов с точки зрения определённых целей.

Достоверность научного результата вытекает из обоснованности.

Обоснованность научного результата – это наличие убедительного доказательства его достоверности.

Достоверность и обоснованность обеспечиваются:

– учётом представительного количества факторов, влияющих на решение научной задачи;

– использованием исходных данных, полученных из практики, а также на полунатурных моделях и апробированных математических (или физических) моделях;

– обоснованным выбором основных допущений и ограничений, принятых в качестве исходных при формулировании постановок научных задач;

– использованием современного, апробированного научно-методического (математического) аппарата, корректным выбором используемых общих и частных показателей и критериев, а также применяемых и разрабатываемых математических моделей;

– сочетанием теоретических исследований с большим объёмом экспериментальных исследований;

– результатами математического и/или физического моделирования, данными лабораторных экспериментов, натуральных (полунатурных) испытаний;

– высокой сходимостью теоретически (аналитически) полученных результатов и результатов моделирования с экспериментальными данными, а также с результатами натуральных испытаний и/или практического внедрения;

- согласованностью полученных результатов с известными (опубликованными) данными;
- получением из вновь разработанных общих научных положений (выводов, рекомендаций, моделей, зависимостей и т.п.) широко известных частных научных результатов;
- результатами опытно-конструкторских разработок, опытом практического внедрения предложений;
- результатами испытаний (войсковых, полигонных, государственных и др.) предлагаемых технических и организационных решений.

Естественно, что не всякий научный результат является новым научным результатом, а тем более вкладом в науку.

3.2. Новый научный результат

Новый научный результат – это результат, обладающий той или иной степенью научной новизны.

Научная новизна может быть **относительной**, когда научный результат является новым лишь для данного коллектива, для той или иной организации, для какого-либо ведомства и т.д., или **абсолютной**, когда научный результат получен (опубликован) впервые и обладает так называемой **мировой новизной**.

Требования к уровню новизны научных результатов проводимых исследований задаются заказчиками и нормативными документами. Так, например, для диссертаций предъявляются требования мировой новизны, определяемой на основе анализа всех доступных информационных источников.

Научный результат становится **известным** при его опубликовании (юридическую силу имеет лишь официальная, зарегистрированная публикация, а признание публикации, произведенной неофициально, считается делом этики), при этом у **автора нового научного результата** (лица, принимавшего творческое участие в получении результата) сохраняется приоритет: данный научный результат для него признается новым навсегда; он может представляться и защищаться автором как обладающий прежней степенью

новизны в любое последующее время после опубликования. Признаком, подтверждающим новизну, является отсутствие соответствующего научного результата в более ранних по времени публикациях других авторов.

К новым научным результатам диссертаций предъявляются требования мировой новизны: экспертиза новизны защищаемых научных результатов диссертационных исследований проводится по всем существующим официальным публикациям как отечественным, так и зарубежным. С этих позиций возможность обнаружить полученный самостоятельно соискателем и не опубликованный им результат в публикации какого-либо другого автора представляет для диссертанта затаённую опасность, так как в этом случае предполагаемая новизна результата автоматически перечеркивается. Поэтому вполне естественным и даже потребным, заслуживающим одобрения, является стремление соискателя найти и использовать первую же возможность срочно опубликовать (как иногда жаргонно выражаются, "застолбить") полученный научный результат, если он оценивается автором и научным руководителем как новый (здесь уместно напомнить девиз, которым руководствовался знаменитый английский физик Майкл Фарадей (1791-1867): "To work, to finish, to publish", что по смыслу соответствует "Работать, завершать, публиковать").

Для двух или более соавторов научный результат признается новым в том разделении авторских прав, которое указано в публикации. Если впервые выполненная несколькими соавторами публикация не содержит сведений о разделении авторских прав, то новый научный результат считается принадлежащим всем соавторам в одинаковой степени, и в этом случае можно говорить только о совместно полученном результате.

Новый научный результат может признаваться специалистами одинаково принадлежащим независимо работавшим авторам, если опубликован ими примерно в одно и то же время, а также если новый результат одного автора включает результат другого автора, являясь его обобщением или развитием (например, закон Бойля-Мариотта, формула Остроградского-Гаусса и т.д.).

Одним из основных способов получения новых научных результатов является научное обобщение.

Научное (в более узком смысле **теоретическое**) **обобщение** – это получение научных результатов, являющихся более общими по отношению к ранее известным. Теоретическое обобщение не сводится к обзору, к простому реферативному суммированию имеющихся знаний, а представляет собой выход на качественно новый уровень знаний, когда известные научные результаты и научные положения (например, ранее полученные модели, формульные соотношения, выводы и рекомендации) оказываются частными случаями вновь предлагаемых более общих.

Теоретические обобщения ведут к развитию существующих теорий: *"...На основе познания новых фактов в теории возникают новые обобщения, которые, накапливаясь, приводят к тому, что старая теория заменяется новой теорией. При этом новая теория сохраняет в себе всё положительное, которое имелось в старой теории"* [6, с.590].

Довольно распространённая ошибка, допускаемая при раскрытии новизны научных результатов в публикациях, заключается в том, что новизна характеризуется не тем, что именно её составляет, а тем, каким образом она проявляется, к чему приводит (например, когда утверждается, что *новизна методики заключается в том, что она позволяет ...*). При этом происходит подмена понятий: стремясь говорить о новизне, на самом деле речь ведут о значимости, что совсем не одно и то же.

Следует исходить из того, что новизна и значимость представляют собой вполне независимые характеристики любого научного результата. Каждая из таких характеристик подлежит самостоятельной оценке по совокупности специфических признаков и показателей. В частности, **научная новизна** характеризуется отличающимися от известных признаками и показателями, выражающими состав, взаимосвязи и свойства составных элементов рассматриваемого научного результата (соответствующими показателями, например при оценке новизны методики, являются состав и точность представления входных и выходных данных, перечень учитываемых факторов, последовательность и содержание основных этапов, процедур, эле-

ментарных операций). В отличие от этого *научная значимость* характеризуется признаками и показателями, выражающими область применимости научного результата, масштабы практической реализации, технико-экономический эффект и т.п. Вполне возможно совместное изложение новизны и значимости, но, естественно, без взаимной подмены понятий.

3.3. Вклад в науку

“Диссертация должна ... содержать новые научные результаты и положения, выдвигаемые для публичной защиты, и свидетельствовать о личном вкладе автора в науку” [9, п.8].

Чтобы тот или иной научный результат был признан вкладом в науку, он должен удовлетворять по крайней мере двум основным требованиям: *мировая новизна и достоверность*.

Под вкладом в науку может пониматься не только вклад в теорию, но и то, что можно было бы назвать вкладом в практику самой науки. Следует, однако, отметить, что понятие вклад в практику как самой науки, так и в более широком смысле в нормативных документах не употребляется и в дальнейшем использоваться не будет, чтобы не потворствовать читателям, склонным при оформлении диссертации к попыткам подмены вклада в науку на вклад в практику, сводящийся лишь к практической значимости.

Полученные в процессе диссертационного исследования научные результаты как элементы знаний, являющиеся вкладом в науку, могут обладать различной степенью научной значимости. Несмотря на то, что новые научные результаты фактографического характера представляют несомненный интерес, они по степени научной значимости не могут конкурировать с результатами научно-методического характера. Это объясняется тем, что метод в науке хотя и создается ради прагматических результатов, но сам по себе всегда играет решающую, принципиальную роль: образно говоря, метод – двигатель науки и практики. В этом отношении русский военный теоретик генерал от инфантерии Г.А. Леер (1829-1904) отмечал, что в

каждом деле важно знание, но метод выше самого знания. Он писал, что если бы ему предложили истину в правой руке, а путь к истине в левой, то он припал бы к левой руке [2].

К сожалению, чёткого критерия, позволяющего отличать новые научные результаты, являющиеся вкладом в науку, от результатов, которые хотелось бы назвать вкладом в практику, не существует.

К примеру, рассмотрим два обладающих новизной результата, полученных в диссертации, относящейся к области технических наук:

а) предлагаемый метод анализа эффективности технологии программирования;

б) результат оценки эффективности конкретной технологии программирования предлагаемым методом.

Обычно не вызывает сомнений, что результат (а) является вкладом в науку, а (б) характеризует отдачу практике, получаемую от реализации вклада в науку.

К сказанному следует добавить, что если новый научный результат имеет чисто теоретическое значение, т.е., например, представляет собой новый или усовершенствованный элемент научно-методического аппарата, то чтобы быть признанным вкладом в науку, он, по мнению ряда специалистов, должен удовлетворять требованию не только чисто научной, но и практической значимости. При этом они считают, что даже самый изящный научно-методический аппарат, который не обеспечивает (в том числе и в перспективе) отдачи практике, вкладом в науку признан быть не может. При таком требовании, вызывающем сомнение, игнорируется научная значимость и доминирует убеждённость, что любой научно-методический аппарат создается в основном ради потребностей практики и имеет прагматический смысл только в случае какой-либо практической отдачи.

Следует исходить из того, что использование известных методик исследования и вообще применение известного научно-методического аппарата таким же образом и для решения тех же конкретных научных и практических задач, как это изложено в

имеющихся публикациях – это работа, не приводящая к вкладу в науку (значимость для практики не исключена!), и для её осуществления не нужен труд исследователя. Такая работа по сложности в лучшем случае соответствует уровню дипломной работы выпускника высшего учебного заведения и может быть выполнена обыкновенным специалистом с соответствующим высшим образованием.

При математическом описании исследуемых объектов новый научный результат на уровне вклада в прикладную науку, а иногда и в общую математику, может быть получен за счёт следующих основных вариантов комбинирования известных и новых или усовершенствованных элементов научно-методического аппарата (с получением ранее не известной по официальным публикациям комбинации элементов, приводящей к положительному эффекту):

1) решение прикладной научной задачи в известной постановке с помощью известных математических методов, ранее не применявшихся (судя по публикациям) для решения данной задачи, – это самый низший уровень научного творчества, соответствующий вкладу в предметную прикладную науку в виде наращивания её научно-методического аппарата;

2) решение прикладной научной задачи в известной постановке с помощью усовершенствованных (в интересах получения положительного эффекта) или вновь предлагаемых математических методов (необходимость усовершенствования возникает в связи с невозможностью или недостатками решения задачи неусовершенствованными методами) – это соответствует вкладу в прикладную науку в области прикладной математики, который иногда может расцениваться как вклад и в общую математику;

3) решение прикладной научной задачи в усовершенствованной (в интересах достижения положительного эффекта) постановке или (что соответствует более существенному вкладу в прикладную науку) в новой постановке с помощью известных математических методов, что соответствует вкладу в предметную прикладную науку в области развития её научно-методического аппарата;

4) решение прикладной научной задачи в усовершенствованной или в новой постановке с помощью усовершенствованных математических методов, что соответствует вкладу как в предметную

прикладную науку в области развития её научно-методического аппарата, так и в прикладную математику данной предметной науки (возможно, в какой-то степени и в общую математику);

5) решение прикладной научной задачи в новой постановке с помощью вновь предлагаемых математических методов, что соответствует высшей степени вклада в прикладную науку (а возможно, и в общую математику).

В качестве новых научных результатов, являющихся вкладом в прикладную науку, могут рассматриваться не только новые и усовершенствованные постановки задач, методы их решения и методики исследования (а также элементы методики и другие элементы научно-методического аппарата, обладающие новизной), но и обладающие новизной положения, характеризующие новые результаты решения задач (имеются в виду новые принципы, выводы, рекомендации, научные эффекты). При формулировании принципа как нового научного результата, следует непременно привести наряду с названием чёткую краткую формулировку принципа с пояснением.

Для научных результатов, являющихся вкладом в науку, характерна довольно высокая степень обобщения (собирательности), а иногда и абстрактности (отвлечённости). Чем для большего количества разнообразных объектов годится тот или иной новый вывод, тем он ценней для науки.

И наоборот: чем конкретней постановка научной задачи (если обратиться к военному примеру: рассматривается не просто войсковое объединение, а объединение первого эшелона, да ещё на приморском направлении, да ещё с конкретным составом сил и средств и т.д.), тем в большей степени вклад в науку разменивается на вклад в практику, а работа исследователя (разработчика) всё в большей степени удаляется от работы учёного и приближается к работе обычных работников административных и хозяйственных органов (или, соответственно, должностных лиц органов управления войсками).

Некоторые специалисты склонны считать, что для получения научных результатов на уровне вклада в науку, в частности в диссертациях, совершенно не обязательно разрабатывать методы и методики, обладающие мировой новизной. Они полагают, что новые для

науки выводы и рекомендации можно получить и с помощью лишь известных методов и методик.

Чтобы понять несостоятельность подобных утверждений, рассмотрим те или иные выводы и рекомендации, в отношении которых автор заявляет, что они, с одной стороны, получены с помощью известных методов и методик, а с другой стороны, являются новыми для науки. Зададим автору вопрос: "Не представляют ли соответствующие выводы и рекомендации научные результаты, полученные таким же образом, как это описано в известных публикациях (каких-либо других авторов), но лишь для новых значений исходных данных?" Если ответ на этот вопрос оказывается положительным, то следует ли сомневаться в том, что мы имеем случай тривиальных, "очевидных" для науки результатов, которые могут представлять большой интерес для практики, являться новыми для какого-то колллектива, но вкладом в науку признаны быть не могут.

При отрицательном ответе на поставленный вопрос, когда автор справедливо отстаивает ту точку зрения, что он пришёл всё-таки к новым для науки выводам и рекомендациям, обычно удается убедить его в том, что свои результаты он получил несколько не так, как это описано у других авторов (например, при иной постановке задачи), а в интересах этого использованные известные методы и методики были либо применены в конкретно рассматриваемой предметной области впервые, либо дополнены некоторыми новыми элементами. Именно за счёт этого в любой диссертации методика исследования (разработки) в целом всегда оказывается более или менее новой в части тех или иных элементов, и такое положение ("*что ни диссертация, то новая методика*") является вполне естественным и никого не должно удивлять. Отсюда напрашивается общий вывод: новые научные результаты на уровне вклада в науку могут быть получены только и лишь только за счёт внесения элементов мировой новизны в методику (метод) исследования (разработки).

При изложении результатов, являющихся вкладом в науку, типичны слова и выражения:

– *теория, методология, теоретические (методические, методологические) основы (положения);*

– научный (научно-методический, методический, математический) аппарат (процедура, метод, методика) обоснования (анализа, оценки, формализации, синтеза, построения, оптимизации, прогнозирования);

– теоретическое (теоретико-экспериментальное, математическое, количественное) обоснование (доказательство);

– закономерность, принцип, правило, гипотеза, постановка задачи;

– формализованное (математическое) описание, математическая модель;

– математические предложения (соотношения), аксиома, теорема, лемма, формула (формульное соотношение), математическая зависимость;

– научно обоснованный вывод (рекомендация, предложение), эффект.

Для увеличения количества доводимой информации о полученном новом научном результате целесообразно, наряду с его наименованием, приводить слова, уточняющие степень вклада автора (авторов) в получение соответствующего результата.

Степень вклада обычно характеризуется прилагательными, отражающими степень новизны (*новый, впервые предлагаемый, оригинальный*), причастиями совершенного или несовершенного вида (*разработанный, предложенный*), а также отличительными признаками предлагаемого в сравнении с известным. Примеры (допускающие для научных результатов с другим наименованием выбор отдельных уточняющих слов или их комбинирование):

– *разработанная (разрабатываемая, совершенствуемая, усовершенствованная) автором математическая модель...*;

– *новая (оригинальная) методика...*;

– *впервые сформулированные (обоснованные, обосновываемые, предлагаемые, предложенные, доказанные, доказываемые, выдвигаемые) теоретические положения...*;

– *выявленные (установленные, описанные) в данном научном труде способы...*

Особо следует отметить, что изобретения, обладая мировой новизной, представляют собой лишь предлагаемое техническое ре-

шение, обладающее практической значимостью. В то же время теоретическое обоснование изобретений, а также технико-экономическая оценка их эффективности и применимости, выполняемые впервые, являются несомненным вкладом в науку.

3.4. Новые научные результаты, выдвигаемые для защиты

Согласно п. 8 Положения о порядке присуждения [9], *"Диссертация должна ... содержать **новые научные результаты и положения, выдвигаемые для публичной защиты**, и свидетельствовать о личном вкладе автора в науку"*, а в соответствии с [9, п.28], в заключении по диссертации, принимаемом диссертационным советом при положительном результате голосования по присуждению учёной степени, наряду с другими сведениями, *"... отражаются **наиболее существенные научные результаты, полученные лично соискателем"***.

Практически бесспорно признаётся, что **основные** новые научные результаты диссертации должны быть в предельно кратком виде в целесообразном объёме охарактеризованы в её научно-популярных частях – выводах по разделам, введении и в заключении. Также признаётся, что вполне естественно требовать, чтобы в диссертации, являющейся согласно [9, п.8] *"научно-квалификационной работой"*, **наиболее существенные** новые научные положения и другие новые научные результаты, выдвигаемые для защиты, вследствие того, что они имеют **юридический смысл**, были компактно и чётко, в виде конкретных пунктов сформулированы во введении.

Любое научное исследование приводит к иерархии научных результатов. Самые нижние ярусы такой иерархии представляют научные результаты, являющиеся исходными для исследования в целом. Промежуточные ярусы иерархии – это промежуточные научные результаты, являющиеся, с одной стороны, конечными для тех или иных частных научных результатов подчинённых уровней иерархии, а с другой стороны, исходными для некоторых или всех научных результатов более высокого иерархического уровня. Самый верхний

уровень иерархии – это научные результаты исследования в целом, представляющие собой решение общей научной задачи или проблемы.

В выводах по разделам диссертации и в формулировках наиболее существенных научных результатов, выдвигаемых для защиты, каждый частный научный результат и общий научный результат диссертации в целом может быть охарактеризован, помимо содержания, как минимум, относительно четырёх основных свойств – актуальность, новизна, достоверность, значимость.

Любое из таких свойств может быть в той или иной мере важным (значимым) и в разной степени неочевидным (требующим научного обоснования и доказательства той или иной сложности). При оформлении выводов по разделам диссертации из множества возможных выводов, характеризующих содержание обладающих новизной научных результатов и их основные свойства, выбираются наиболее важные и неочевидные.

Выводы по разделам диссертации играют роль **основных научных положений**, выдвигаемых для защиты, в отличие от выдвигаемых для защиты **наиболее существенных положений** и **наиболее существенных новых научных результатов**, которые формулируются во введении.

Целесообразность формулирования научных положений и других новых научных результатов, выдвигаемых для защиты, обусловлена их особой **защитной ролью**. Для большинства узких специалистов по проблематике диссертации с вершины их владения материалами, относящимися к предмету диссертационного исследования, положения, выдвигаемые для защиты, обычно выглядят само собой разумеющимися, претенциозными, а иногда даже раздражающими. Между тем эти положения пишутся не для них, а адресованы главным образом тем лицам, участвующим в экспертизе диссертации, которые не являются узкими специалистами, а иногда и вообще оказываются не специалистами по профилю конкретной диссертации.

Тем не менее такие специалисты в составе диссертационных и экспертных советов, представляя другие специальности, практически всегда составляют большинство, определяющее исход голосования, обеспечивая своим участием более объективную и всесторон-

ную оценку диссертации. Формулировки, выражающие в чётком научно-популярном изложении наиболее существенные новые научные результаты диссертации, позволяют этим специалистам осознать существо диссертационного исследования и выработать свое личное суждение о степени вклада соискателя в науку. Истинность этого суждения гарантируется тем, что правильность формулировок новых научных результатов, выдвигаемых для защиты, оказывается тщательно проверенной узкими специалистами — как минимум, официальными оппонентами.

Наиболее существенные научные положения, выдвигаемые для защиты, целесообразно формулировать как новые научные результаты-идеи концептуального уровня в предельно кратких содержательных формулировках, подобных теоремам, доказательствам которых содержится в основных разделах диссертации.

Наиболее часто научные положения формулируются в виде, соответствующем трём основным вариантам изложения (здесь и далее в кавычках приводятся примеры):

1) утверждение в отношении исследуемого объекта о наличии (отсутствии или степени проявления) тех или иных свойств: *“Существует ранее не учитывавшаяся возможность радиолокационного обнаружения объектов за горизонтом за счет сигналов, многократно отраженных от ионосферы и земной поверхности”*;

2) утверждение о достижимости тех или иных свойств (научного эффекта) тем или иным образом, допускающим различные реализации: *“Существенное снижение энергозатрат для достижения требуемого эффекта (примерно на порядок) достижимо на основе управляемого аномального СВЧ-нагрева пристеночной плазмы спецобъекта”*;

3) утверждение о реализуемости тех или иных свойств (эффекта) на основе указываемых конкретных базовых, а при наличии аналога (похожего или близкого по смыслу известного научного результата), и отличительных признаков новизны: *“Управляемый аномальный нагрев пристеночной плазмы спецобъекта осуществим воздействием излучения ... диапазона с переменной амплитудой, пропорциональной росту электронной температуры плазмы, в режиме*

модулирования последовательности импульсов с учётом времени процессов релаксации”.

Недостаточная конкретность того или иного научного положения (неполная ясность того, как использовать или реализовать идею) может быть восполнена конкретизирующим дополняющим научным положением (в роли такового для примера, поясняющего второй вариант изложения научных положений, выдвигаемых для защиты, может служить пример, поясняющий третий вариант изложения).

Кроме того, наиболее существенное научное положение может быть конкретизировано отдельным формулированием наиболее существенного нового научного результата, выдвигаемого для защиты.

Рекомендуется сначала изложить пункты наиболее существенных научных положений, выдвигаемых для защиты, а затем пункты выдвигаемых для защиты других наиболее существенных новых научных результатов (по 3 – 5 пунктов).

Первое научное положение часто посвящается актуальности темы диссертации (либо общей научной задачи или проблемы, решение которой содержится в диссертации) в следующем возможном варианте изложения:

“Известный ... (научный результат) не обеспечивает... (требуемое свойство), в связи с чем тема диссертации, посвящённая ... (получению научного результата, не обладающего таким недостатком, либо обладающего более совершенным свойством), является актуальной”.

Последующие научные положения рекомендуется формулировать в вариантах 2 и 3 изложения.

Наиболее существенные научные положения, выдвигаемые для защиты, выглядят более убедительными, если среди них присутствует положение, в котором достигаемое (достижимое) свойство (эффект) характеризуется количественным показателем. Например, в научном положении, приводимом последним, может быть указано значение количественного показателя, подтверждающего степень достижения цели диссертационного исследования.

Выдвигаемые для защиты наиболее существенные новые научные результаты (не являющиеся научными положениями) представляют собой результаты-объекты научного твор-

чества, такие как метод, методика, модель, формульное соотношение и другие результаты обычно научно-методического характера.

Наиболее существенные новые научные результаты целесообразнее всего излагать в виде формулы творческого вклада, содержащей (подобно формуле изобретения) для каждого такого результата, наряду с названием, **отличительные признаки научной новизны**, преднамеренно выделенные словами "отличающийся (от известного)".

При необходимости и/или целесообразности, результат может быть охарактеризован понятием, конкретизирующим заслуживающий внимания *частный случай полной научной новизны* (в терминах "**впервые предлагаемый** (рассмотренный, обоснованный и т.п.)", "**не имеющий аналогов**", "**ранее не применявшийся**", "**оригинальный**" и т.п.), либо *частный случай явно подчёркиваемой частичной научной новизны* (в понятиях "**усовершенствованный**", "**модифицированный**" и др.).

Лучше всего, если эти результаты формулируются в таком виде, в каком соискатель и его научный руководитель хотели бы их видеть в заключении по диссертации, принимаемом диссертационным советом при положительном результате голосования по присуждению учёной степени [9, п.28], в котором наряду с другими сведениями "*... отражаются наиболее существенные научные результаты, полученные лично соискателем, оценка их ... новизны...*".

Пример сформулированных наиболее существенных новых научных результатов, выдвигаемых для защиты (кандидатская диссертация):

"Наиболее существенные положения, выдвигаемые для защиты:

- 1. Оптимизация последовательности обучающих воздействий автоматизированной обучающей системы (АОС) для конкретного оператора может проводиться на основе построения процесса учебной деятельности с учётом данных интеллектуальной и психофизиологической диагностики и результатов психологического тестирования с определением значений показателей, характеризующих скрытые и скрываемые свойства личности.*

2. В основу адаптации АОС к индивидуальным свойствам операторов может быть положено описание структуры индивидуальности операторов, выявляемой с помощью психодиагностического анализа.

3. Адаптация АОС к особенностям операторов с учетом принципов интеллектуальной скрытности осуществима на основе описания процесса учебной деятельности в терминах аппарата нечётких множеств и математической лингвистики.

4. В условиях нечётко выраженных факторов (индивидуальные характеристики операторов, качество усвоенных знаний, содержание учебного материала, цель обучения) значительное уменьшение размерности пространства поиска при планировании обучающих воздействий достижимо на основе применения человеко-машинных процедур принятия решения по выбору последовательности обучающих воздействий.

5. Существенное, примерно на 60%, уменьшение времени проведения периодического компьютеризированного психодиагностического тестирования при достаточной доле его информативности реализуемо на основе использования метода корреляционного анализа.

Наиболее существенные новые научные результаты, выдвигаемые для защиты:

1. Модель подготовки операторов с использованием диалоговых автоматизированных систем, отличающаяся учётом структуры индивидуальности обучаемых.

2. Модель коррекции процесса подготовки с описанием управляющих воздействий в виде карт Вейтча–Карно, основанная, в отличие от известных, на нечетком представлении субъективной составляющей коррекции обучения.

3. Усовершенствованная методика оценки деятельности обучаемых, отличающаяся введением дополнительных численных показателей, характеризующих скрытые и скрываемые свойства личности.

4. Методика автоматизированной адаптации средств АОС к психофизиологическим и интеллектуальным особенностям операторов, предусматривающая выбор последовательности целей обучения в соответствии с квалификационными характеристиками, отличаю-

щаяся дополнительным включением этапа планирования обучающих воздействий по результатам последовательного анализа нечётких состояний обучаемых в пространстве индивидуальных свойств и знаний.

5. Впервые предложенная методика выбора информативных тестов для идентификации индивидуальных особенностей обучаемых, отличающаяся использованием процедуры корреляционного анализа”.

В составе наиболее существенных новых научных результатов, выдвигаемых для защиты, может быть указан принцип, например, *“принцип контурной адаптации апертуры непараметрических фильтров изображений, отличающийся от известного принципа адаптации по локальным выборочным статистикам тем, что форма апертуры определяется расстояниями до ближайших контурных признаков, оцененных в соответствии с векторным методом адаптации градиентных масок”.*

В таком случае принцип должен быть изложен в тексте одного из основных разделов диссертации, при этом указывается название принципа, его чёткая формулировка, а при целесообразности и некоторые пояснения.

Искусство формулирования положений и других наиболее существенных новых научных результатов, выдвигаемых для защиты, основывается на умении распознавать и устранять недостатки.

Наиболее часто встречающийся недостаток – формулирование положений, выдвигаемых для защиты (а также выводов по разделам диссертации), в виде утверждения типа “А позволяет (либо обеспечивает и т.п.) В” без указания собственно научного решения – за счёт чего именно допускается и обеспечивается то, о чём идёт речь¹⁸. Пример: *“Система ранжированных видовых и параметрических критериев обеспечивает для техногенной системы различение*

¹⁸ В качестве примечания следует отметить, что указываемый недостаток обычно не распространяется на противоположное (негативное) утверждение типа “А не обеспечивает (либо не позволяет, делает невозможным и т.п.) В”. Обоснованные негативные утверждения потенциально оказываются существенно более информативными, чем позитивные утверждения, не исключаящие элементы рекламы, и обычно являются довольно убедительной мотивацией актуальности дальнейших исследований.

степени, глубины и близости безопасности, а для техногенного объекта – собственной безопасности, а также оптимизирует по времени процесс нахождения показателей опасности системы (объекта)“.

Аналогичным недостатком формулирования выдвигаемых для защиты научных результатов, не относящихся к научным положениям, является их изложение в виде “А (метод, модель и т.п.), позволяющий (обеспечивающий и т.п.) В (эффект)“.

Неудачность подобной формулировки начинает осознаваться автором, как только ему сказано: “А обеспечивает В, а при чём тут Вы?”.

После этого автор обычно легко соглашается с тем, что использованная формулировка неудачна тем, что ставит его в пассивное положение – как бы всё определяется предметом рассмотрения, и ничего не зависит от самого исследователя.

Теперь автора нетрудно подвести к мысли о том, что в такой формулировке его личная научная позиция оказывается невыраженной, и что в положениях, выдвигаемых для защиты, наиболее убедительными, действительно выражающими позицию диссертанта как ученого, а поэтому предпочтительными, оказываются констатации, подчёркивающие активную роль исследователя, например, при выборе или оценке метода как средства достижения ожидаемого эффекта подходят формулировки типа “В может (либо не может) быть обеспечено (осуществлено, достигнуто, реализовано) методом А” или “В обеспечивается (осуществимо, достижимо, допустимо, реализуемо, не обеспечивается, неосуществимо, не достижимо, не допустимо) методом А”.

Чтобы исключить недостатки, о которых идёт речь, рекомендуется утверждения об эффектах (выражаемых совами “обеспечивает”, “позволяет” и т.п.) изъять из формулировок научных результатов, являющихся элементами научно-методического аппарата, и попытаться перенести их смысл в формулируемые научные положения, а соответствующие откорректированные формулировки научных результатов крайне целесообразно дополнить (в случае отсутствия) конкретными признаками новизны характеризуемых результатов (обычно указываемых после слова “отличающийся”).

Не следует выдвигать для защиты положения и другие результаты, претендующие на практическую значимость: согласно п. 8 действующего Положения [9], *“Диссертация должна ... свидетельствовать о личном вкладе автора в науку”*. Понятие вклада в практику в нормативных документах по вопросам присуждения учёных степеней вообще не применяется, однако на различных этапах экспертизы диссертации оценивается практическая значимость новых научных результатов (например, в заключении организации, где выполнялась диссертация), их значение для теории и практики (в частности, в заключении по диссертации, принимаемом диссертационным советом при положительном результате голосования по присуждению ученой степени).

Другими словами, разработанные инженерные и другие научно-технические решения (устройства, алгоритмы, практические рекомендации и др.) должны в диссертации отражаться непременно, но не как защищаемые результаты, а как практическая значимость или значение для практики полученных новых научных результатов. Следует иметь в виду, что, например, если в алгоритме поменять местами слагаемые, это уже другой алгоритм, в то время как при перемене мест слагаемых метод остаётся тем же самым. Подчеркнуть факт практической разработки алгоритма можно, если выдвинуть для защиты алгоритмически реализуемый метод, а не алгоритм, реализующий метод.

Подобно тому, как в формуле изобретения пишут не *“устройства, отличающиеся”*, а *“устройство, отличающееся”*, при формулировании наиболее существенных научных результатов, не являющихся научными положениями, следует, например, описывать не *“методы, отличающиеся”*, а *“метод, отличающийся”*, имея в виду, что такой метод подразумевает все (без исключения) методы, обладающие указанными отличительными признаками.

Следует стремиться к тому, чтобы наиболее существенные научные положения и другие новые научные результаты взаимно дополняли друг друга, поясняя сущность и результаты конкретного диссертационного исследования.

По своему смыслу новые научные положения и другие новые научные результаты (не являющиеся научными положениями) взаим-

но разменны. Например, научному положению “Оценка осуществима” соответствует научный результат “Доказательство (обоснование) того, что оценка осуществима”, а научному результату “Метод, отличающийся” – научное положение “Нечто осуществимо (достижимо, реализуемо) методом, отличающимся” (надо лишь указать нечто). Именно это обстоятельство обеспечивает возможность изложения в выводах по разделам не только новых научных положений, но и новых научных результатов.

Ориентируясь на п. 9 Положения [9], лучше всего исходить из следующих понятий.

Диссертация – это совокупность “новых научных результатов и положений, выдвигаемых автором для публичной защиты”.

Выводы по разделам диссертации – это основные положения, выдвигаемые автором для публичной защиты (выражающие наиболее важные научные результаты диссертации в виде компактно сформулированных утверждений).

Наиболее существенные научные положения и другие наиболее существенные новые научные результаты, помещаемые во введении к диссертации – это компактные формулировки, интегрирующие самые важные выводы по разделам диссертации.

В заключение рассмотрим часто возникающий вопрос, связанный с научной новизной математического метода, выдаваемой за новизну алгоритма. Такой вопрос особенно часто возникает при формулировании наиболее существенных научных результатов, выдвигаемых для защиты как в кандидатских, так и в докторских диссертациях по техническим наукам.

Практика защиты диссертаций свидетельствует о том, что соискатели учёных степеней, их научные руководители и консультанты, а также эксперты, оценивающие диссертации, в том числе члены диссертационных советов и даже члены экспертных советов ВАК не имеют чёткого и единого мнения о понятиях и различиях математических методов и реализующих их алгоритмов.

К сожалению, в существующей справочной литературе и в электронных публикациях Интернета приводятся формулировки, относящиеся лишь к наиболее общему понятию метода, например, согласно Большой Советской Энциклопедии, **метод** – совокупность

приёмов или операций практического или теоретического освоения действительности, подчинённых решению конкретной задачи. Такое понятие не позволяет осознать, что из себя представляет **математический метод**.

В то же время можно найти много публикаций, посвящённых довольно чёткому определению алгоритма, например:

1. Алгоритм (алгорифм) [algorithm] – точное предписание относительно последовательности действий (шагов), преобразующих исходные данные в искомый результат.

2. В информатике: алгоритм – это определенная последовательность логических действий для решения поставленной задачи.

3. В словаре Ефремовой: алгоритм – определенная последовательность операций или вычислений (в математике).

4. В современном толковом словаре изд. «Большая Советская Энциклопедия»: алгоритм (алгорифм) (от algorithmi, algorismus, первоначально – лат. транслитерация имени математика аль-Хорезми) – способ (программа) решения вычислительных и др. задач, точно предписывающий, как и в какой последовательности получить результат, однозначно определяемый исходными данными. Алгоритм – одно из основных понятий математики и кибернетики.

5. В вычислительной технике: алгоритм – совокупность точных предписаний, задающих конечную последовательность действий, которые надо выполнить при варьируемых исходных данных для получения требуемого результата.

В целом опубликованные сведения не обеспечивают понимания специалистами, какую роль играют математические методы и алгоритмы в выполнении диссертационных исследований и при защите получаемых новых научных результатов.

На основе обобщения сведений, содержащихся в имеющихся публикациях, и опыта разработки и экспертизы диссертаций можно предложить следующие формулировки:

Метод (математический) – выполняемая в той или иной допустимой последовательности совокупность математических операций, процедур (вычислений) и расчётных соотношений, обеспечивающая получение требуемого результата, определяемого исходными данными.

Алгоритм – конечная последовательность предписаний, четко и однозначно определяющая во всех деталях процесс получения за конечное число шагов результата, однозначно определяемого исходными данными.

Слишком часто в научных публикациях алгоритмом называют математический метод, описанный с использованием формульных соотношений, а иногда и отдельно записанную формулу. Нет сомнений, что математический метод и формула могут быть представлены в виде алгоритма, но это лишь в случае, когда приведена соответствующая последовательность предписаний четко и однозначно определяющая во всех деталях процесс получения результата за конечное число шагов, при этом не подразумевается, что предписания не могут заменяться на эквивалентные (например, замена предписания “вычислить $y=a+b$ ” на предписание “вычислить $y=b+a$ ” приводит к другому алгоритму).

Алгоритм (за чрезвычайно редким возможным исключением) не следует считать новым научным результатом диссертации ввиду того, что он практически всегда представляет конкретное инженерно-техническое решение в области предельно формализованного описания того или иного математического метода, например, для программной реализации, при этом для одного и того же математического метода может быть предложено некоторое множество алгоритмов.

Если считается целесообразным в диссертации подчеркнуть то, что полученный новый научный результат в виде математического метода доведен до конкретного инженерно-технического решения в виде алгоритма, что весьма положительно и свидетельствует о практической значимости научного результата, то следует выдвигать для защиты **алгоритмически реализованный метод**, а лучше (с точки зрения подчёркивания личного вклада автора в науку) **алгоритмически реализуемый метод**.

Если же (что теоретически возможно) выдвигается для защиты в виде научного результата алгоритм, реализующий математический метод, то отличительные признаки научной новизны должны указываться по отношению к другому алгоритму, реализующему этот же метод, и важно, чтобы указанные в определении

алгоритма отличительные признаки не подменялись отличительными признаками научной новизны алгоритмически реализованного метода.

В заключение следует отметить, что сказанное относится не только к диссертации.

Рекомендации по оформлению выводов по разделам диссертации в виде основных положений, выдвигаемых для защиты, относятся к выводам, формулируемым при оформлении научных статей, которые, если говорить словами Положения о порядке присуждения учёных степеней, *“должны быть опубликованы в научных изданиях”* (к которым приравниваются *“депонированные в организациях государственной системы научно-технической информации рукописи работ, аннотированные в научных журналах, работы, опубликованные в материалах всесоюзных, всероссийских и международных конференций и симпозиумов, публикации в электронных научных изданиях”* [9, п.9]), а также в монографиях, при этом в текстовой части таких публикаций следует широко использовать рекомендации к оформлению новых научных результатов, выдвигаемых для защиты в виде формулы творческого вклада, содержащей отличительные признаки научной новизны.

3.5. Типичные недостатки оформления новых научных результатов

1. Во введении диссертации и автореферата ***не приведены*** имеющие юридический смысл¹⁹ ***наиболее существенные положения, выдвигаемые для защиты, и/или наиболее существенные новые научные результаты, выдвигаемые для защиты***, изложение новых научных результатов подменено перечислением лишь названий, не отражающих конкретные признаки научной новизны.

¹⁹ Согласно требованию п.8 Положения о присуждении *“Диссертация должна ... содержать совокупность новых научных результатов и положений, выдвигаемых автором для публичной защиты...”*.

2. **Подмена** наиболее существенного **положения, выдвигаемого для защиты** во введении, **а также вывода по разделу** диссертации **общеизвестным** или очевидным **утверждением** или лишь **упоминанием названия** полученного научного **результата** без раскрытия сущности (фразы типа "нечто сделано, получено, приведено...") либо рекламированием полученного результата ("предлагаемое автором позволяет..., отличающееся тем, что обеспечивает"... и т.п.) **с подменой признаков новизны характеристикой значимости**²⁰.

3. **Отсутствие** в формулировке выдвигаемого для защиты наиболее существенного нового научного результата **основных отличительных признаков научной новизны**, преднамеренно выделяемых словами типа "отличающийся (от известного)", а также **конкретизации** заслуживающего внимания **частного случая полной новизны** в терминах "впервые предлагаемый (рассмотренный, обоснованный и т.д.)", "не имеющий аналога", "ранее не применявшийся" и т.п., либо **частного случая явно подчёркиваемой частичной новизны** в понятиях "усовершенствованный", "модифицированный", "оригинальный" и др.

²⁰ Рекомендуется все фразы типа "М позволяет (обеспечивает, позволяющий, обеспечивающий) Э" заменить на формулировки, подчёркивающие в "теоремном" стиле не свойства М, а научную позицию автора: "Э **достижимо** (осуществимо, реализуемо, может быть достигнуто и т.д.) с применением (на основе, с использованием и т.п.) М" либо "С применением М **достижимо** Э".

4. ПУБЛИКАЦИЯ НАУЧНЫХ РЕЗУЛЬТАТОВ ИССЛЕДОВАНИЙ

Слово "**публикация**" (от латинского *publicani* [3]) применяется, по крайней мере, в двух смыслах – как процесс и как объект. В одном смысле публикация – это доведение до всеобщего сведения (синоним – опубликование), которое может осуществляться посредством печати, радиовещания, телевидения и других средств в том числе электронной информации. В другом случае публикация – это документ, например в виде текста, представленного в каком-либо издании. В каком именно смысле используется конкретное слово "публикация" обычно ясно из контекста.

Признаком научной публикации является возможность для заинтересованных специалистов ознакомиться с публикуемыми научными результатами, при этом, естественно, только фактом публикации не гарантировано внедрение (реализация) соответствующих научных результатов (опубликованные результаты могут оказаться никем не использованными).

4.1. Виды и формы публикаций

К основным **видам научных публикаций** можно отнести учебные, научно-популярные, профессиональные и квалификационные.

Особый вид публикаций представляют собой нормативные и организационно-распорядительные (административные, научно-технические и др.) документы, получающие регистрационные реквизиты, свидетельствующие об официальном статусе соответствующих документов.

Наиболее широкое распространение в настоящее время получили публикации в виде изданий.

Издание – это документ для распространения содержащейся в нём информации, прошедший редакционно-издательскую обработку, полученный печатанием или теснением, полиграфически самостоятельно оформленный, имеющий выходные сведения (это и при-

водимые ниже определения основных видов изданий заимствованы из ГОСТа [10]).

Среди изданий по целевому назначению соответственно основным видам публикаций выделяют научные издания, научно-популярные, учебные, справочные и некоторые другие, например, литературно-художественные, массово-политические, рекламные и т.д.

Научное издание – издание, содержащее результаты теоретических и/или экспериментальных исследований.

Решением ВАК в качестве научных изданий, в которых могут публиковаться основные научные результаты диссертаций, признаются также *электронные научные издания*, зарегистрированные в депозитарии НТЦ "Информрегистр". Примером электронного научного издания является электронный многопредметный научный журнал "Исследовано в России" (адрес электронной почты – zhurnal@zhurnal.apc.relarn.ru, номер государственного учета 0329900013).

Научно-популярное издание – издание, содержащее сведения о теоретических и (или) экспериментальных исследованиях в области науки, культуры и техники, изложенные в форме, доступной читателю-неспециалисту.

Учебное издание – издание, содержащее систематизированные сведения научного или прикладного характера, изложенные в форме, удобной для изучения и преподавания.

Справочное издание – издание, содержащее краткие сведения научного или прикладного характера, расположенные в порядке, удобном для их быстрого отыскания, не предназначенное для сплошного чтения.

4.1.1. Учебные публикации

Основными **формами учебных публикаций** являются учебник и учебное пособие.

Учебник – учебное издание, содержащее систематическое изложение учебной дисциплины (её раздела, части), соответствующее

щее учебной программе и официально утверждённое в качестве данного вида издания.

К написанию учебников, которые широко используются не только во всех учебных заведениях, но также и для самообразования, привлекаются наиболее квалифицированные педагоги.

Учебники, как правило, издаются типографским способом после рецензирования рукописи в организациях, внешних по отношению к учебному заведению, в котором работают авторы (автор).

Учебными пособиями в широком смысле называют печатные, графические, изобразительные и другие материалы (книги, таблицы, карты, картины, макеты, модели, диапозитивы, кинофильмы и т.д.), предназначенные для целей обучения.

В узком смысле **учебное пособие** – учебное издание, дополняющее или частично (полностью) заменяющее учебник, официально утверждённое в качестве данного вида издания. К изданным учебным пособиям предъявляются менее жесткие требования, чем к учебникам, они рецензируются и используются обычно только в стенах учебного заведения, где работают авторы (автор). Практически частым случаем является предварительное издание учебных пособий вместо учебника по новым, ещё не установившимся учебным дисциплинам.

4.1.2. Научно-популярные публикации

К основным **формам научно-популярных публикаций** относятся научно-популярные книжные издания (книги, брошюры), в том числе справочные издания (справочники, энциклопедии), а также журнальные и газетные издания [10].

Книжное издание – издание в виде блока скрепленных в корешке листов печатного материала любого формата в обложке или переплете.

Книга – книжное издание объёмом свыше 48 страниц.

Брошюра – книжное издание объёмом свыше 4, но не более 48 страниц.

Справочник – справочное издание, носящее прикладной, практический характер, имеющее систематическую структуру или построенное по алфавиту заглавий статей.

Энциклопедия – справочное издание, содержащее в обобщённом виде основные сведения по одной или всем отраслям знаний и практической деятельности, изложенные в виде кратких статей, расположенных в алфавитном или систематическом порядке.

Журнальное издание – издание в виде блока скрепленных в корешке листов печатного материала установленного (нормативными документами) формата, издательски приспособленное к специфике данного периодического издания, в обложке или переплете.

Газетное издание – издание в виде одного или нескольких листов печатного материала установленного формата без скрепления, издательски приспособленное к специфике данного периодического издания.

4.1.3. Профессиональные публикации

Публикации, названные профессиональными, можно условно разделить на научно-исследовательские и творческие.

Научно-исследовательские публикации

Основными **формами научно-исследовательских публикаций** являются: отчёт о научно-исследовательской работе (НИР), препринт, научная статья, монография, депонированная рукопись, реферат, тезисы научного доклада.

Отчёт о НИР – научно-технический документ, который содержит систематизированные данные о научно-исследовательской работе, описывающий процесс или результаты научно-технического исследования [11]. Отчёт о НИР представляет собой рукописный труд, оформляемый и размножаемый (обычно с помощью пишущей машинки или персональной ЭВМ) в ограниченном количестве экземпляров (как правило, от трёх до пяти). Исполнителями отчёта являются специалисты, принимающие творческое участие в исследовании (например, тот, кто выполняет лишь машинописные работы, не отно-

сится к исполнителям НИР, хотя его труд также должен оплачиваться).

Объём отчёта может составлять от нескольких листов, оформляемых в виде брошюры, до нескольких сотен листов, оформляемых в виде одной или нескольких книг.

Препринт – научное издание, содержащее материалы предварительного характера, опубликованные до выхода в свет издания, в котором они могут быть помещены.

Статья представляет собой сведения объёмом, как правило, в несколько машинописных страниц, опубликованные в научном или научно-популярном журнале, в сборнике научных трудов, в энциклопедическом издании (энциклопедия, энциклопедический словарь) или в газете.

Научная статья содержит изложение результатов теоретических и/или экспериментальных исследований или сведения о них. Типовая структура научной статьи:

- наименование;
- сведения об авторе (авторах) – инициалы и фамилия автора обычно с указанием учёной степени и учёного звания, а в некоторых случаях и населённого пункта проживания автора;
- введение – обоснование актуальности, сопоставление с исследованиями других авторов;
- разделы – изложение основного содержания публикации;
- заключение – краткое изложение выводов, в том числе новых возможностей, полученных в результате проведенных исследований;
- библиография.

Согласно ГОСТу [10]:

Журнал – периодическое журнальное издание, содержащее статьи или рефераты по различным общественно-политическим, научным, производственным и др. вопросам, литературно-художественные произведения, имеющее постоянную рубрику, официальное утверждённое в качестве данного вида издания.

Научный журнал – журнал, содержащий статьи и материалы о теоретических исследованиях, а также статьи и материалы прикладного характера, предназначенный научным работникам.

Сборник – издание, содержащее ряд произведений.

Сборник научных трудов – сборник, содержащий исследовательские материалы научных учреждений, учёных заведений или обществ.

Энциклопедический словарь – энциклопедия, материал в которой расположен в алфавитном порядке.

Газета – периодическое газетное издание, выходящее через краткие промежутки времени, содержащее официальные материалы, оперативную информацию и статьи по актуальным общественно-политическим, научным, производственным и другим вопросам, а также литературные произведения и рекламу.

Монография – научное или научно-популярное книжное издание, содержащее полное и всестороннее исследование одной проблемы или темы и принадлежащее одному или нескольким авторам [10].

Депонированная рукопись (депонировать – передавать на хранение [3]) – это оформленная в соответствии с установленными требованиями рукописная работа, переданная на хранение во Всероссийский институт научно-технической информации (ВИНИТИ) или в Центральный справочно-информационный фонд (ЦСИФ) Министерства обороны. Информация о депонированных рукописях даётся в специальных каталогах ВИНИТИ и ЦСИФ МО и в текущих указателях центральных отраслевых органов научно-технической информации. По заявкам заинтересованных организаций и специалистов осуществляется изготовление и рассылка аналитических материалов и копий хранимых рукописных работ.

Определения реферата и аннотации с разъяснениями, требования к составлению и построению рефератов и аннотаций на все виды документов, включая произведения художественной литературы, содержатся в ГОСТ 7.9-95 [12].

Реферат – сокращённое изложение содержания первичного документа (или его части) с основными фактическими сведениями и выводами.

Реферат дает возможность установить основное содержание первичного документа, акцентирует внимание на новых сведениях и определяет целесообразность обращения к документу. Рефераты по-

мещают в первичных документах (книги, журналы, сборники научных трудов, отчёты и т.д.) и во вторичных документах (реферативные журналы и сборники, информационные карты, массивы на магнитных лентах и др.). Реферат **составляется по** следующему **плану**:

- тема, предмет (объект), характер и цель работы (о которой идет речь в первичном документе);

- метод проведения работы;

- конкретные результаты работы;

- выводы (оценки и предложения), принятые и отвергнутые гипотезы, описанные в первичном документе;

- область применения (особенно важно указывать в рефератах на патентные документы).

Если в документе отсутствует какая-либо часть (методы, выводы, область применения), то её в реферате опускают, сохраняя последовательность изложения.

Аннотация – краткая характеристика произведений печати (их совокупности или частей) с точки зрения содержания, назначения, формы и других особенностей. Аннотация носит пояснительный или рекомендательный характер.

Аннотации на произведения печати по естественным, техническим и общественным наукам включают характеристику типа произведения, основной темы, проблемы, объекта, цели работы и её результаты. В аннотации указывается, что нового несёт в себе данное произведение печати в сравнении с другими, родственными ему по тематике и целевому назначению (при переиздании – что отличает данное издание от предыдущего). При необходимости приводятся сведения об авторе.

Тезисы докладов (сообщений) научной конференции (съезда, симпозиума) – научный непериодический сборник, содержащий опубликованные до начала конференции материалы предварительного характера (аннотации, рефераты докладов и/или сообщений).

Творческие публикации

К творческим отнесём публикации с целью доведения до всеобщего сведения объектов технического творчества, являющихся

объектами промышленной собственности: открытие, изобретение, рационализаторское предложение, полезная модель, промышленный образец.

Открытие – установление неизвестной ранее объективно существующей закономерности материального мира.

Изобретение – техническое решение в любой области, относящееся к продукту или способу [13], обладающее новизной и полезностью.

Рационализаторское предложение (рацпредложение) – техническое решение, являющееся новым и полезным для предприятия (организации учреждения), где оно подано.

К **полезным моделям** относится конструктивное выполнение средств производства и предметов потребления, а также их составных частей.

К **промышленным образцам** относится художественно-конструкторское решение изделия, определяющее его внешний вид.

Требуемая новизна для открытия, изобретения, полезной модели и промышленного образца – мировая, а для рацпредложения – местная на уровне предприятия, учреждения.

Авторские права на объекты технического творчества охраняются в соответствии с законодательством.

Законы об охране авторских прав на изобретения имеются практически во всех государствах, а законы об охране авторских прав на полезные модели и промышленные образцы – во многих странах.

Законами предусматривается, что объекты технического творчества являются объектами промышленной собственности и их использование в течение срока, установленного законом, иными лицами возможно только по соглашению с авторами, при этом предусматривается авторское вознаграждение, облагаемое государственными пошлинами.

Авторское право на объект технического творчества возникает в связи с подачей заявки, содержащей описание предложения по установленной форме.

Заявка на изобретения, полезные модели и на промышленные образцы направляется в органы государственной экспертизы, а

на рацпредложение – подается в комиссию, образуемую на предприятии. По изобретению, полезной модели и промышленному образцу после проведения государственной экспертизы, а по рацпредложению – после экспертизы на предприятии автору или авторам выдается официальный документ, подтверждающий решение компетентных органов о признании авторских прав на соответствующее предложение.

Таковыми документами являются:

- для открытия – диплом, содержащий формулу открытия;
- для изобретения – патент с описанием и формулой изобретения;
- для полезной модели – свидетельство с описанием и формулой полезной модели;
- для промышленного образца – патент с описанием, включающим перечень существенных признаков;
- для рационализаторского предложения – удостоверение с его названием.

Описания объектов технического творчества публикуются в специальной литературе (реферативные журналы, сборники и другие информационные издания), распространяемой через технические библиотеки, в том числе и по линии международного сотрудничества.

Срок охраны авторских прав ограничивается законодательно и различен в разных странах.

В Российской Федерации авторские права, подтверждаемые патентом, охраняются в определяемые законом сроки: по изобретениям – 20 лет с даты поступления заявки, по полезным моделям – 5 лет с возможностью продления не более чем на 3 года, по промышленным образцам – 10 лет с возможностью продления до 5 лет. В эти сроки использование объекта промышленной собственности без ведома автора (авторов) карается по закону возмещением убытков в пользу автора, присуждаемым судом.

К творческим публикациям следует также отнести программы для электронных вычислительных машин (ЭВМ) и базы данных.

Программа для ЭВМ – это объективная форма представления совокупности данных и команд, предназначенных для функ-

ционирования ЭВМ и других компьютерных устройств с целью получения определённого результата.

База данных – это объективная форма представления и организации совокупности данных, систематизированных таким образом, чтобы эти данные могли быть найдены и обработаны с помощью ЭВМ.

Опубликование (выпуск в свет) программы для ЭВМ или **базы данных** – это предоставление экземпляров программы или базы данных с согласия автора неопределённому кругу лиц.

Согласно действующему законодательству, программам для ЭВМ предоставляется правовая охрана как произведениям литературы, а базам данных – как сборникам. Регистрация программы для ЭВМ или базы данных осуществляется путём подачи правообладателем заявки в Федеральный орган исполнительной власти по интеллектуальной собственности.

4.1.4. Квалификационные публикации

К основным **формам квалификационных публикаций** можно отнести оформленные для защиты курсовые и дипломные работы (с их разновидностями – курсовые и дипломные задачи и проекты), диссертации на соискание учёной степени кандидата и доктора наук, а также авторефераты диссертаций.

Любая квалификационная публикация является самостоятельной (в смысле личного выполнения и оформления) научной работой автора, представляемой к защите на заседании специалистов (в форме комиссии или совета), принимающих решение об уровне квалификации автора.

Курсовая работа выполняется в учебных заведениях после прохождения наиболее важных предметов с целью контроля глубины и прочности приобретенных обучаемым знаний, способностей и навыков его самостоятельной работы по профилю предмета.

Дипломная работа выполняется в учебных заведениях как выпускная, по результатам защиты которой Государственная экзаменационная комиссия решает вопрос о присвоении обучаемому соответствующей квалификации.

Попутно отметим два обстоятельства.

1. По техническим дисциплинам выполняются курсовые и дипломные проекты (это действительно технические проекты тех или иных устройств, изделий и т.п.), а по другим предметам, не связанным с техническим проектированием, – курсовые и дипломные работы или задачи.

2. Курсовые и дипломные работы, проекты, задачи выполняются с целью проверки знаний и навыков применения известного научно-методического аппарата, изученного обучаемыми или опубликованного в литературе. Поэтому к оформленным работам этого вида не предъявляются требования получения результатов на уровне вклада в науку (хотя творческий подход на уровне попыток вклада в науку поощряется).

Диссертация, в отличие от этого, "*должна ... содержать новые научные результаты и положения, выдвигаемые для публичной защиты, и свидетельствовать о личном вкладе автора в науку*" [9, п. 8].

Диссертация представляется к защите соискателем учёной степени в виде специально подготовленной рукописи, а соискатель учёной степени доктора наук может представлять диссертацию также в виде научного доклада или опубликованной монографии [9, п. 8].

Основные научные результаты диссертации должны быть опубликованы в научных изданиях и приравненных к ним документах [9, п. 10], при этом результаты диссертации на соискание ученой степени кандидата наук должны быть опубликованы хотя бы в одном рецензируемом журнале или издании.

Автореферат представляет собой научное издание в виде брошюры, содержащее составленный автором реферат его диссертации, представляемой на соискание учёной степени [10].

4.2. Авторское право

Следует отметить особо, что научная публикация является не просто способом доведения информации. В большинстве случаев научная публикация выступает в качестве общепринятого средства провозглашения авторских прав на те или иные научные результаты, юридическим основанием для признания приоритета на конкретные результаты теоретических и (или) экспериментальных исследований.

Публикуемые новые мысли, научные идеи являются выражением интеллектуального потенциала отдельных лиц и организаций и поэтому, как и вещи, всегда кому-то принадлежат. Это наше духовное богатство, может быть, более ценное, чем материальное, и по-человечески несправедливо забывать, кто явился его создателем. Именно по этой причине использование в научных работах результатов, полученных другими лицами, регламентируется вполне определёнными юридическими и этическими нормами. В частности, п. 11 действующего Положения [9] гласит: *"При написании диссертации соискатель обязан ссылаться на автора и (или) источник заимствования материалов или отдельных результатов. При использовании в диссертации идей или разработок, принадлежащих соавторам, коллективно с которыми были написаны научные работы, соискатель обязан отметить это обстоятельство в диссертации. Указанные ссылки должны делаться также в отношении научных работ соискателя, выполненных им как единолично, так и в соавторстве. В случае использования заимствованного материала без ссылки на автора и (или) источник заимствования диссертация снимается с рассмотрения диссертационным советом без права повторной защиты указанной диссертации"*.

Законодательно закреплено, что в научном труде может быть сделана ссылка на чужую мысль в виде изложения её в форме высказывания или в виде дословной цитаты, взятой в кавычки, с обязательным указанием фамилии автора и цитируемого источника. Заимствование из чужого произведения текста или идей без указания фамилии истинного автора и источника заимствования называют **плагиатом** (от латинского слова *plagiō* – похищаю). В действующих законодательных актах термин "плагиат" не употребляется, а соответствующие незаконные действия называются **нарушением авторских прав**.

Нарушение авторских прав может проявляться в различных формах.

Часто недобросовестные авторы включают в свою работу содержание чужого произведения с незначительными переделками без соблюдения правила ссылки. В некоторых случаях ссылка имеется,

но она не дает правильного представления о масштабах и характере заимствования, а это также признается недопустимым [14].

У некоторых авторов проявляется стремление оформить свою работу с минимальным количеством ссылок на использованные научные результаты и публикации других авторов, при этом что-то по умолчанию подразумевается как чужой результат, о чем-то, опубликованном другими, очень важным и имеющем прямое отношение к публикуемому материалу, просто не упоминается. Это, как наивно полагают некоторые, якобы усиливает впечатление о наличии в данной работе личного вклада автора в науку, но сами не осознают, что действуют далеко не лучшим для себя образом и, как правило, больше теряют в глазах окружающих, чем находят. Ведь приобретение некоторого ложного авторитета за счёт преднамеренного или невольного присвоения чужих научных трудов не идёт ни в какое сравнение даже с незначительной утратой реального авторитета хотя бы даже у части специалистов и коллег, обнаруживших, что какая-то часть работы присвоена. Кроме того, и сама диссертация теряет как в обосновании актуальности проводимого диссертационного исследования, так и в чёткости выделения личного вклада автора в науку.

Порядочному научному работнику присуще здоровое чувство опасения, что в его работе какая-либо идея может быть сформулирована таким образом, что она окажется полностью или даже частично присвоенной (то есть изложенной ранее кем-то другим, и это можно было и следовало бы знать). Очень этично ссылаться в научных трудах не только на публикации, но и на устные высказывания (может быть, даже в личной беседе), хотя формально можно упрекнуть, а в некоторых случаях и привлечь к ответственности за присвоение лишь официально опубликованных чужих материалов.

В гражданском законодательстве предусмотрены способы восстановления права автора. Например, после опубликования произведения (в том числе и диссертации) с неправомочным заимствованием суд или иной компетентный орган может обязать виновного дать публикацию в печати о допущенном нарушении авторских прав. Что касается присвоения идей, высказанных устно, – это дело этики.

Типична ситуация, когда человек самостоятельно пришёл к отличной идее, но даже найдя эту идею в более ранних публикаци-

ях другого автора, продолжает верить в то, что она принадлежит лично ему. "Не существует открытия, – писал французский математик Лежанр, – которое нельзя было бы приписать себе, сказав, что те же вещи были найдены на несколько лет раньше; но если не дать тому доказательства, состоящего в указании места, где они опубликованы, это утверждение становится беспредметным и представляет собой только обиду для истинного автора открытия". Отказаться от авторства на идею порой очень трудно: она настолько великолепна, и пришёл к ней сам, без какой-либо посторонней помощи... Тем не менее надо найти в себе мужество открыто признать, что это кем-то уже предложено, при этом обычно могут (и при наличии должны) быть выделены элементы новизны, являющиеся истинной заслугой соискателя.

Следует отдельно остановиться на совместном опубликовании результатов научных работ. Здесь можно увидеть две крайности.

Одна крайность характерна для человека, имеющего достаточно высокие творческие способности, позволяющие ему выступать среди окружающих в роли **генератора научных идей**. Такого человека увлекает сам процесс творения, поиска, разработки научных решений и, как правило, не заботит вопрос об оформлении авторства на то, что им предлагается. Он чрезвычайно любит процесс коллективного творчества, очень уважительно относится к чужим идеям, всегда выделит то, что в каждом конкретном случае предложено им, а что другими. К такому человеку тянутся люди, и результатом совместной деятельности обычно оказывается множество научных публикаций.

Другая крайность наблюдается у человека, не обладающего возможностями пользоваться результатами собственного научного творчества (в силу причин, которые могут лежать в широком диапазоне от **а** – дефицит времени до **я** – отсутствие творческих способностей) и выступающего в связи с этим при условиях, требующих проявления личной активности, в позитивной роли **аккумулятора и реализатора чужих научных идей**. Тем не менее разного рода обстоятельства (престижные соображения, "необходимость" защиты диссертации, а иногда и просто принцип "на всякий случай") побуждают таких людей публиковаться. Общим для этих двух крайних слу-

чаев оказывается то, что как генератор, так и аккумулятор идей становятся соавторами достаточно большого количества публикаций, в которых не содержится сведений о разделении авторских прав на опубликованные материалы, и в то же время почти или вообще не имеют единолично оформленных работ. На этой почве в тех случаях (когда вопрос о личном вкладе в науку встаёт принципиально, например, при защите диссертаций в виде научного доклада) часто возникают неприятности. Для их разрешения назначаются комиссии, устанавливающие степень творческого участия тех или иных лиц в публикациях, делается задним числом оформление авторства на ту или иную часть ранее опубликованных материалов, но всё это уже выглядит несолидно. И особенно досадно становится, когда в такой ситуации оказывается истинный генератор идей. Избежать эти неприятности можно: надо лишь проявлять постоянную принципиальность и честность в совместных публикациях – чётко указывать, какая их часть (или какие идеи) кому именно из соавторов принадлежат. Кроме того, следует хотя бы иногда публиковать единоличные обобщающие работы, помня о том, что наличие публикаций без соавторов является формальным признаком самостоятельности в научной работе, что также учитывается при квалификационной оценке диссертаций.

Крайне целесообразно в аннотациях отчётов о научно-исследовательских работах отмечать, кем конкретно из исполнителей и что выполнено на уровне вклада в науку (для потенциальных соискателей учёных степеней это характеризует наличие или отсутствие заделов будущих диссертаций) и практику, а также особо подчёркивать случаи использования новых научных результатов, ранее полученных коллегами по работе как из одного коллектива, так и из одной организации. Это обеспечивает гласность в науке, создаёт в коллективе, занимающемся научной деятельностью, атмосферу истинной добропорядочности, научной добросовестности и душевного комфорта.

5. ПРАКТИЧЕСКОЕ ИСПОЛЬЗОВАНИЕ РЕЗУЛЬТАТОВ ИССЛЕДОВАНИЙ

5.1. Виды исследований

Следует отличать обычное исследование от диссертационного.

Обычное исследование – это любое исследование на теоретическом и/или на эмпирическом уровне, выполняемое с использованием известного либо с помощью вновь предлагаемого (усовершенствованного) научно-методического аппарата, т.е. на уровне вклада в науку или без него.

Диссертационное исследование – это исследование, выполняемое в порядке подготовки диссертации как (научно-квалификационной) работы, проводимое на достаточно высоком теоретическом уровне, содержащее вклад в науку – новое (или обладающее новизной) решение актуальной научной задачи или решение научной проблемы.

Следует не сомневаться на тот счёт, что если при подготовке обычных отчётов о научно-исследовательских работах подходит обычное исследование, то от соискателя учёной степени требуется исследование на уровне диссертации. Работа над диссертацией чем-то напоминает труд по созданию поэтического произведения, о котором В.В. Маяковский (1893-1930) писал:

"Поэзия – та же добыча радия.

В грамм добыча, в год труды.

*Изводишь единого слова ради
тысячи тонн словесной руды".*

Вообще говоря, любой опубликованный научный результат (будь то научная статья, отчёт о НИР или диссертация) представляет собой литературное произведение, хотя, разумеется, в специфической области с широким использованием специфических терминов и понятий.

В самом деле, между опубликованным научным результатом и литературным произведением может быть проведен ряд параллелей.

Во-первых, публикация научного результата строится по законам литературного жанра – включает наименование, аннотацию, введение, основные разделы, заключение, а при наличии и приложения. Такая рубрикация весьма характерна для любого полновесного литературного произведения.

Во-вторых, разработка и оформление научного труда, как и любого литературного произведения, – это искусство: зададим одну и ту же тему и идеи, поясняющие замысел, талантливому литератору и ординарному литератору. В результате соответствующей работы авторов получим два различных произведения. В одном из них будут как проявление таланта блистать идеи, а во втором – лишь тускло отражаться, хотя вроде бы речь идёт об одном и том же. То же самое получится, если дать одну и ту же тему и идеи, поясняющие замысел, умелому научному работнику и неумелому. Получится два научных труда, отличающихся стилем, содержанием и даже научным уровнем.

Вместе с тем, диссертационное исследование подчиняется специфическим требованиям. Если воспользоваться аналогией, то с точки зрения подготовки диссертации: исследование – это добыча руды, ценный компонент которой – результаты исследования на уровне диссертации, а всё остальное представляет собой сопутствующие компоненты (так называемую пустую породу, которая может быть и весьма важной, но для других целей).

К такого рода сопутствующим компонентам относятся результаты исследования, полученные с использованием известных методов и методик решения научных и практических задач (в постановках, описанных в литературе), или, например, рекомендации для практической деятельности, выработанные на чисто эмпирическом уровне, без количественного обоснования.

К сожалению, соискатели учёных степеней довольно часто пытаются отождествлять исследование на уровне диссертации с исследованием вообще в смысле, эквивалентном подмене ценного компонента на пустую породу. С позиций вышеизложенного умение оформить диссертацию заключается в том, чтобы чётко и рельефно выразить, в чём заключается личный вклад автора в науку, и при этом убедительно показать, что уровень такого вклада отвечает тре-

бованиям, предъявляемым к научно-квалификационной работе на соискание соответствующей учёной степени.

5.2. Разновидности актов о практическом использовании результатов исследования

Общеизвестно, что наука развивается ради практики. Другими словами, научные результаты исследования, в том числе диссертационного, получаются в интересах практического использования. Именно поэтому в п. 8 действующего Положения о присуждении учёных степеней сказано: *“В диссертации, имеющей прикладной характер, должны приводиться сведения о практическом использовании полученных автором научных результатов, а в диссертации, имеющей теоретический характер, – рекомендации по использованию научных выводов”* [9].

Следует обратить внимание на то, что практическое использование научного результата исследования обычно называют по-разному – либо реализацией научного результата, либо внедрением.

При дальнейшем изложении будет говориться только о реализации, при этом слова “реализация” и “внедрение” будут считаться взаимозаменяемыми синонимами.

Факты реализации научных результатов исследования (с целью придания официального статуса) принято подтверждать дополнительными документами, называемыми актами о реализации (о внедрении).

Акт – это служебный документ, подтверждающий установленные факты и события, составляемый комиссией в составе нескольких лиц и подлежащий утверждению должностным лицом, обладающим соответствующими полномочиями.

Акт о реализации результатов исследования – официальный документ, имеющий юридическую силу, свидетельствующий о практическом применении результата исследования в той или иной предметной области.

Юридическую силу актам придаёт их утверждение лицами не ниже заместителя руководителя организации (предприятия), завере-

ние печатью, а также приведение в актах сведений о реквизитах документов, использованных при составлении.

В акте о реализации результатов исследования документируется наличие факта (фактов) практического применения результата (результатов) исследования заинтересованным лицом или организацией. Это разновидность актов о реализации, оформляемых обычно в рамках договорных отношений, предусматривающих оплату или вознаграждение со стороны заинтересованного лица или организации, часто выступающего в роли заказчика.

В практике оформления актов о реализации результатов исследований крайне целесообразно выделить в отдельную разновидность акты о реализации научных результатов диссертационных исследований.

Акт о реализации научных результатов диссертационного исследования – акт, в котором документируются *“сведения о практическом использовании полученных автором научных результатов”* [9, п.8].

Это вторая разновидность актов, не пересекающаяся с разновидностью актов о реализации результатов исследования, не являющегося диссертационным. К этой разновидности актов предъявляются дополнительные требования (об этом речь пойдёт далее). Такие акты должны составляться с учётом их использования при экспертизе диссертации в части определения практической значимости полученных автором новых научных результатов, при этом крайне целесообразно указывать отличительные признаки научной новизны, свидетельствующие *“о личном вкладе автора в науку”* [9, п.8].

Возможны два вида реализации научных результатов исследования (в том числе диссертационного) в той или иной организации или на предприятии:

- реализация в том или ином объекте или процессе;
- реализация в документе.

При этом формы реализации могут быть различными.

В случае реализации в том или ином объекте или процессе перечисление конкретных форм реализации научных результатов исследований для профессионального специалиста не представляет

трудностей – это конкретное техническое устройство, вполне определённый производственный процесс и т.д.

Формами реализации в виде документов могут служить например, техническое задание, руководящие документы для производственной, хозяйственной и других видов деятельности и т.д.).

К сожалению, нормативно **установленных требований ни к форме акта** о реализации научных результатов исследования, **ни к его содержанию**, а также регламентированных перечней форм реализации **не существует**.

В существующих документах по вопросам подготовки научно-педагогических и научных кадров слова “реализация”, “внедрение”, “акт о реализации” отсутствуют.

Представляет интерес Положение о научной работе в Вооруженных Силах Российской Федерации, введенное приказом Министра обороны РФ от 23 марта 2000 года № 140 (п.56):

“Результаты исследований считаются реализованными, если они использованы в постановлениях Правительства Российской Федерации, уставных документах, в документах Генерального штаба Вооруженных Сил, главных штабов видов Вооруженных Сил, штабов Тыла Вооруженных Сил и родов войск, главных и центральных управлений Министерства обороны, штабов объединений, соединений, воинских частей и организаций Вооруженных Сил; в утвержденных Государственной программе вооружения и государственном оборонном заказе, тактико-технических требованиях и заданиях на НИР, создание новых и модернизацию существующих систем и образцов ВВТ и критериях их оценки; в теоретических трудах, учебниках, учебных пособиях, справочниках, инструкциях, методиках и других документах.

Реализация каждой НИР должна быть документально оформлена генеральным заказчиком (заказчиком) научно-технической продукции в виде акта по форме № 14 в соответствии с приложением № 14 к настоящему Положению.”

Однако, несмотря на то, что это Положение объявлено действующим, целесообразно руководствоваться рекомендацией:

“Результаты исследований считаются реализованными, если они использованы в ... документах”, перечень которых может быть записан в следующем более подробном виде:

– перспективные планы фундаментальных и поисковых исследований;

– основные направления, программы и перспективные планы развития науки и техники;

– технические (специально-технические) задания на проведение научно-исследовательских и опытно-конструкторских работ;

– технические (специально-технические) требования и задания на создание новых и модернизацию существующих образцов техники (оборудования), сооружений и объектов;

– руководящие документы для производственной, хозяйственной, научно-технической, опытно-конструкторской, финансовой и других видов деятельности, в том числе в области обороны государства и образования;

– постановления, уставы, положения, наставления, руководства, инструкции, правила, указания, планы, методики, рекомендации и другие официально введенные документы, регламентирующие вопросы создания (строительства), испытания, эксплуатации, хранения (сбережения) техники (оборудования), сооружений и объектов²¹;

²¹ **Постановление** – правовой акт, принимаемый коллегиальными органами.

Положение – правовой акт, устанавливающий основные правила организации и деятельности учреждения или органа управления.

Наставление, руководство, инструкция, правила регламентируют организационные, научно-технические, хозяйственные, финансовые и иные специальные стороны деятельности учреждений и должностных лиц.

Положения, наставления, руководства, инструкции и правила обычно вводятся в действие приказами соответствующих должностных лиц.

Приказ – правовой акт, представляющий собой основной распорядительный документ управленческой деятельности, издаваемый руководителями учреждений (предприятий, организаций), содержащий нормы, обязательные для исполнения подчинёнными. Приказы издаются во исполнение законодательных актов, решений органов государственной власти и управления, постановлений коллегиальных органов на основании (во исполнение) приказов вышестоящих должностных лиц, а также в инициативном порядке.

План – перечень намечаемых к выполнению работ или мероприятий, их последовательность с указанием сроков исполнения и исполнителей.

– требования к стандартам и стандарты (на материалы, изделия и т.п.);

– принятые к внедрению дипломы на открытия, патенты на изобретения и промышленные образцы, свидетельства на полезные модели;

– документация для изготовления и эксплуатации приборов и аппаратуры;

– программы, учебные и тематические планы для вузов.

Реализация результата исследований представляет собой документально подтверждаемое применение результата в каком-либо виде деятельности организации (являющейся юридическим лицом).

Те или иные лица, выполняющие непосредственную работу по организации и претворению в жизнь результата исследования (например, работа, приводящая к практическому применению предложенного кем-либо метода при построении конкретного устройства), выступают в роли **реализаторов** научного результата. Автор или авторы реализуемого результата исследования могут входить в состав реализаторов полученного результата, а могут и не входить.

Следует чётко отличать реализацию результатов исследований от их публикации.

Использование результатов исследований, полученных автором, теми или иными лицами в их собственных публикациях (например, цитирование со ссылкой) не является реализацией ни для автора, ни для лиц, осуществивших публикации.

Для исполнителя отчёта о НИР:

– собственный научный результат в отчёте о НИР с указанием авторства исполнителя – это только лишь *публикация*, которая превращается в реализацию, если от заказчика получен акт о реализации НИР как научно-технической продукции;

– ссылки исполнителя в тексте отчёта и в списке литературы на ранее выполненные им научные труды – это дополнительные сведения о публикации.

В отличие от этого для лица, не являющегося исполнителем отчёта о НИР, материалы которого, опубликованные им ранее, использованы в данном отчёте (о чём, например, свидетельствует ссылка), – это реализация (в документе).

Диплом на открытие, патент на изобретение или на промышленный образец, а также свидетельство на полезную модель признаются для авторов одновременно и формами *реализации* в случае документального подтверждения (составлением акта) практического использования в конструкторских или иных разработках какого-либо предприятия (свидетельством чего может служить отметка о выплате соответствующего авторского вознаграждения).

Алгоритмы и программы, принятые установленным порядком в государственный фонд алгоритмов и программ, республиканские, ведомственные фонды, а также в частные фонды (библиотеки) алгоритмов и программ организаций (предприятий, учреждений, учебных заведений и т.п.) для их авторов представляют собой формы *публикации* научных результатов, как и ссылка в описаниях алгоритмов и программ на других авторов представляет для последних форму *публикации* их результатов другими лицами.

Учебник (учебное пособие) для авторов является формой *публикации*, а не формой реализации результатов исследований. Использование (со ссылками в списке литературы) ранее опубликованных научных трудов для авторов (а также для лиц, не являющихся авторами) не признаётся *реализацией*. Формами *реализации* научных результатов, изложенных в учебнике (учебном пособии), для их авторов являются программы, учебные и тематические планы дисциплин, преподаваемых в учебных заведениях, методические разработки для проведения занятий с обучаемыми и другие методические документы, используемые в учебно-воспитательном процессе при условии фактического использования (подтверждаемого наличием соответствующих ссылок в текстах документов и включения в список использованной литературы, указанный в этих документах).

5.3. Рекомендации по оформлению актов о реализации

Случаи неправильного оформления актов о реализации научных результатов встречаются довольно часто. Весьма характерный пример:

УТВЕРЖДАЮ
Руководитель предприятия ...

" ___ " _____

А К Т
о реализации на предприятии ...
результатов диссертации представителя (организации) ... Иванова В.А.
на тему "..."

Комиссия в составе ... установила, что результаты диссертационной работы Иванова В.А. реализованы в практике конструирования специзделия "...".

Методики, предложенные в диссертации Иванова В.А., использовались как на этапе определения и уточнения требований к специзделию "...", так и на этапе выбора технических решений.

(подписи председателя и членов комиссии)

По форме – это акт об индивидуальной реализации во внешней организации (на предприятии) научных результатов, полученных Ивановым с указанием их отношения к диссертационной работе (с приведением наименования темы работы), подтверждающий факт реализации без указания реализаторов научных результатов.

Рассмотренная форма акта имеет некоторые существенные недостатки:

– она не подходит для специалистов-новаторов, не работающих над диссертацией, в частности, для уже защитивших диссертации, но продолжающих работать на уровне личного вклада в

науку и отдачи практике, а также для реализаторов научных результатов, работающих на уровне внедрения в практику новых идей, предложенных другими авторами (а это тоже целесообразно официально фиксировать с целью обоснованного морального и материального стимулирования активной научно-практической деятельности специалистов);

– при таком оформлении акта совершенно неясно, на практическое внедрение каких именно результатов может претендовать соискатель и какова именно форма их реализации;

– в акте не охарактеризован получаемый за счёт реализации конкретный положительный эффект (рекомендуется подтверждать количественными показателями, включаемыми в акт);

– довольно часто проявляющимся неудобством подобных актов является явное упоминание темы диссертации, которая в некоторых случаях может частично, а иногда и полностью изменяться, и тогда возникает необходимость переоформления акта.

Следует также отметить, что по своей форме акт, о котором идёт речь, можно признать вполне соответствующим требованиям, предъявляемым к акту **о реализации результатов исследования**: документируются сведения о наличии факта практического применения полученного автором результата.

В то же время именно так оформленный документ совершенно не соответствует требованиям, которые должны быть предъявлены к акту **о реализации научных результатов диссертационного исследования**.

С учётом важности акта о реализации научных результатов диссертационного исследования для оценки диссертации при её экспертизе в качестве убедительных свидетельств должны указываться вполне конкретные научные результаты, обладающие новизной на уровне вклада соискателя в науку, с ссылками на документ, выступающий в роли публикации, а для подтверждения их практической значимости – форма (формы) реализации с документальным подтверждением, а также достигаемый положительный эффект.

Правильно оформленный документ в содержательной части мог бы иметь примерно такой вид:

А К Т

о реализации на предприятии ... результатов научной работы представителя (организации) ... Иванова В.А.

Комиссия в составе ... установила, что на предприятии ... при конструировании специзделия "..." ("Техническое описание изделия "...". реализована разработанная Ивановым В.А. "Методика оценки производительности ..." (вх. предприятия ... № ... от 6.11.1985 г.), отличающаяся ... (признаки научной новизны).

Применение методики на этапе выбора технических решений позволило сократить трудозатраты на выполнение соответствующей части работ со 120 до 80 человеко-дней.

(подписи председателя и членов комиссии)

В акте конкретно указана степень вклада Иванова В.А. в науку и его практическая значимость, а с помощью ссылок на публикации чётко констатируется, какие именно научные результаты реализованы, и в какой степени принадлежит Иванову авторское право на них. Кроме того, что очень важно, здесь полученный в результате внедрения технико-экономический эффект охарактеризован вполне конкретно. Акт с подобным названием годится и для лиц, не работающих над диссертациями. При целесообразности в название акта (при таком же содержании) может быть включена не вызывающая сомнения тема диссертации – это придаёт акту оттенок квалификационной направленности.

Иногда акты целесообразно составлять не только для авторов научных результатов, но и для реализаторов. Пример пункта такого акта:

... на предприятии ... реализована оформленная Петровым К.А. "Методика расчета нормативов времени на разработку элементов комплексов средств автоматизации" (вх. Главсистемпрома № 127/3 от 21.1.87), использующая научно-методический аппарат, разработанный Григорьевым С.И. и Афанасьевым К.И. (Сборник научно-методических материалов предприятия ..., выпуск 28, 1981 г.,

с.с. 24..27), включена в Технологию создания автоматизированных систем и систем обработки информации (рег. № 075, 3.1,31.12.87 в технологической службе Главсистемпрома).

Для Григорьева и Афанасьева это реализация на уровне диссертации (вклада в науку), в то время как для Петрова это реализация научного результата, хотя и не на уровне диссертации, но нового для ведомства, что положительно характеризует Петрова В.А. как практика-новатора.

Ещё пример акта (о реализации научных результатов в учебном процессе военно-учебного заведения), оформляемого при групповой реализации, когда практически используемый научный результат (или результаты) получен несколькими авторами, при этом, если для каждого из авторов не выделяется конкретная степень личного участия в получении (разработке) реализуемых научных результатов, авторство считается принадлежащим всем указанным авторам в равной степени:

А К Т

*о реализации научных результатов, полученных
в научно-исследовательской лаборатории № __ РВИ РВ*

Комиссия в составе _____

установила, что Тутубалиным Г.Д., Вырва Н.А. и Наконечным В.Н. реализована в учебном процессе кафедры 00 РВИ РВ (Тематический план учебной дисциплины Д-03, инв. кафедры 00 № 258 и Методическая разработка для проведения группового упражнения №__ с обучаемыми 141, 241, 441, 541 учебных групп по тактической задаче №__ "Оценка возможностей средств вооружения по поражению объектов", инв. кафедры 00 № 259) разработанная сотрудниками научно-исследовательской лаборатории №__ Заносовским А.В., Смирновым Г.В., Загайчук С.А. информационно-справочная задача "Возможности средств вооружения", опубликованная в отчёте о НИР "Игра-91" (шифр ЗДН 09602Р), исх. РВИ РВ № 01121 от 19.12.96г.

Применение задачи повышает дидактическую эффективность занятий за счёт существенного (не менее чем на 60 %) сокращения объема рутинной работы обучаемых по поиску справочной информации, требуемой при отработке учебных вопросов.

(подписи председателя и членов комиссии)

Во всех случаях предпочтительно выделять конкретную степень личного участия каждого из авторов или групп авторов в получении (разработке) реализуемого научного результата.

Пример:

А К Т
о реализации в в/ч _____ научных результатов,
полученных в РВИ РВ

Комиссия в составе _____

установила, что специалистами в/ч _____ Орловым В.Г., Тиховым И.В. и Мирским С.И. в систему прикладного программного обеспечения АРМ боевого поста командира внедрено программное изделие "ШММ прогнозирования возникновения чрезвычайных ситуаций... " (исх. РВИ РВ № 32/НИО от 25.04.97 г., учётный номер частной библиотеки алгоритмов и программ в/ч _____ № 27), разработанное сотрудниками научно-исследовательской лаборатории №__ (НИЛ) РВИ РВ Дедовым Ю.А. и Розянко Д.Е, в котором реализованы научные результаты, полученные сотрудниками РВИ РВ:

1) методика расчёта, разработанная Варским П.В., Дениным А.В., Мосиным С.Ю (отчёт о НИР "Юнга", 1996, инв. НИЛ № 47, подраздел 3.2);

2) алгоритмы, составленные Дениным А.В и Мосиным С.Ю. (отчёт о НИР "Юнга", 1996, инв. НИЛ № 47, подраздел 3.2);

3) концепция автоматизации управления войсками, предложенная Фоковым В.С. и Ефовым О.А.(отчёт о НИР "Юнга", 1996, инв. НИЛ № 47, подраздел 1.2).

4) рекомендации по комплектованию АРМ, обоснованные Ефовым О.А. (отчёт о НИР "Юнга", 1996, инв. НИЛ № 47, подраздел 2.3).

По опыту применения программного изделия на командно-штабных учениях (План проведения учения инв. в/ч _____ № 232), за счёт дополнительной автоматизации функций информационной поддержки процесса принятия решений командиром обеспечивается повышение оперативности управления силами и средствами, привлекаемыми для ликвидации последствий чрезвычайных ситуаций, на 10-15 %.

(подписи председателя и членов комиссии)

При целесообразности наряду с фамилиями авторов и реализаторов научных результатов в актах могут указываться их должности, учёные степени, звания и т.п.

Акт о реализации результатов диссертационного исследования выглядит наиболее убедительным, когда в нём указаны не только реквизиты документов (в которых опубликованы реализуемые научные результаты и которые подтверждают форму реализации результатов), но и отличительные признаки научной новизны соответствующих результатов.

В заключение можно дать некоторые дополнительные советы соискателям ученых степеней.

Сведения о результатах, реализованных в процессе диссертационного исследования, в текст диссертации и автореферата, а также в материалы доклада при защите диссертации и аттестационное дело соискателя (в Заключение, принимаемое по результатам защиты в соответствии с п.28 Положения о присуждении [9]) целесообразно включать в следующей формулировке (иллюстрируемой на примере):

“Основные результаты диссертации реализованы в следующих документах:

в ГОСТ по тематике телекоммуникационных систем в ОАО ВНИИ «Эталон» (акт, вх. РВИ РВ № 286/НИО от 9.10.2009 г.);

в техническом задании на разработку изделия «...» в ОАО «Концерн «Созвездие» (акт, вх. РВИ РВ № 325/НИО от 13.11.2009 г.);

в учебном процессе Ростовского военного института РВ при проведении занятий по дисциплине «Автоматизация проектирования систем и средств управления» (акт, вх. РВИ РВ № 285/НИО от 8.10.2009 г.)”.

Акты о реализации могут составляться как по инициативе тех или иных лиц, так и организаций. Так, например, как предусматривается ведомственными документами, по окончании каждой НИР её реализация должна быть документально оформлена генеральным заказчиком (заказчиком) научно-технической продукции в виде акта установленной формы.

Составление актов о реализации особенно важно в тех случаях, когда в документах, представляющих форму реализации (приказах, наставлениях, руководствах, инструкциях, планах и т.д.) нет ссылки на автора научного результата.

Следует обратить внимание на то, что составление акта о реализации не требуется, если оформлен утверждённый руководителем организации или его заместителем документ (например,

техническое описание устройства), в котором имеется ссылка на такую публикацию автора или авторов (отчёт о научно-исследовательской работе, научная статья и т.п. с указанием необходимых реквизитов), в которой описан реализованный в устройстве новый научный результат. Такой документ эквивалентен акту, так как содержит все требуемые сведения о реализации нового научного результата, а именно, **форму публикации** (например, отчет о научно-исследовательской работе) и **форму реализации** (сам документ). При таком документе авторы (автор) могут быть, а могут и не быть одновременно реализаторами нового научного результата.

Акты о реализации результатов исследования в аттестационное дело соискателя не включаются, однако в процессе экспертизы диссертации в ВАК РФ могут быть запрошены документы, подтверждающие реализацию любых результатов, указанных в тексте, автореферате диссертации и в аттестационных документах как внедрённых.

5.4. Типичные недостатки оформления акта о реализации научных результатов

Отсутствие возможности по тексту акта установить:

1) **что реализовано** – недостаточны сведения о специфических особенностях (признаках) реализованного научного результата и/или не указаны реквизиты документа (например, научной публикации), содержащего необходимую информацию;

2) **в каком виде реализовано** – не указан документ, являющийся формой реализации научного результата, либо документ назван, но отсутствуют его реквизиты;

3) **кто является автором** (а также в случае, если указать целесообразно, **и реализатором**) **реализованного научного результата** – в тексте акта нет соответствующих сведений;

4) **как найти документы**, упомянутые в п. 1 и 2, – приведенных реквизитов недостаточно;

5) в случае реализации на внешнем предприятии: **каким образом о научном результате стало известно на предприятии** – документ, упомянутый в п. 1 (содержащий сведения о том, что реализовано), не является общедоступным, и при этом отсутствует ссылка на исходящий или входящий в адрес предприятия документ переписки.

6. ДИССЕРТАЦИЯ КАК ОБЪЕКТ ЭКСПЕРТИЗЫ

6.1. Квалификационная составляющая диссертации

При экспертизе диссертаций руководствуются принципами обеспечения единства требований к научно-квалификационным работам и максимально возможной объективности их оценки, что нашло отражение в основных руководящих документах: в соответствии с [9, п.8] *"Диссертация должна ... свидетельствовать о личном вкладе автора в науку"*, а из содержания [9, п.7] следует, что кандидатская диссертация является научно-квалификационной работой, в которой содержится *"решение научной задачи, имеющей существенное значение для соответствующей отрасли знаний"*, а докторская диссертация – *"работой, в которой ... решена крупная научная проблема, имеющая важное социально-культурное или хозяйственное значение..."*. При этом возможны и некоторые указанные в пункте 7 [9] конкретизированные формы выражения научных достижений, в том числе как в области развития соответствующего научного направления, так и в области разработки технических, экономических и технологических решений и разработок.

Реализация принципов единства требований и максимальной объективности достигается на основе введения единого характерно представительного объекта, отражающего научные достижения авторов независимо от проблематики и тематической направленности диссертаций, а также использования более или менее чётких и единообразных критериев соответствия защищаемых квалификационных работ требуемому научному уровню кандидатской и докторской диссертаций. Таким характерно представительным объектом (подобным, например, товару в политэкономии) в данном случае является научный результат, являющийся вкладом в науку, а в качестве единого критерия для докторской диссертации принимается наличие решения научной проблемы (в том числе по разработке теоретических положений, технических, технологических или иных решений), а для кандидатской диссертации – наличие решения (научной) задачи (в том

числе в области научного обоснования технических, технологических или иных решений и разработок).

Отсюда следует вывод, что только личный вклад в науку признаётся **квалификационной составляющей диссертации** (по чему судят об уровне квалификации автора как учёного). Несмотря на то, что наука развивается ради практики, в нормативных документах понятие вклада в практику вообще не употребляется, за исключением *“решений, внедрение которых вносит значительный вклад в развитие страны”* [9, п.7], и это сделано преднамеренно, чтобы не затемнить в требованиях к научно-квалификационной работе направленность на достижения вклада именно в области науки. Вместе с тем, практика никоим образом не забыта: весьма существенное внимание уделяется практической значимости получаемых новых научных результатов, наличие которой повышает оценку результатов, являющихся вкладом в науку.

Опыт экспертизы диссертаций свидетельствует однако, что уровень подготовки очень многих соискателей оказывается таким, что они не могут изложить полученные ими новые научные результаты в форме, явно выражающей вклад в науку, способствующей наиболее быстрой и безошибочной оценке соответствия диссертации требованиям Положения о порядке присуждения учёных степеней, что затрудняет работу членов диссертационных и экспертных советов, заставляет их кропотливо выискивать и формулировать за автора его истинные научные достижения.

Упоминания здесь и далее о трудностях экспертизы, возникающих из-за упущений в оформлении диссертаций, делаются в основном не в виде жалобы на судьбу экспертов, а ради привлечения внимания к тому, что по совершенно очевидным мотивам в научно-квалификационной работе всё, что сказано непонятно или двусмысленно, может трактоваться не в пользу соискателя.

Само собой разумеется, что подавляющему большинству соискателей хотелось бы, чтобы новизна и значимость их работы понимались правильно, и с этой точки зрения в чёткости изложения материала и правильном оформлении диссертации соискатель заинтересован не меньше, чем эксперты.

Одна из причин допускаемых недостатков при оформлении диссертаций состоит как раз в том, что многие соискатели не могут чётко выделить среди полученных новых научных результатов те, которые являются вкладом в науку, и отделить от них те, которые они считают не менее важным вкладом в практику, хотя правильней говорить о практической значимости научных результатов, являющихся вкладом в науку.

Здесь возникает вопрос, правомерно ли говорить о науке и о практике в отдельности? Ответ может быть только один: да, правомерно, и это делается всегда, когда хотят подчеркнуть или выделить относительно самостоятельную роль науки, которая, как известно, должна опережать практику, прокладывая ей дорогу, дальше заглядывая вперед. Но раз о науке и практике можно говорить отдельно, значит, вклад в науку и практическая значимость также могут рассматриваться в отдельности, и вполне объяснимым является то, что в научно-квалификационной работе, представляемой на соискание учёной степени, наличие новых результатов, представляющих вклад именно в науку, является определяющим требованием.

Таким образом, можно сделать вывод, что отражение в диссертации вклада в науку является обязательным, а в отношении внедрения или практического использования полученных новых научных результатов можно ограничиться (по крайней мере, в квалификационной работе, имеющей теоретический характер) лишь приведением рекомендаций по использованию научных выводов.

Однако содержание вышеперечисленного надо понимать правильно: провозглашается не принижение роли практической значимости, а обязательность вклада в науку.

Практика ни в коем случае не должна забываться – именно это придаёт вес, значимость диссертации, но, учитывая квалификационный характер работы, необходимо выделять и особо подчеркивать результаты, являющиеся вкладом в науку.

Новые научные результаты, которые хотелось бы называть вкладом в практику, в научно-квалификационной работе целесообразно преподносить в плане обоснования значимости результатов, являющихся вкладом в науку, возможности и полезности

их практической реализации. Соответственно недостатком некоторых диссертаций является то, что на защиту выдвигаются и перечисляются в новых научных результатах, полученных лично соискателем, результаты, которые считаются вкладом в практику (например, алгоритмы), а результаты, являющиеся вкладом в науку (т.е. именно то, что должно учитываться и оцениваться в первую очередь), оказываются представленными недостаточно или вообще упущенными.

Следует особо отметить, что сказанное воспринимается, как вполне само собой разумеющееся, далеко не всеми. Некоторые специалисты, неправильно трактуя рекомендацию чётко выделять среди полученных результатов те из них, которые являются вкладом в науку, пытаются усмотреть в этом отрыв науки от практики. Однако нельзя не согласиться с тем, что *"оторвать"* и *"выделить"* – слова, имеющие совершенно различный смысл. В данном случае речь идет не об отрыве, а о выделении среди всего сделанного того, что является вкладом в науку, в интересах подчеркивания квалификационной составляющей диссертации. Это способствует упрощению не только экспертизы диссертации, но и её практического использования заинтересованными специалистами.

Таким образом, в диссертации содержатся два вида результатов – результаты научного творчества, представляющие решение общей научной задачи или проблемы, и результаты в основном технического творчества, представляющие собой технические, технологические или иные решения и разработки, подтверждающие практическую значимость наиболее существенных научных результатов, являющихся вкладом в науку.

6.2. Экспертиза научного и технического творчества

Рассматривая диссертацию как объект экспертизы, целесообразно провести некоторые параллели между техническим и научным творчеством ввиду того, что этим сферам деятельности присущ целый ряд весьма сходных коренных черт, а именно:

– непосредственным продуктом той и другой деятельности, приводящим к практической отдаче, является идея, обладающая но-

визной и полезностью. При этом в техническом творчестве идея должна найти воплощение в техническом, конструкторском, организационном или ином практически применимом решении, а в научном творчестве идея может иметь и иные формы воплощения: теория, организационное решение, метод, методика и др.;

– подобно тому, как в образовательной и научной деятельности рассматриваются защищаемые учебно-научные и научно-квалификационные работы (являющиеся результатами познания и научно-творчества) трёх уровней – курсовые, дипломные работы (проекты, задачи) и диссертации, в технической деятельности также рассматриваются работы трёх уровней технического творчества: рационализаторское предложение, изобретение, открытие;

– как в научной, так и в творческой технической деятельности устанавливаются и юридически охраняются авторские права на полученные новые результаты согласно срокам и объёмам их официальной публикации;

– в той и в другой деятельности организована государственная экспертиза новизны, достоверности и практической значимости предлагаемых решений, которая в нашей стране осуществляется в области научно-квалификационных работ сетью диссертационных советов и экспертными органами Высшей аттестационной комиссии Министерства образования и науки Российской Федерации, а в области промышленно применимых решений – Государственным патентным ведомством Российской Федерации.

Отмечая сходные черты, нельзя не обратить внимания и на некоторые существенные отличия.

В области изобретательской деятельности, представляющей одну из наиболее важных сфер технического творчества, считается, чтобы стать экспертом, недостаточно просто быть изобретателем, а необходимо пройти обучение в специализированных учебных заведениях или на соответствующих курсах, где осуществляется подготовка экспертов-патентоведов, получающих требуемые знания и навыки экспертной работы. В отличие от этого, чтобы стать экспертом в научной деятельности, считается вполне достаточным иметь учёную

степень доктора или кандидата наук. Никакой специальной подготовки экспертов для оценки работ в научной области не организуется.

Между тем, попробуйте задать вопросы специалистам-экспертам в области изобретательства: какими признаками различаются рационализаторское предложение, изобретение и открытие; что является и что не является новым техническим решением; что может быть объектом изобретения и что не может? На эти и многие другие вопросы они дадут весьма чёткие ответы, которые почерпнут, например, из Правил составления и подачи заявки на выдачу патента на изобретение (Приложение 5 к Патентному закону Российской Федерации) и некоторых других нормативных документов.

Задайте схожие вопросы специалистам, занимающимся экспертизой диссертаций: какими признаками различаются между собой дипломная работа, кандидатская и докторская диссертации; что является и не является научной задачей и научной проблемой; что может быть признано вкладом в науку и что не может? В подавляющем большинстве ответы, опирающиеся лишь на некоторые строки действующих нормативных документов, будут весьма нечёткими и противоречивыми, особенно если не ограничиваться уровнем примитивного понимания (например, когда различия упомянутых научно-квалификационных работ усматриваются лишь в объёме исследований), а попытаться выяснить принципиальные отличия (в виде чётких отличительных признаков работы каждого вида).

Уровни развития нормативной базы экспертизы технического творчества и квалификационного научного творчества несопоставимы, и в этом нет ничего удивительного.

Нормативная база поддержки экспертизы изобретательских и рационализаторских предложений получила серьёзное развитие не вдруг и не случайно, а в связи с заказом социально-экономического характера – потребностью корректного юридического регулирования прав на размеры авторского вознаграждения, в то время как в области науки экспертиза традиционно основывалась "на общественных началах". С выходом Патентного закона Российской Федерации и некоторых других нормативных актов нормативная база экспертизы промышленно применимых решений, а также охраны авторских прав, получила дальнейшее существенное развитие и распространилась,

наряду с изобретениями, на ряд новых промышленно применимых объектов научно-технического творчества, таких как полезные модели, программы для ЭВМ, банки данных.

Следует сразу отметить, что для развития нормативной базы в области подготовки и экспертизы диссертаций не надо ничего придумывать заново. Надо лишь выбрать то уже имеющееся, что оказывается подходящим с учётом здравого смысла, и дополнить, прибегая к аналогиям, тем, что является явно целесообразным, так как проверено опытом в наиболее близкой области – оформление и экспертиза рационализаторских и изобретательских предложений.

Из накопленного положительного опыта создания нормативной базы в упомянутых областях технического творчества следует, что для поднятия на должный уровень экспертизы творческих работ в любой области деятельности требуется разумная канонизация некоторых наиболее важных требований, в частности, необходимо:

- выделить обобщённый **объект оценивания** творческого вклада;
- дать однозначно трактуемые всеми специалистами предельно краткие, но, по возможности, наиболее ёмкие **опорные определения** основным объектам различного творческого уровня, подлежащим оцениванию;
- указать рассматриваемые экспертизой конкретные **объекты творчества**;
- регламентировать в интересах экспертизы и охраны прав автора компактную **форму изложения** в документах сущности **творческого вклада** с чётким очерчиванием объёма авторских притязаний.

Объект оценивания

Здесь всё просто. Как известно, в практике изобретательской и рационализаторской деятельности в качестве обобщённого объекта оценивания творческого вклада выступает **техническое решение**. Его аналогом в научном творчестве нельзя не признать более широкий обобщённый объект оценивания – **научное решение**.

Опорные определения

По имеющемуся опыту, предельно краткие опорные определения основных объектов различного творческого уровня получаются указанием признаков обобщённого объекта оценивания:

изобретение – техническое решение в любой области, относящееся к продукту или способу [13];

рационализаторское предложение – техническое решение, являющееся новым для предприятия.

В нормативных документах не дано опорное определение для диссертации, а лишь приводятся требования к содержанию научно-квалификационной работы [9, п. 8, 9].

С учётом объекта оценивания возможно такое определение:

диссертация – научное решение в любой области, обладающее новизной, достоверностью и существенной значимостью²².

Объекты творчества

Далее ограничимся проведением параллелей между изобретениями и диссертациями.

Конкретными объектами экспертизы, согласно действующим нормативным документам, являются:

– в области технического творчества – объекты изобретений: продукты и способы [13, п.10.4];

– в области научного творчества – виды диссертаций [9, п.7]:

докторская диссертация – решение научной проблемы, имеющее фундаментальное научное либо важное политическое, социально-экономическое, культурное или хозяйственное значение;

кандидатская диссертация – решение научной проблемы или новое решение научной задачи, имеющее существенное значение для соответствующей отрасли знаний.

²² В соответствии с дополнительными разъяснениями, содержащимися в нормативных документах, новизна изобретения и научных результатов диссертации *мировая*.

В порядке конкретизации объектов изобретений, как указано в действующем нормативном документе [13, п.10.4.1]:

– продуктом как объектом изобретения является *устройство, вещество, штамм микроорганизма, культура (линия) клеток растений или животных, генетическая конструкция;*

– способом как объектом изобретения является *процесс осуществления действий над материальным объектом с помощью материальных средств.*

Более того, для каждого из конкретных объектов технического творчества строго установлены признаки, используемые для описания их в документах. Такими признаками, в частности, являются:

для устройства – *наличие конструктивных элементов и связей между ними: взаимное расположение и форма выполнения элементов, связей между ними или устройства в целом; материал, из которого выполнены элементы или устройство в целом; среда, выполняющая функции элемента;*

для способа – *наличие действия или совокупности действий; порядок выполнения действий во времени; условия осуществления действий* и т.д.

К конкретизируемым разновидностям объектов квалификационного научного творчества в действующем нормативном документе [9, п.7] отнесены:

– решение научной проблемы (докторский уровень) по *"разработке теоретических положений, совокупность которых можно квалифицировать как научное достижение"* и по *"научному обоснованию технических, технологических или иных решений, внедрение которых вносит значительный вклад в развитие страны"*;

– решение научной задачи" (кандидатский уровень) по *"научному обоснованию технических, технологические или иных решений и разработок, имеющих существенное значение для развития страны"*.

Изложение творческого вклада

Регламентированные требования к форме компактного изложения сущности творческого вклада и объёма притязаний автора (авторов) в изобретательстве заключаются в обязательности составления **полной формулы творческого вклада** в виде одного повествовательного предложения, в котором указываются: наименование прототипа – известного решения, наиболее близкого по совокупности признаков к новому (предлагаемому) решению, с перечислением существенных признаков, общих для прототипа и для нового решения, и далее после слов *"отличающийся (еёся) тем, что"* – отличительных признаков нового решения (приводящих к положительному эффекту).

Регламентировать точно такую же формулу для диссертации нецелесообразно. В научно-квалификационной работе аналогичную роль могут выполнить компактные формулировки постановки общей научной задачи (проблемы), решение которой содержится в диссертации, и основных новых научных результатов, выдвигаемых для защиты.

В связи с этим полезно вспомнить п. 32 (второй абзац) и п. 38 Положения о порядке присуждения учёных степеней 1975 г., если их изложить так:

Во введении (предисловии) к диссертации должны приводиться краткие формулировки общей научной задачи или научной проблемы диссертационного исследования, основных научных положений и других новых научных результатов, выдвигаемых для защиты.

Постановка общей научной задачи (проблемы) должна быть конкретной, вытекать из современного состояния вопроса и обосновываться в диссертации анализом соответствующих научных работ.

Вполне логичным дальнейшим шагом было бы придание кратким формулировкам постановки общей научной задачи (проблемы) диссертационного исследования и основных новых научных результатов, выдвигаемых на защиту, юридического смысла.

Заключая сказанное, следует отметить, что на фоне произведенной чёткой классификации и канонизации определений ква-

лификационных объектов научного творчества (обобщённый объект оценивания, основные объекты различного творческого уровня, конкретные объекты творчества) формулировки вариантов требований основных руководящих документов выглядят явно не альтернативными, не имеющими общего стержня и допускающими самые различные трактовки, что не обеспечивает единства понимания специалистами требований, предъявляемых к диссертациям из разнообразных предметных областей. Можно надеяться, что приводимые материалы помогут экспертам, а также соискателям, научным руководителям и консультантам диссертационных работ прийти к единым более глубоким и правильным трактовкам требований действующих руководящих и инструктивных документов по вопросам подготовки и экспертизы самых разнообразных диссертаций и создадут основу для дальнейшего развития нормативной базы в области аттестования научных работников.

Следует также подчеркнуть, что существует возможность приблизить уровень экспертизы диссертаций к уровню экспертизы изобретений, имеются все необходимые предпосылки для разработки официального документа, чётко регламентирующего положения по экспертизе научных работ, подобного, например, ранее действовавшей инструкции (ЭЗ-2-74) по государственной научно-технической экспертизе изобретений. Разработка такого документа и его внедрение в практику аттестования научных работников существенно подняли бы уровень подготовки и экспертизы научных работ и в определённой степени сравняли бы его с мировым уровнем оформления и экспертизы изобретений.

Это создало бы предпосылки для превращения достоинств и незадействованных потенциальных возможностей сложившейся у нас оригинальной отечественной двухступенчатой системы квалификации научных работников ("кандидат наук – доктор наук") в несомненные преимущества перед другими (зарубежными) системами по получаемой от соискателей учёных степеней и квалифицированных учёных отдаче науке и практике.

6.3. Ширина и глубина диссертационного исследования

Любой исследователь за располагаемое время способен выполнить вполне определённый **объём (V)** исследовательской работы, который в условных измерениях можно выразить произведением ширины (**H**) исследования на его глубину (**G**), продолжительность (**T**) и научный уровень (**U**):

$$V = H \cdot G \cdot T \cdot U. \quad (1)$$

Ширина исследования – это количество и многообразие частных научных задач, решаемых в процессе исследования.

Глубина – это степень детализации модельного описания предмета исследования, воплощаемая в постановках и методах решения частных научных задач исследования.

Продолжительность исследования – это время, отводимое на его выполнение.

Ширина и глубина определяются рамками исследования, а продолжительность исследования определяется сложностью исследовательских задач (проблем) и временем, выделяемым на решение каждой из них.

Научный уровень исследования - комплексный показатель новизны, достоверности и значимости решений частных научных задач и их результатов, полученных в процессе исследования.

Продолжительность исследования, характеризующаяся временем **T**, складывается из двух составляющих:

$$T = T1 + T2, \quad (2)$$

где **T1** – время, отводимое на освоение предмета, опубликованных методов исследования и ранее сформулированных рекомендаций, когда исследователь познает новые для него, но уже выработанные наукой и практикой знания;

T2 – время, затрачиваемое на творческую работу, когда исследователь добывает и вырабатывает новые знания на уровне личного вклада в науку и практической реализации получаемых результатов.

После подстановки (2) в (1) получается

$$V = H \cdot G \cdot (T1 + T2) \cdot U = H \cdot G \cdot T1 \cdot U + H \cdot G \cdot T2 \cdot U,$$

где $H \cdot G \cdot T1 \cdot U$ – объём исследовательской работы, затрачиваемой исследователем на самообразование (исследователь берёт от науки и практики);

$H \cdot G \cdot T2 \cdot U$ – объём исследовательской работы, затрачиваемой на общество (исследователь даёт науке и практике).

Не вызывает сомнений, что если $T2$ стремится к нулю ($T2 \rightarrow 0$), то вклад исследователя в науку и практику также устремляется к нулю. Однако чем шире исследование, тем $T1$ должно быть больше. Из вполне объяснимого допущения о том, что время T , отведенное на проведение исследования, есть величина вполне определённая (постоянная), вытекает утверждение: при расширении исследования (когда величина $T1 \rightarrow T$, и вследствие этого $T2 \rightarrow 0$) вклад исследователя в науку и практику устремляется к нулю.

С другой стороны, при сужении исследования в определённых пределах (когда величина $T1 \rightarrow 0$, и ввиду этого $T2 \rightarrow T$) вклад исследователя в науку и практику максимизируется. Отсюда следует общий вывод: при объеме и научном уровне исследовательской работы, гарантирующих признание её научной и практической значимости достаточной, чем шире исследование, тем меньше ожидаемый от него вклад в науку и практику, и наоборот – чем уже исследование, тем больше ожидаемый вклад в науку и практику.

Причиной неоправданного расширения исследований чаще всего являются искренние заблуждения Заказчика, под которым будем понимать того, кто заинтересован в результатах исследования и кто способен влиять на его тему и содержание. Если Заказчик на этапе согласования темы и плана работы заявляет, что ему не нужна теория, а хочется видеть как можно больше конкретных практических выводов и рекомендаций, – это как раз тот случай, о котором идет речь.

Заказчик ввиду своего служебного положения способен влиять не только на содержание диссертаций на этапе планирования

научных исследований, но и на экспертные предпочтения в области суждений о квалификационной составляющей диссертаций, обеспечивающие перераспределение усилий соискателей с научного творчества на техническое творчество. Неоднократно добившись своего, через несколько лет Заказчик обнаружит, что по интересующей его проблематике поработало немало исследователей, однако существенной пользы от науки он не ощущает.

И это не удивительно: Заказчик сам обеспечил перераспределение времени, отводимого на исследования (см. формулу (2)) в пользу **T1**, расширив предмет исследования ("*...как можно больше практических выводов и рекомендации*"), но в ущерб **T2** – вкладу в науку ("*...не нужна теория*"). Заставляя исследователей выдавать как можно больше рекомендаций (при этом **T1** → **T**) и преднамеренно заглушая усилия в области развития теории, Заказчик своими руками разрушает условия существенного продвижения в той самой практике, в которой он "кровно" заинтересован.

Итак, за счёт расширения исследования хотелось получить всё. Затрачено драгоценное время, а на выходе, с точки зрения вклада в науку и практику, – почти ничего. В интересах самого Заказчика поступать более мудро и дальновидно, руководствуясь принципом "*лучше меньше, да лучше*", принять все зависящие от него меры к тому, чтобы исследователи как можно больше работали на отрезке времени **T2**, или, говоря иначе, побуждать исследователей к выполнению работ на самом высоком теоретическом уровне (по принципу: "*Давай хорошую новую теорию в смысле получаемых выводов и рекомендаций*"). Разумеется, Заказчику с такими работами будет тяжелее знакомиться, но это уже трудности продвижения на новые высоты практической деятельности. Впрочем, чаще всего сложным оказывается лишь объяснение нового пути (теории, метода), ведущего к выводу или к рекомендации. Сама же рекомендация, как правило, оказывается достаточно просто воспринимаемой, а её эффективность вполне очевидной.

Довольно часто причиной расширения исследования является и то, что некоторые исследователи и их научные наставники усматривают в этом увеличение возможностей выхода на новые на-

учные идеи. Здесь, действительно, есть рациональное зерно, но такой подход является оправданным лишь на начальном этапе исследования.

После того как наметятся успехи в проработке одних частных вопросов и неудачи в других, нужно на последующих этапах работы обязательно сузить исследование, чётко ограничив его соответствующими рамками. В ином случае исследователь, с одной стороны, вследствие необходимости получения вклада в науку и практику, должен глубоко и всеаспектно осваивать огромное количество вопросов, в которых (несмотря на то, что $T1 \rightarrow T$) он рискует так и остаться не до конца осведомлённым, а с другой стороны, он вынужден (в условиях $T2 \rightarrow 0$ и очень широких рамок исследования) выдать такое количество требуемых от него и напрашивающихся выводов и рекомендаций, обосновать даже некоторые из которых если ему и удастся, то только на чисто эмпирическом уровне.

Вывод очевиден: в науке, как и в бою, следует прорываться на узком участке, и крайне удивительно, что этот широко известный принцип военного искусства даже те, кто работают над диссертациями в области военных наук, забывают ничуть не реже, чем специалисты из других областей знаний.

7. ФОРМА ИЗЛОЖЕНИЯ НАУЧНЫХ РЕЗУЛЬТАТОВ В ДИССЕРТАЦИИ И В АВТОРЕФЕРАТЕ

7.1. Изложение научных результатов в диссертации

Общие требования к оформлению кандидатских и докторских диссертаций и авторефератов по всем отраслям знаний устанавливает ГОСТ Р 7.0.11-2011 "Диссертация и автореферат диссертации. Структура и правила оформления" [15].

Предметом дальнейшего рассмотрения будет оформление кандидатской диссертации в виде специально подготовленной рукописи, имеющей типичную структуру из трёх разделов.

Излагаемые далее рекомендации соответствуют упомянутому ГОСТу, однако лишь в части, относящейся к содержанию и последовательности изложения введения и заключения к диссертации и автореферату, предложена некоторая конкретизация, способствующая выполнению нормативных требований к диссертации.

По стилю изложения научных результатов диссертацию следует рассматривать состоящей из двух частей – научно-популярной и узкопрофессиональной.

Научно-популярная часть включает введение, выводы по разделам диссертации и заключение. Эта часть должна быть изложена с использованием не специфических, а общенаучных терминов, без использования аббревиатур, т. е. на языке, понятном самому широкому кругу специалистов, привлекаемых к экспертизе диссертации, в том числе членам диссертационного совета, не являющимся узкими специалистами в научной области конкретного диссертационного исследования.

Узкопрофессиональная часть объединяет не относящиеся к научно-популярной части материалы всех разделов диссертации, а также материалы приложений. Эта часть по стилю изложения обычно рассчитывается на восприятие в основном узкими специалистами в соответствующей научной области знаний.

7.1.1. Введение к диссертации

Во введение включают оформляемые по результатам завершённого диссертационного исследования материалы, в которых отражаются:

- актуальность диссертационного исследования и степень разработанности темы;
- объект исследования (при целесообразности);
- цель диссертационного исследования;
- предмет исследования (при целесообразности);
- общая (научная) задача диссертационного исследования (краткая содержательная формулировка);
- краткие сведения о содержании основных разделов и приложений;
- научная новизна;
- публикации – сведения об опубликовании основных научных результатов диссертации в научных изданиях и об использовании идей или разработок, принадлежащих соавторам, коллективно с которыми были написаны научные работы;
- реализация – сведения о внедрении научных результатов.

Кроме того, довольно часто во введении помещают краткие сведения о методологии и методах исследования (при целесообразности) и (если не указываются в Заключение) сведения о достоверности научных результатов, их апробации, теоретической и практической значимости.

Ввиду приведения во введении кратких сведений о содержании основных разделов диссертации не имеет смысла здесь же формулировать частные задачи диссертационного исследования, так как они в данном случае оказываются избыточными. Наиболее уместно частные задачи диссертационного исследования перечислить в конце первого раздела, сразу после изложения постановки общей научной задачи.

Актуальность диссертационного исследования

Прагматическая актуальность обуславливается наличием противоречия в практике и обосновывается в интересах выдвижения

цели диссертационного исследования (соответствующей реальным потребностям практики и возможностям реализации), а также определения объекта, а затем и предмета исследования.

Научная актуальность диссертационного исследования обуславливается наличием противоречия в науке и обосновывается в интересах удовлетворения требования наличия в диссертации личного вклада автора в науку. При обосновании научной актуальности упоминаются авторы известных публикаций, посвящённых решению научных задач и проблем в исследуемой области, кратко характеризуются достоинства и недостатки известных научных решений и делаются соответствующие выводы.

Объект исследования указывается в связи с тем, что именно им предопределяется цель диссертационного исследования.

Цель диссертационного исследования формулируется относительно объекта исследования соответственно характеру диссертации [9, п. 8]: в диссертации, имеющей прикладной характер – на чисто прагматическом уровне (практического использования полученных автором научных результатов), а в диссертации, имеющей теоретический характер, целесообразна формулировка на научно-прагматическом уровне (“разработка рекомендаций...”), при этом чисто научную цель оставляют для формулирования общей научной задачи.

Цель диссертационного исследования должна быть достижимой и подтверждаться количественной оценкой, обычно помещаемой в последнем разделе диссертации.

Характерные недостатки формулирования цели диссертационного исследования:

– подмена цели диссертационного исследования множеством частных целей (в таком случае оценка степени достижения общей цели оказывается затруднительной);

– цель в диссертации, имеющей прикладной характер, сформулирована в виде, не позволяющем количественно оценить ожидаемую или реальную степень её достижения.

Довольно часто формулировку цели диссертационного исследования перегружают пояснениями способов и условий её достижения, сопровождаемыми словесными связками “на основе...”, “с учё-

том..."; "путём..." и др. Лучше оформить цель в предельно сжатой и чёткой формулировке, а все требуемые пояснения, фактически характеризующие рамки исследования, привести отдельно.

Пример формулировки *объекта и цели диссертационного исследования*, взятые из реально защищённой кандидатской диссертации:

"Объект исследования: *аппаратурные и программные средства информационно-вычислительной системы".*

"Цель диссертационного исследования: *сокращение стоимости обслуживания информационно-вычислительной системой внешнего потока заданий".*

Предмет диссертационного исследования целесообразно формулировать, исходя из того, что им предопределяется общая научная задача диссертационного исследования.

Общая научная задача диссертационного исследования. При подготовке и экспертизе диссертаций имеют дело с задачами различного уровня:

– общая научная задача, решение которой содержится в диссертации как в научно-квалификационной работе, имеющей существенное значение для соответствующей отрасли знаний, так и диссертации, в которой изложены научно обоснованные технические, технологические или иные решения и разработки, имеющие существенное значение для развития страны (требование, предусмотренное п.8 Положения о присуждении учёных степеней);

– частные научные задачи, получаемые в результате декомпозиции общей научной задачи;

– частные научные проблемы или, проще говоря, проблемные вопросы, решения которых ведут к решению общей научной задачи.

Решения частных научных проблем (проблемных вопросов), методы решения которых не известны, составляют важнейшую, наиболее творческую часть работы над диссертацией. С другой стороны, не только новые, но и сочетаемые с ними известные решения частных научных задач исследования обычно составляют существенную часть любой диссертации.

В любом случае предъявляемое к кандидатской диссертации требование [9, п.8] ("*Диссертация должна ... обладать внутренним единством*") может быть выполнено только и лишь только в случае, если диссертация содержит решение общей научной задачи.

Как показывает опыт экспертизы, неумение кратко и чётко сформулировать общую научную задачу, решение которой содержится в диссертации, является очень характерным недостатком.

Следует отметить неудачность довольно распространённых формулировок научных задач в явно неконкретном (лишь целевом) виде (без указания исходных данных), а также как чисто прагматических предметного уровня (например, "*разработка алгоритмов ...*"), ограничивающих поиск решения на уровне технического (конструкторского) творчества, без вклада в науку.

Следует исходить из того, что формулировка общей научной задачи, решение которой содержится в диссертации, имеет юридический смысл.

Краткую содержательную формулировку общей научной задачи (как имеющую юридический смысл) обычно помещают не только во введении диссертации, но во введении автореферата. В случае удачной формулировки она будет цитироваться в отзывах и заключениях на диссертацию и автореферат, в связи с чем следует стремиться к предельно краткой формулировке (желательно не более 6-8 строк).

Определение соответствия формулировки общей научной задачи, решение которой содержится в диссертации, исходным данным и новым научным результатам, представленным в диссертации, представляет собой один из важнейших результатов экспертизы, отражаемых в заключениях сначала диссертационного, а затем и экспертного совета.

При оформлении диссертации следует приложить все необходимые усилия с тем, чтобы общая научная задача диссертационного исследования была чётко сформулирована на *научно-методическом (либо методологическом) уровне* и обязательно изложена в диссертации и в автореферате. Без этого очень важный элемент, влияющий на исход всех дальнейших этапов экспертизы диссертации.

ции, пускается соискателем (и его научным руководителем) на само­тёк.

Краткая содержательная формулировка общей научной зада­чи должна не ограничиваться лишь названием задачи и отражать (на чисто описательном уровне) основные элементы постановки задачи – что дано и что требуется.

Примеры предмета исследования и общей научной задачи (в краткой содержательной формулировке) из кандидатской диссертации:

***"Предмет исследования:** методы и средства обслуживания информационно-вычислительной системой внешнего потока заданий.*

***Общая научная задача, решение которой содержится в диссертации:** разработка метода выбора варианта комплектующих узлов информационно-вычислительной системы, обеспечивающего минимизацию стоимости обслуживания внешнего потока заданий при заданных исходных данных о стоимости комплектующих узлов и об интенсивностях поступления заданий внешнего потока на обслуживание, а также известном для каждого из узлов статистическом распределении интервалов поступления заданий и длительностей их обслуживания."*

Лучше всего, если диссертация в завершающей части 1-го раздела содержит строгую постановку общей научной задачи диссертационного исследования, а краткая содержательная формулировка научной задачи получается сокращением текста упомянутой постановки главным образом за счёт исключения формульных соотношений и символов, вводимых в интересах формализованного описания переменных для рассматриваемых показателей и критериев. В любом случае краткая содержательная формулировка общей научной задачи должна быть перенесена в автореферат, а также следует стремиться к тому, чтобы такая формулировка, по мнению соискателя и его научного руководителя, могла быть включена в заключение диссертационного совета, как имеющая юридический смысл.

Краткие сведения о содержании основных разделов и приложений диссертации по объёму и содержанию должны соответствовать требованиям к аннотации [12].

Научная новизна. Этот пункт введения должен соответствовать одному из основных требований "Диссертация должна ... со-

держат новые научные результаты" (в том числе) "и положения, выдвигаемые для публичной защиты" [9, п.8], которые следует оформить в виде кратких формулировок выдвигаемых для защиты наиболее существенных положений и наиболее существенных новых научных результатов.

Наиболее существенные положения, выдвигаемые для защиты, в кандидатской диссертации обычно формулируются в виде трёх-пяти пунктов, предваряющих предельно краткое изложение наиболее существенных новых научных результатов, выдвигаемых для защиты. Каждое положение целесообразно представлять в виде отдельного пункта, содержащего, как правило, одно предложение (без подпунктов) объёмом от трёх до десяти (не более) строк машинописного текста.

Вполне оправдано, если некоторые или даже все наиболее существенные новые научные положения, выдвигаемые для защиты, дословно совпадают с выводами по тем или иным разделам диссертации.

Пример формулирования наиболее существенных положений, выдвигаемых для защиты:

"Научная новизна

Наиболее существенные положения, выдвигаемые для защиты:

1. Существующие методы не дают удовлетворительного формального описания функционирования такого сложного информационного объекта, как информационно-вычислительная система (ИВС), в связи с чем дальнейшее их развитие в интересах адекватного моделирования информационных потоков в ИВС является актуальным и имеет существенное значение для повышения эффективности обслуживания пользователей ИВС.

2. Формальное описание функционирования ИВС, соответствующее реальным физическим процессам с отражением временных и вероятностных разрешений конфликтов, осуществимо в терминах сетей Петри при условии их модификации.

3. Существенное снижение сложности и размерности задачи выбора оптимально необходимой интенсивности обслуживания узлов ИВС, а также избавление от необходимости решения задач нелинейного

программирования по нахождению экстремума требуемого функционала, достижимо на основе описания нагрузки переходов модифицированной сети Петри, моделирующей функционирование ИВС, моделью коллективного поведения узлов системы.

4. Значительное повышение производительности ИВС (для рассмотренного примера специализированной системы – в 1,5 раза) осуществимо целесообразным выбором технологии доступа к данным: при объёмах базы данных в 10-12 Мбайт экономически оправдано использование системы файлового сервера, в то время как при объёмах базы данных более 20 Мбайт следует прибегать к использованию технологии клиент-сервер”.

Научные положения не могут полностью выразить результаты, представленные в диссертации, поэтому наряду с ними обязательно должны быть дополнительно охарактеризованы и наиболее существенные новые научные результаты, выдвигаемые для защиты [9, п.28].

Следует стремиться к тому, чтобы выдвигаемые для защиты наиболее существенные положения и наиболее существенные новые научные результаты взаимно дополняли друг друга, поясняя сущность и результаты конкретного диссертационного исследования. Предпочтительно в наиболее существенных положениях акцентировать внимание на доказываемой или обосновываемой в диссертации научной идее, а в информационно соответствующем научном результате, не являющемся научным положением, сосредоточиться на характеристиках новизны объекта научного творчества, в котором научная идея находит воплощение.

Выдвигаемые для защиты наиболее существенные новые научные результаты являются результатами-объектами научного творчества, обычно излагаются сразу после наиболее существенных положений, выдвигаемых для защиты, в виде трёх-четырёх пунктов объёмом от трёх до семи текстовых строк каждый. Лучше всего, если эти пункты сформулированы в таком виде, в котором соискатель и его научный руководитель хотели бы их видеть в заключении, принимаемом диссертационным советом по результатам защиты диссертации, в котором наряду с другими сведениями "... отражаются наиболее существенные результаты, полученные лично соискателем, оценка их ... новизны..." [9, п.28].

Конкретность изложения соответствующих пунктов достигается применением **формулы творческого вклада** с указанием отличительных признаков научной новизны, а также избеганием употребления крайне обобщённых понятий (типа научно-методический аппарат, научно-методический подход и т.п.).

Прибегая к конкретизации, автор, с одной стороны, выходит на уровень наиболее чёткого осознания степени личного вклада в науку, а с другой стороны, содействует упрощению и более оперативному решению задач не только экспертизы, но также изучения и практического использования его диссертации.

Нецелесообразно выдвигать для защиты результаты, характеризующиеся слишком общими, далёкими от конкретности понятиями, такими как "научно-методический подход" и "научно-методический аппарат", если не раскрываются базовые и/или отличительные признаки соответствующего результата.

Следует стремиться не употреблять выражения типа "предложенный (или разработанный) метод", если при этом не указывается, в чём конкретно выражаются научные достижения автора в виде отличительных признаков предложенного, обладающих научной новизной. Формулируя основные отличительные признаки новизны излагаемого научного результата, целесообразно преднамеренно выделять их словосочетаниями типа "отличающийся от известного", "оригинальность которого состоит в ..." и т.п.

Научные положения, выдвигаемые для защиты, смотрятся наиболее выигрышно, если первый пункт посвящается актуальности решаемой общей научной задачи (это, разумеется, бывает важно, но не всегда обязательно), а последний пункт содержит количественную оценку достигаемого эффекта, соответствующего цели диссертационного исследования.

Признаками целесообразности формулирования выдвигаемого для защиты положения об актуальности является возникновение при апробации результатов диссертации борьбы мнений по данному вопросу и вызванная этим необходимость проведения специального исследования для представления убедительных доказательств. В любом случае положение об актуальности диссертационного исследования принято обосновывать и относить к основным ре-

зультатам диссертации, и если оно не представляется в составе наиболее существенных новых научных положений, выдвигаемых для защиты, помещаемых во введении (заключении), то обязательно включается в выводы по первому разделу диссертации.

Пример формулирования в заключительной части пункта введения **Научная новизна** наиболее существенных *новых научных результатов* (не являющихся научными положениями):

"Наиболее существенные новые научные результаты, выдвигаемые для защиты:

1. Модификация сетей Петри – раскрашенные стохастически-временные сети Петри (РСВСП), отличающаяся от известных использованием управляющей раскраски, а также учётом порядка размещения меток в позиции и динамического изменения параметров сети.

2. Модель ИВС в терминах РСВСП, отличающаяся формализованным описанием асинхронности возникновения информационных запросов, параллельности обработки информации, распараллеливания и слияния информационных потоков.

3. Усовершенствованный метод анализа временных задержек в ИВС, возникающих при обработке информационных потоков в случаях централизованного хранения данных с использованием технологий типа "файлового сервера" и "клиент-сервер", отличающийся использованием модели ИВС в терминах РСВСП-сетей.

4. Впервые предлагаемая методика решения задачи выбора состава комплектующих компонентов ИВС для случая централизованного хранения данных с использованием технологии "файлового сервера", разработанная на основе модели коллективного поведения, построенной в терминах РСВСП-сетей."

Богатство языковых возможностей позволяет сформулировать любое новое научное положение, являющееся результатом-идеей, в виде результата-объекта научного творчества, не являющегося научным положением. Так, ранее сформулированное наиболее существенное научное положение *"Формальное описание функционирования ИВС, соответствующее реальным физическим процессам с отражением временных и вероятностных разрешений конфликтов, осуществимо в терминах сетей Петри при условии их модификации"* может быть сформулировано в виде результата-объекта научного

творчества следующим образом: *"Доказательство (либо обоснование) того, что формальное описание функционирования ИВС, соответствующее реальным физическим процессам с отражением временных и вероятностных разрешений конфликтов, осуществимо в терминах сетей Петри при условии их модификации"*.

В то же время любой результат-объект научного творчества, не являющийся научным положением, может быть изложен в форме научного положения (это важно при формулировании выводов по разделам). Например, формулировка результата *"Модель ИВС в терминах РСВСП, отличающаяся формализованным описанием асинхронности возникновения информационных запросов, параллельности обработки информации, распараллеливания и слияния информационных потоков"* может быть выражена в виде следующего научного положения: *"Адекватное описание функционирования ИВС осуществимо на основе построения модели ИВС в терминах РСВСП, отличающейся формализованным описанием асинхронности возникновения информационных запросов, параллельности обработки информации, распараллеливания и слияния информационных потоков"*.

Алгоритмы не следует выдвигать для защиты, если новизна относится к алгоритмически реализованному методу, при этом, чтобы подчеркнуть важный с точки зрения практической значимости факт алгоритмической реализуемости метода, рекомендуется выдвинуть для защиты алгоритмически реализуемый метод.

Заключая сказанное, следует отметить, что довольно часто во введении наиболее существенные положения и наиболее существенные новые научные результаты, выдвигаемые для защиты, подменяют наименованиями полученных научных результатов с указанием их значимости, при этом сведения о научной новизне оказываются не представленными.

Публикации. Следует исходить из того, что *"Основные научные результаты диссертации должны быть опубликованы в научных изданиях"*, а *"при использовании в диссертации идей или разработок, принадлежащих соавторам, коллективно с которыми были написаны научные работы, соискатель обязан отметить это обстоятельство в диссертации"* [9, п.10,11].

В практике защиты встречаются диссертации как с весьма подробными сведениями о публикациях, так и с предельно краткими.

Пример соответствующей части введения к диссертации с весьма подробными сведениями (здесь и далее нумерация ссылок, выходящая за пределы, указанные в списке использованных источников, является условной):

"Публикации. Основные научные результаты диссертации опубликованы в 11 научных изданиях, в составе которых 2 научных статьи [22,23] в периодических научных изданиях, рекомендуемых ВАК для публикации научных работ, отражающих основное научное содержание диссертаций, общим объёмом 18 с. (авторских 50%); 1 депонированная рукопись [25] объёмом 29 с. (авторских 50%); 2 патента на изобретения [52, 53] с общим объёмом описаний 6 с. (авторских 50%) и 3 работы, опубликованные в материалах всероссийских научно-технических конференций [40,41] и на XXIV международной конференции (IT-SE'97) Новые информационные технологии в науке, образовании и бизнесе [42] общим объёмом 12 с. (авторских 66%).

Научные результаты диссертации, содержащие сведения, имеющие гриф "...", изложены в трёх отчётах о НИР [36-38] общим объёмом 22 с. (авторских 50%) и в документе, утверждённом в директивном органе [54].

Научные работы [23,24,36,37,40,42,52,53] выполнены в соавторстве, при этом:

публикации [40,42,52,53] сделаны соавторами на паритетных началах;

в [23] лично соискателем предложены показатели и математическая модель для учёта структуры индивидуальности обучаемых;

в [36] лично соискателю принадлежат введение, разделы 1 и 3;

в [37] соискателю принадлежат все теоремы подраздела 2.3, кроме теоремы 2.1, формулировка и первоначальный вариант доказательства которой принадлежат И.Дуброву. Совместно с ним разработаны алгоритмы этого подраздела. Результаты подраздела 3.1 [37] получены соискателем самостоятельно, после чего были обобщены совместно с К.Блохиной на многомерные пространства и опубликованы в [24]."

Пример предельно кратких сведений о публикации:

“Публикации. Основные научные результаты диссертации опубликованы в 11 научных изданиях, в составе которых 2 научных статьи [22,23] в периодических научных изданиях, рекомендуемых ВАК для публикации научных работ, отражающих основное научное содержание диссертаций, 1 депонированная рукопись [25], 2 патента на изобретения [52, 53] и 3 работы, опубликованные в материалах всероссийских научно-технических конференций [40,41] и на международной конференции [42].

Научные результаты диссертации, содержащие сведения, имеющие гриф "...”, изложены в трёх отчётах о НИР [36-38] и в документе, утверждённом в директивном органе [54]”.

Подробные сведения необходимы, когда соискатель в большинстве публикаций выступает в качестве соавтора, а краткое изложение допустимо, когда соискатель является единоличным автором практически всех указанных публикаций.

Сведения о том, что на те или иные идеи, выдвинутые автором (и/или с его участием) получены патенты на изобретения и полезные модели несомненно украшают диссертацию. Тем самым подчёркивается мировая новизна соответствующих предложений автора, засвидетельствованная государственной патентной экспертизой.

Иногда считается целесообразным во введении диссертации (обычно перед подзаголовком *Публикация*) предусмотреть дополнительный подзаголовок *Апробация* с изложением сведений об участии соискателя в вузовских, ведомственных и межведомственных семинарах и конференциях, а также о публикациях, не относящихся к научным изданиям, в которых должны быть опубликованы основные результаты диссертаций.

Апробация. Требований к формам апробации и изложению сведений об апробации в нормативных документах не предъявляется.

Обычно излагаются сведения об апробации основных научных результатов диссертации на научных конференциях и семинарах, не относящихся к всероссийским и международным.

Пример изложения сведений об апробации:

“Апробация. Основные научные результаты диссертации докладывались, обсуждались и были одобрены на межвузовских и межведомственных научных конференциях г. Санкт-Петербург, 2006, г. Ростов-на-Дону, 2008, 2009, г. Москва, 2009 г.”

В более развернутом варианте сведений указывают названия конференций и организаций, в которых они проведены.

Реализация. При изложении соответствующих сведений следует указывать организации, в которых осуществлена реализация, наименования форм реализации и реквизиты соответствующих документов. Для того чтобы упростить экспертизу диссертации и избежать кривотолков, целесообразно указанные в тесте и автореферате диссертации факты внедрения результатов проведенных исследований (в диссертации, имеющей теоретическое значение, их может и не быть [9, п.8]) засвидетельствовать актами. Пример:

"Реализация. Основные результаты диссертации реализованы в следующих документах, что засвидетельствовано оформленными актами:

в эскизном проекте ОКР "Патруль", инв. в/ч № 7432с (акт, исх. в/ч №22 от ...);

в методических материалах "Научно-методический аппарат логического вывода для обработки информации в АСУ войсками...", инв. в/ч № 5717 (акт, исх. в/ч №122 от ...);

в техническом проекте системы имитационного моделирования боевых действий ракетных соединений, инв. в/ч № 193347 (акт, исх. в/ч №139 от ...);

в отчёте о командно-штабных учениях инв. НТК РВСН № 25256 (акт, исх. НТК РВСН №22 от ...);

в Плане боевых действий объединения, инв. в/ч № 5323/с (акт, исх. в/ч №27 от ...);

в тематическом плане учебной дисциплины Д-103 (инв. кафедры 2 РВВКИУ РВ №258 от ...);

в методической разработке "Оценка возможностей ВТО и СНС по поражению объектов РВСН" (инв. кафедры 2 РВВКИУ РВ № 259 от ...).

Научные результаты диссертации использованы при подготовке четырёх отчётов о научно-исследовательских работах [36-39]⁷, две из которых [37,39] реализованы заказчиками – акты о реализации НИР вх. РВВКИУ РВ № 122/НИО от ... и № 63/НИО от"

⁷ Здесь указываются ссылки на все отчёты о НИР (как имеющие, так и не имеющие гриф).

7.1.2. Основные разделы диссертации

Первый раздел диссертации. Основное содержание данного начального раздела составляет обоснование актуальности и сущности общей научной задачи, решаемой в диссертации, проводимое на базе анализа предмета исследования под углом зрения практических потребностей дальнейшего развития науки в соответствующей предметной области и состояния разработки известного научно-методического аппарата, применимого в рассматриваемой области исследования.

При разработке материалов раздела надо ориентироваться на то, что: *"Предложенные автором решения должны быть аргументированы и оценены по сравнению с другими известными решениями"* [9, п.8].

Рекомендуется следующая ***структура первого раздела диссертации***, способствующая выполнению этих требований.

Диссертация как научно-квалификационная работа приобретает особую чёткость, если первый раздел и его подразделы, имеют наименования, передающие смысл, выражаемый следующими названиями:

1 Актуальность и сущность научной задачи (проблемы) исследования

1.1 Объект, цель и предмет исследования

1.2 Анализ известного научно-методического аппарата и необходимости его совершенствования

1.3 Постановка общей научной задачи (проблемы) и частные задачи исследования

В начале помещается подраздел, посвященный анализу противоречия, возникшего в практике рассматриваемой предметной области типа *"то, что имеет практика, ей недостаточно"*. В данном подразделе главным образом анализируются объект и предмет исследования и мотивируется прагматическая цель исследования, которая для диссертации, имеющей прикладной характер, является общей целью исследования.

Если первый подраздел первого раздела диссертации обычно отводится анализу противоречия, возникающего в практике предмет-

ной области, то очередной подраздел этого же раздела научно-квалификационной работы (которая должна быть выполнена на уровне вклада в науку с мировой новизной) естественно посвятить выявлению противоречия типа *"то, чем располагает наука, уже не может удовлетворить"*.

В данном подразделе приводятся результаты анализа всего того научно-методического аппарата, известного из отечественной и зарубежной литературы, который разработан для рассматриваемой предметной области, а также научно-методического аппарата из других предметных областей, если он может быть использован. При этом осуществляются общий анализ адекватности существующих постановок задач, оценки состава учитываемых факторов, принятых допущений и ограничений, наиболее характерных формульных соотношений, качества получаемых научных выводов и рекомендаций применительно к конкретному предмету исследования, что не исключает более детального анализа тех или иных элементов известного научно-методического аппарата в последующих разделах диссертации.

Недостатком первого раздела в ряде диссертаций является явно преувеличенное внимание к анализу объекта исследования в ущерб анализу достоинств и недостатков известного научно-методического аппарата и необходимости его совершенствования. Иногда анализ осуществляется в тех же аспектах, что и у других авторов, даётся поверхностно, схематично, неубедительно, без критического обсуждения и сопоставления конкретных показателей, расчётных соотношений и без оценки их адекватности и области применения.

При разработке материалов второго подраздела требование мировой новизны заставляет соискателя не ограничиваться анализом лишь того, что известно в организации, где он работает, а активно и настойчиво искать и анализировать все материалы, имеющие отношение к диссертационному исследованию, во всех доступных источниках. Соискатель должен обеспечить личное глубокое знание состояния проработки вопросов в исследуемой им относительно узкой области науки на уровне никак не ниже совокупности знаний всех тех лиц, которые участвуют или могут участвовать в экспертизе его диссертации (официальные оппоненты, специалисты других организа-

ций, дающие заключения на диссертацию, члены диссертационного совета, в том числе внешние, члены экспертного совета ВАК и т.д.).

Недостатком ряда диссертаций является отсутствие в перечне использованной литературы иностранных источников, проработанных автором. В научно-квалификационной работе не лишне показать, что кандидатский экзамен по иностранному языку был сдан соискателем не ради формальности.

Некоторые соискатели стремятся избегать детальной критической оценки известного научно-методического аппарата, руководствуясь опасениями, что это может вызвать недовольство авторов критикуемых работ.

Но, во-первых, следует учитывать, что все, занимающиеся научной деятельностью, достаточно глубоко осознают относительность добытых знаний и потенциальную возможность развития любых результатов. Каждый понимает, что количество ссылок на научные публикации специалиста является мерой его известности, выражением авторитета. Даже в том случае, когда с полным основанием вообще отвергаются научные положения автора публикации, у него есть повод и право испытывать удовлетворение: затраченный труд не пропал даром, он не просто замечен, а послужил определённой вехой на пути познания истины, дал побудительный толчок для дальнейшего развития науки. При этом объективная критическая оценка не может умалить, а лишь более чётко очерчивает реальные научные достижения.

Во-вторых, всегда можно найти такую форму изложения, чтобы критика была не только справедливой и аргументированной, но и доброжелательной, даваемой на фоне анализа соответствующих научных достижений автора, его личного вклада в науку. Более того, иногда можно обойтись вообще без критических высказываний, обсуждая лишь необходимость дальнейшего развития того, что уже сделано, и перенося, таким образом, внимание с недостатков известного на достоинства искомого.

Итак, избегать впервые выполняемого в тех или иных аспектах подробного критического анализа работ других авторов не следует, это обедняет диссертацию, а при условии доброжелательности

и соответствующей литературной обработке может быть обеспечена самая высокая принципиальность оценки любой публикации.

Характерным недостатком последнего подраздела, посвящённого изложению постановки общей научной задачи (проблемы) и частных задач диссертационного исследования, является уклонение от чёткого формулирования постановки общей научной задачи, решение которой должно содержаться в диссертации.

Довольно часто постановка задачи подменяется перечнем наименований частных задач исследования либо краткой содержательной формулировкой на уровне названия задачи, не раскрывающего её конкретный смысл.

Под **постановкой общей научной задачи диссертационного исследования** понимают компактную формализованную формулировку, раскрывающую, **что требуется** и **что дано** с применением символических обозначений как для исходных данных, так и для целевой и (или) критериальной функции.

Пример краткой содержательной формулировки общей научной задачи, соответствующий примерам наиболее существенных новых научных положений и других научных результатов, выдвигаемых для защиты, из кандидатской диссертации:

"Научная задача исследования – разработка методики минимизации стоимости C обслуживания внешнего потока заданий, поступающих на вход информационно-вычислительной системы (ИВС) при заданных исходных данных о топологии ИВС и протоколах информационного обмена, количестве n узлов ИВС, стоимости c_{qi} q -го варианта комплекующих i -го узла ($q=1\dots k, i=1\dots n$), интенсивности λ_{ji} поступления j -го задания ($j=1\dots m$) внешнего потока на обслуживание i -м узлом, законе F_{ji} распределения интервалов поступления j -го задания внешнего потока на обслуживание i -м узлом ИВС и законе f_{ji} распределения длительностей обслуживания j -го задания в случае его назначения для обслуживания i -му узлу:

$$C(n, c_{qi}, \lambda_{ji}, F_{ji}, f_{ji}) \rightarrow \min."$$

Не рекомендуется в постановку общей научной задачи включать прагматические и научно-прагматические требования, сковывающие элементы научного поиска и навязывающие, что именно на-

до делать (например, какой именно метод использовать и какими он должен обладать свойствами) для решения задачи.

Первый раздел диссертации, как и все другие разделы, принято завершать выводами.

Выводы формулируются как итоговые утверждения, выражающие в краткой форме наиболее важные научные результаты, проработке и изложению которых посвящен данный раздел.

В сущности, если сама *диссертация* в соответствии с п.8 действующего Положения о присуждении [9] представляет собой «*новые научные результаты и положения, выдвигаемые для публичной защиты*», то *выводы по разделу* – это *выдвигаемые для защиты основные новые научные результаты* в виде положений, обоснованных и доказанных в данном разделе диссертации.

Наиболее важные выводы обобщаются и представляются во введении диссертации как *выдвигаемые для защиты наиболее существенные положения и наиболее существенные новые научные результаты*.

Формулируемые выводы должны обладать научной новизной либо чётко выражать личную позицию автора или его критическое отношение к уже известному.

Научные положения, приводимые в выводах по разделу диссертации, являются, как правило, более мелкими по сравнению с наиболее существенными положениями, приводимыми во введении (впрочем, ничего нет предосудительного и в случае обнаружения при сравнении полного совпадения некоторых или даже всех наиболее существенных новых научных положений, выдвигаемых для защиты, с теми или иными выводами по разделам диссертации).

Естественно требовать, чтобы в научно-квалификационной работе, выполняемой на уровне личного вклада автора в науку, в выводах по разделам не помещались общеизвестные (тривиальные) или уже опубликованные другими авторами утверждения и цифры, если в соответствующем разделе диссертации не проанализированы альтернативные (иные) сведения, опубликованные в научной литературе или известные из практики, ибо в ином случае такие выводы выглядят присвоенными и в них "тонут" выводы, являющиеся личной заслугой автора.

Недостатком ряда диссертаций является то, что вместо выводов приводится перечисление сделанного, например:

“Выводы по разделу

1. Проведен анализ основных недостатков ...
2. Обоснованы показатели эффективности ...
3. Предложены способы расчёта ...”,

и при этом не характеризуется сущность научных результатов и не указываются признаки научной новизны, свидетельствующие о вкладе автора в науку.

В выводах обычно не дают ссылки на литературу и не приводят мотивацию или объяснение, но, с другой стороны, недопустимо появление выводов, не поддержанных текстом в соответствующем разделе диссертации.

Очень часто выводы переполняют начальные формулировки типа *“Анализ показал, что ...”, “Из изложенного следует...”*. Они затемняют смысл выводов, отвлекают внимание от основного. Целесообразно от подобных слов вообще избавиться, сделав выводы более компактными.

Лучше всего, если к выводам предъявляются те же требования, что и к приводимым во введении к диссертации наиболее существенным новым научным положениям, выдвигаемым для защиты (фразы типа *“метод позволяет нечто”* должны быть заменены на *“нечто достижимо методом”* и т.п.).

При рекомендуемом построении **первого раздела** диссертации целесообразны следующие **выводы:**

– *о наличии противоречия в практике (типа “то, что имеет практика, ей недостаточно”);*

– *о целевой направленности и ожидаемой практической значимости проведения научного исследования в рассматриваемой предметной области;*

– *о состоянии разработки научно-методического аппарата, применимого в рассматриваемой предметной области (что уже сделано в науке);*

– *о недостатках существующего научно-методического аппарата (что не сделано в науке или сделано, но не на должном уровне);*

- о наличии противоречия в науке (типа "то, чем располагает наука, уже не может удовлетворить");
- о сущности и актуальности общей научной задачи (проблемы) диссертационного исследования;
- о целесообразных рамках исследования (при необходимости).

Если первый раздел диссертации не завершается выводами о состоянии разработки научно-методического аппарата в рассматриваемой предметной области и об актуальности решаемой общей научной задачи (проблемы), то вполне правомерен упрек автору: им не сделано то, ради чего фактически обычно и пишется начальный раздел работы, выполняемой на уровне вклада в науку.

Второй раздел посвящается разработке и обоснованию новых научных результатов, обеспечивающих решение общей задачи диссертационного исследования.

Для этого раздела и его подразделов могут быть рекомендованы наименования, передающие смысл, выражаемый следующими названиями:

2 Разработка метода (методики) решения задачи

2.1 Обоснование состава показателей и критериев, используемых при решении рассматриваемой научной задачи

2.2 Построение модели (моделей) для формализованного описания исследуемых свойств предмета диссертационного исследования

2.3 Разработка метода (методов, методики) решения общей научной задачи

В случае разработки метода (или методики) не следует ограничиваться приведением основных формульных соотношений – необходимо изложить описание метода (или методики) с пояснением взаимосвязей структурных элементов, а при целесообразности привести структурную схему.

В конце второго раздела диссертации могут быть приведены выводы:

- о составе показателей и критериев, которые целесообразно выбрать для проведения исследования;

– о возможностях и недостатках существующего научно-методического аппарата с точки зрения методов расчёта показателей и формирования критериев;

– о сущности и возможностях предлагаемых новых элементов научно-методического аппарата;

– о результатах оценки предлагаемых элементов научно-методического аппарата и методики исследования по сравнению с известными (что осуществимо, достижимо, реализуемо и т.д.);

– о целесообразной структуре общей методики решения научной задачи.

Третий раздел диссертации (содержащей три раздела) целесообразно посвятить обоснованию практической значимости разработанных новых научных результатов и оценке степени достижения цели диссертационного исследования.

Рекомендуемые наименования раздела и его подразделов:

“3 Обоснование рекомендаций...”

3.1 Разработка рекомендаций...

3.2 Экспериментальная проверка рекомендаций...

3.3 Техничко-экономическая оценка рекомендаций...”

Содержанием раздела является непосредственное применение разработанных новых научных результатов для синтеза, оценки и оптимизации рекомендаций.

Предлагаемые практические рекомендации должны сопровождаться комплексными оценками эффективности их осуществления, в том числе технико-экономическими оценками.

Важной частью рассматриваемого раздела является оценка степени достижения цели диссертационного исследования. Эта часть обычно включает получение показателя или критерия достижения цели, способа расчёта соответствующего показателя, анализ возможных значений показателя с графическими иллюстрациями и формулирование рекомендаций (с необходимыми обоснованиями и оценками).

В составе **выводов** по **третьему разделу** могут быть предусмотрены:

– о применимости новых элементов научно-методического аппарата и сравнении их с известными;

- о технической и экономической эффективности новых рекомендаций и сравнительной оценке их с известными;
- о достижении цели диссертационного исследования по избранному показателю и/или критерию.

Рекомендуется после завершения работы над выводами по всем разделам диссертации откорректировать формулировки наиболее существенных научных положений и других наиболее существенных новых научных результатов, выдвигаемых для защиты.

7.1.3. Заключение диссертации

При оформлении заключения целесообразно стремиться изложить сведения, которые, по мнению соискателя и его научного руководителя, могли бы быть использованы при подготовке заключений и отзывов в процессе экспертизы диссертации.

К таким сведениям, в частности, относятся значение наиболее существенных научных результатов, свидетельствующих о личном вкладе в науку, для теории (теоретическая значимость) и практики (практическая значимость), а также сведения о достоверности (если не указаны во введении) и рекомендации об использовании результатов диссертационного исследования [9, п.28].

7.2. Изложение научных результатов в автореферате

Соответственно требованиям ГОСТ Р 7.0.11-2011 [15], автореферат включает в себя:

- а) обложку автореферата диссертации;
- б) текст автореферата диссертации с разделами:
 1. Общая характеристика диссертационного исследования
 2. Основное содержание диссертации
 3. Заключение
 4. Список работ, опубликованных автором по теме диссертации.

В разделе *Общая характеристика диссертационного исследования* целесообразно предусмотреть следующие подразделы:

Актуальность диссертационного исследования (не только прагматическая, но и научная)

Объект исследования (при целесообразности)

Цель диссертационного исследования
Предмет исследования (при целесообразности)
Общая научная задача, решение которой содержится в диссертации

Рамки исследования (при необходимости)
Научная новизна
Наиболее существенные положения, выдвигаемые для защиты
Наиболее существенные новые научные результаты, выдвигаемые для защиты)
Достоверность (чем обеспечивается или подтверждается)
Апробации
Публикации
Реализация

В подразделе “Актуальность диссертационного исследования” следует ориентироваться на обоснование актуальности не темы диссертации, а рассматриваемой общей научной задачи, т.е. на научную актуальность диссертационного исследования (не сводя всё к прагматической актуальности).

Вполне естественным является совпадение материалов пунктов раздела автореферата “Общая характеристика диссертационного исследования” с соответствующими материалами введения и заключения диссертации (при несовпадениях и несоответствиях обычно у экспертов возникают вопросы).

Раздел “Основное содержание диссертации” обычно строится в обзорном порядке:

Во введении диссертации...

В первом разделе...

Во втором разделе...

Именно в данном разделе автореферата должны быть основные идеи и выводы диссертации (постановки частных задач диссертационного исследования, сведения о методах и результатах их решения), при этом в ходе изложения следует уделить должное внимание иллюстрированию новизны, научного уровня диссертационного исследования и достоверности его результатов.

Убедительность иллюстрирования новизны, научного уровня исследования и достоверности его результатов обеспечивается:

- изложением постановки общей научной задачи и вытекающих из неё частных задач исследования;

- чётким формулированием постановок для каждой частной задачи исследования и указанием научно-методического аппарата, используемого для её решения (с необходимыми комментариями);

- приведением в тексте автореферата тех отдельных элементов научно-методического аппарата (формульные соотношения, логические правила и т.п.), в которых внесена новизна;

- пояснением полученных в процессе исследования количественных данных (представляемых, например, в виде таблиц, диаграмм и графиков), подтверждающих наиболее существенные новые научные положения, выдвигаемые для защиты.

В разделе *Научная и практическая значимость результатов диссертационного исследования* приводятся сведения, ранее рекомендованные для заключения диссертации.

8. ПОРЯДОК РАБОТЫ НАД КАНДИДАТСКОЙ ДИССЕРТАЦИЕЙ

Диссертационная работа представляет собой осуществляемый соискателем учёной степени (самостоятельно или под научным руководством) сложный и довольно длительный процесс подготовки диссертации и её защиты.

Подготовка диссертации в наиболее общем случае включает выбор темы диссертационной работы, планирование диссертационного исследования, в том числе составление и утверждение плана (или плана-проспекта) диссертационной работы, самостоятельное творческое (возможно, с элементами коллективного творчества) проведение диссертационного исследования, оформление и апробацию получаемых научных результатов, пробное внедрение результатов диссертационной работы, оформление диссертации, а также документов, требуемых для защиты (автореферата диссертации, актов о реализации и др.).

В квалификационной практике принято оценивать не диссертационную работу соискателя, а её конкретный результат – диссертацию. В Положении о присуждении учёных степеней [9, п.7] при изложении требований к диссертациям применяется понятие “научно-квалификационная работа”, а понятие “диссертационная работа” вообще не употребляется, так как говорится о выполненной диссертации [9, п.12, 21] как полученном результате.

Диссертационная работа начинается с составления плана, представляющего собой документ, содержащий сведения о предполагаемой структуре и содержании диссертации. Следует иметь в виду, что тема диссертации формулируется на завершающем этапе работы. Она должна соответствовать реально достигнутому и может не совпадать с первоначально указанной темой диссертационной работы. Кроме того, может отличаться от указанного в плане и содержание окончательно оформленной диссертации. Гораздо хуже, если тема диссертации не соответствует её реальному содержанию.

После согласования и утверждения плана, обычно оформляемого в виде более объёмного документа, называемого планом-про-

спектом, дополнительно включающим сведения об актуальности планируемого исследования, а также о научной и практической значимости, наступает достаточно длительный период непосредственной разработки диссертации, который, в случае оформления её в виде самостоятельного рукописного научного труда, имеет продолжительность обычно не менее трёх лет. Именно в этот период разворачиваются во всей своей сложности творческие процессы, приводящие соискателя к получению и оформлению новых научных результатов на уровне вклада в науку.

Творческие процессы в науке практически всегда реализуются многоэтапно, методом проб и ошибок, т.е. не строго поступательно, а с неоднократными возвратами к предыдущим этапам работы с целью коррекций – уточнения, а иногда и коренного пересмотра ранее достигнутых результатов.

Между тем многими защитившимися соискателями и их научными руководителями было обнаружено любопытное обстоятельство: наибольшее количество вынужденных правок (коррекций) получается при разработке материалов диссертации в порядке следования разделов и подразделов, указанных в плане-проспекте. Следует, однако, отметить, что отход от такого, казалось бы, естественного порядка работы часто и очень заметно сокращает трудоемкость подготовки и оформления диссертации. Опыт научного руководства соискателями и текущей оценки результатов их творческой деятельности позволяет дать излагаемые ниже рекомендации относительно целесообразного порядка подготовки и оформления материалов диссертации. Действенность рекомендаций проверена и реально подтверждена практикой досрочной защиты диссертаций.

Непосредственную разработку диссертации рекомендуется начать с изучения публикаций других авторов по рассматриваемой проблематике с целью определения актуальных вопросов диссертационного исследования и выявления противоречий в науке и практике рассматриваемой предметной области.

В дальнейшем изучение публикаций других авторов должно превратиться в периодически выполняемую работу на фоне всех других видов работ над диссертацией.

Типичной ошибкой, возникающей из-за недостаточного опыта, является попытка начать подготовку диссертации с оформления чернового варианта первого раздела. По мере дальнейшей диссертационной работы, и особенно на этапе завершения работы над диссертацией, этот вариант будет устаревать и его непременно придётся многократно пересматривать и корректировать. В то же время вполне естественным является начало подготовки диссертации с оформления обзорных (реферативных) материалов (сообщений, докладов) по проблематике проводимого диссертационного исследования с анализом известных постановок научных задач и методов их решения и выявлением имеющихся недостатков и проблемных вопросов. В процессе изучения публикаций целесообразно в специально заведенную тетрадь делать выписки из изучаемых материалов (с указанием реквизитов публикаций), которые могут быть процитированы (или использованы иным образом) при разработке и оформлении первого, а также и других разделов диссертации.

При изучении публикаций по теме диссертации следует иметь в виду, что любой предмет, выбранный для исследования, обладает неисчислимым количеством свойств, безграничных для познания. Даже в случае хорошо изученного предмета (признаком чего является наличие большого количества соответствующих публикаций научно-методического и методологического характера) достаточно дополнительного более глубокого изучения, чтобы убедиться, что знания о предмете являются не только не исчерпывающими, но и не совершенными.

Неотвратимость развития науки проявляется в том, что рано или поздно тому или другому исследователю откроются горизонты непознанного, которые будут расширяться по мере всё более глубокого познания свойств исследуемого предмета. В этом смысле нет предметов исследований, которые не могли бы послужить основой для диссертации, но есть соискатели учёных степеней и их научные руководители, не способные в силу реально ограниченного индивидуального и общественного познания того или иного предмета (даже при вполне оправданной уверенности, что они познали его глубже, чем кто-либо) увидеть очень большое количество актуальных науч-

ных задач и проблем, решение которых было бы несомненным вкладом в науку и практику.

Как только соискатель оказывается способным на основе собственных убеждений судить о недостатках не только практики, но и того, что сделано и делается в науке рассматриваемой предметной области, целесообразно приступить к построению и обоснованию методики исследования, а также к выработке и оценке новых практических выводов и рекомендаций. Это соответствует переходу к подготовке материалов второго и последующих (если их больше трёх) разделов диссертации.

На этом этапе, сущность которого составляют главным образом выдвижение и проверка научных предположений (гипотез), построение моделей (т.е. более или менее абстрактных описаний того, что исследуется) и разработка методов решения частных научных задач (а также анализ их достоверности и применимости), внимание соискателя то и дело перераспределяется между наукой и практикой рассматриваемой предметной области, между развиваемыми элементами научно-методического аппарата, получаемыми частными теоретическими результатами и располагаемыми эмпирическими данными.

По мере дальнейшей работы во всё большей степени внимание сосредотачивается на систематизации полученных разрозненных результатов и увязывании их в единый научный труд.

Очередными важнейшими задачами в работе над диссертацией являются уточнение цели диссертационного исследования и краткой (содержательной) формулировки общей научной задачи (первоначальная, ориентировочная краткая формулировка общей задачи составляется ещё при подготовке плана-проспекта диссертационной работы). Кроме того, рекомендуется предварительное формулирование наиболее существенных положений и наиболее существенных новых научных результатов, выдвигаемых для защиты, которые на последующих этапах диссертационной работы развиваются и всё более уточняются и конкретизируются. Опытные научные руководители знают, насколько велика ориентирующая и дисциплинирующая роль предварительных формулировок, и поэтому стремятся

побудить соискателей приступить к первоначальному их продумыванию и оформлению как можно раньше.

На последней стадии разработки второго и последующих разделов диссертации особое внимание уделяется выбору показателя (или показателей – целесообразно не более двух) количественной оценки степени достижения цели, обычно проводимой в заключительном разделе диссертации.

После того как разработка материалов второго и последующих разделов диссертации окажется по оценкам соискателя и научного руководителя практически завершённой, переходят сначала к формулированию всех выводов по второму и последующим разделам, а затем к окончательному формулированию цели диссертационного исследования (подготавливаемой для введения к диссертации), постановки общей научной задачи или проблемы (как правило, помещаемой в конце первого раздела диссертации), а также краткой содержательной формулировки общей научной задачи (проблемы) и наиболее существенных положений, выдвигаемых для защиты (обычно помещаемых во введении к диссертации и в первом разделе автореферата).

После этого целесообразно приступить к оформлению материалов первого раздела, причём в порядке, обратном нумерации подразделов. Целесообразно ориентироваться на типовую структуру первого раздела диссертации, обычно содержащего не менее трех подразделов, включающих сведения, соответствующие названиям:

1.1 Актуальность, цель и предмет исследования

1.2 Анализ известного научно-методического аппарата и необходимости его совершенствования

1.3 Постановка общей научной задачи (проблемы) и частные задачи исследования

Сначала подготавливаются материалы последнего подраздела первого раздела *"Постановка общей научной задачи (проблемы) и частные задачи исследования"*. Как ясно из вышеизложенного, постановка научной задачи (проблемы) к этому времени оказывается уже полностью отработанной, а частные задачи исследования, чётко выраженные рубрикой практически завершённых разделов диссертации, лишь констатируются и могут быть пояснены рисунком

"Структура исследования", вполне подходящим и для плаката, используемого при защите диссертации.

Далее уточняются цель и частные задачи исследования.

Правильно сформулированная общая цель диссертационного исследования, ввиду того, что на неё распространяется общее требование "Предложенные автором решения должны быть ... оценены по сравнению с другими известными решениями" [9, п.8], должна быть изложена в виде, позволяющем (в рамках вариантов формулировок выбираемых среди допустимых) количественно оценить степень её достижения.

Правильно поставленные частные задачи диссертационного исследования, ввиду того, что "диссертация должна ... иметь внутреннее единство" [9, п.8], должны иметь непосредственную направленность на разработку новых научных результатов и оценку их достоверности и практической значимости и ориентированы на достижение общей цели исследования.

Необходимо особо отметить следующее. Если общая цель диссертационного исследования (формулируемая относительно объекта исследования) и постановки частных научных задач диссертации *сформулированы правильно*, а при решении основных частных научных задач широко использованы формализованные или формальные (например, математические) методы, то выявление постановки общей научной задачи (проблемы) утрачивает элементы субъективизма.

В процессе объективного выявления формализованной постановки общей научной задачи на основе материалов диссертационного исследования определяют:

1) основной критериальный показатель оценки степени достижения общей цели диссертационного исследования, характеризующий в постановке общей научной задачи (проблемы), **что требуется**. Соответствующий критерий обычно обосновывается и оценивается в одном из разделов диссертации;

2) перечень исходных данных для решения общей научной задачи (проблемы) диссертационного исследования, характеризующий в постановке общей научной задачи (проблемы), **что дано**. Такой перечень получается в результате спуска по имеющейся ие-

рархии постановок частных научных задач к тем исходным данным, которые не оказываются промежуточными с точки зрения решения общей научной задачи (проблемы).

Теперь можно окончательно оформить постановку общей научной задачи (проблемы) диссертационного исследования, которая при целесообразности дополняется допущениями и ограничениями, водимыми и обосновываемыми при решении частных научных задач.

В порядке дальнейшего оформления первого раздела диссертации подготавливаются материалы подраздела *"Анализ известного научно-методического аппарата и необходимости его совершенствования"*, отражающего своим содержанием тезис *"то, чем располагает наука, уже не может удовлетворить"* применительно к рассматриваемой предметной области.

На этой стадии подготовки диссертации особенно широко используются результаты изучения публикаций других авторов, которые накапливались в специально заведенной папке в виде выписок или в виде ссылок в процессе всей работы.

После этого оформляется начальный подраздел *"Предмет и цель исследования"*, отражающий в своем содержании тезис *"то, что имеет практика, ей недостаточно"*. Можно лишь добавить, что разрабатывать материалы первого раздела в порядке, обратном нумерации подразделов, оказывается проще ввиду чёткой смысловой нацеленности каждого очередного оформляемого подраздела - он должен поддержать, и притом только необходимыми обоснованиями, конкретные материалы того подраздела, который был перед этим оформлен.

Наконец, последними в условиях полной определённости относительно содержания всей работы оформляются введение и заключение диссертации.

Помещаемый во введение окончательный вариант краткой содержательной формулировки общей научной задачи для исключения противоречий целесообразно получить сжатием (трансформированием) её постановки. Для обеспечения краткости формулировки вполне естественно применение обобщенных названий для больших групп рассматриваемых показателей, а в оптимизационных задачах – терминов "максимизация" и "минимизация" в научно-прикладном смысле (в общем случае, не подразумевающим непре-

менный поиск экстремума). Оцениваемый или оптимизируемый показатель, указываемый в части формулировки и постановки общей научной задачи **что требуется**, должен соответствовать прагматическому эффекту, достижение которого является целью диссертационного исследования (например, если цель – повышение производительности, то **что требуется** сводится к максимизации производительности).

В большинстве случаев краткую формулировку общей научной задачи целесообразно дополнить формулированием рамок исследования.

После этого рекомендуется проверить соответствие всех элементов блока «Название диссертации – цель диссертационного исследования – краткая формулировка общей научной задачи (во введении) – постановка общей научной задачи (в первом разделе) – количественная оценка степени достижения цели (в последнем разделе диссертации)».

Наконец, рекомендуется также проверить на смысловое соответствие элементы блока «Наиболее существенные положения, выдвигаемые для защиты» (введение), «Наиболее существенные новые научные результаты, выдвигаемые для защиты» (введение), все выводы по разделам.

На заключительном этапе оформления диссертации целесообразно провести проверку совпадения ключевых слов, с одной стороны, в помещаемых во введении к диссертации и в автореферате наиболее существенных научных результатах и положениях, выдвигаемых для защиты, а с другой стороны, в наименованиях разделов и подразделов диссертации, а также в названиях плакатов, подготавливаемых для проведения защиты. В диссертациях, в отличие от художественной литературы, использование синонимов и других понятий, близких по смыслу, демонстрирующих словарный запас автора и якобы «разукрашивающих» речь, совершенно неуместно и, как показывает опыт, в значительной степени затрудняет восприятие материала.

Кроме того, надо убедиться в том, что каждое слово, содержащееся в названии диссертации, использовано в качестве ключевого в тексте основных разделов диссертации, а при упоминании в

названии принципов – они в тексте диссертации должны не просто подразумеваться, а быть целевым образом изложены и чётко сформулированы (с получением названий).

С точки зрения предстоящего доклада при защите диссертации, который лучше всего строить в виде компактного изложения конкретных научных результатов решения частных задач исследования, рекомендуется откорректировать формулировки частных задач исследования и наиболее существенных новых научных положений, выдвигаемых для защиты, таким образом, чтобы каждое выдвигаемое для защиты наиболее существенное положение подводило итог докладываемым научным результатам решения одной либо двух-трёх взаимосвязанных частных задач.

Окончательно отработанные материалы введения берутся за основу при написании автореферата (в части, совпадающей по содержанию).

В процессе разработки и оформления диссертации должное внимание необходимо уделить **апробации** и реализации результатов диссертационного исследования, т.е. представлению их на обсуждение специалистов.

Основные **формы апробации**:

представление материалов к опубликованию;

включение материалов в отчёты о НИР;

участие со своими научными результатами в учениях, деловых играх и т.п.;

выдвижение результатов работы на конкурсы;

участие с докладами и сообщениями в научных семинарах, конференциях, симпозиумах;

оформление изобретений и рационализаторских предложений.

Высшими **формами апробации** для **отдельных результатов** диссертации является их реализация, а для **диссертации в целом** – так называемая предзащита диссертации в подразделении той организации, где выполнялась диссертация или к которой был прикреплен соискатель, которая делает предварительную экспертизу диссертации и даёт по ней заключение (в соответствии с [9, п.12], являющееся официальным основанием для принятия её к защите.

Следует иметь в виду, что акты о реализации результатов исследования в аттестационное дело соискателя не включаются, однако в процессе экспертизы диссертации в ВАК могут быть запрошены документы, подтверждающие реализацию любых результатов, указанных в тексте, автореферате диссертации и в аттестационном деле как внедрённых.

Высокая требовательность к содержанию и оформлению диссертаций обусловлена тем, что с точки зрения общественных интересов нашему государству нужны не просто лица с учёными степенями, а подлинные учёные, способные развивать науку, а при необходимости и компетентно руководить научной работой коллективов. Успехи отечественной науки и техники завтра – это серьёзный спрос с претендентов на учёные степени сегодня. Повышенные требования, предъявляемые к соискателям учёных степеней, представляют собой своеобразный фильтр, способствующий наиболее успешному решению задачи подготовки настоящих учёных.

Опыт показывает, что подготовка диссертации, удовлетворяющей официально предъявляемым требованиям, вполне посильна для самого широкого круга специалистов. Необходимы только целеустремлённость, настойчивость и учёт с самого начала работы рекомендаций, о которых говорилось выше. Сформулируем их в краткой форме.

1. Диссертационную работу начинайте с уяснения требований, предъявляемых к научному уровню и оформлению диссертаций. Не пожалейте на это время: правильное понимание требований исключает распыление усилий, позволяет сосредоточиться на главном, обеспечивает экономию сил соискателя и научного руководителя, приводит к наивысшей отдаче затрачиваемого труда, к существенному сокращению сроков подготовки и защиты диссертации.

2. Посвящайте диссертационное исследование актуальной, интересующей вас научной задаче. Стремитесь, если это не вступает в противоречие с целью работы, максимально сузить рамки диссертационного исследования в пользу его глубины.

3. Формулируйте название темы так, чтобы оно отражало решаемую научную задачу. Не склоняйтесь к названию, указывающему лишь предмет исследования либо только чисто прагматическую задачу (проблему). Не начинайте название с уводящих от конкретики слов *"Совершенствование..."* и *"Повышение..."* (за исключением случая, когда речь идет о развитии научно-методического аппарата), а также со слова *"Исследование..."*.

4. Обосновывайте актуальность не темы, а решаемой научной задачи, усматривая разницу между научной и чисто прагматической задачей.

5. Формулируйте цель диссертационного исследования без подмены её частными целями в виде, позволяющем количественно оценить ожидаемую или реальную степень её достижения.

6. В помещаемой во введении краткой содержательной формулировке общей научной задачи стремитесь выразить наиболее важные элементы её постановки, указывая не только, что требуется, но и заданные исходные данные.

7. Стремитесь чётко выделить среди новых результатов исследования те, которые являются вкладом в науку (новыми научными решениями), и те, которые представляют другие – инженерно-технические, организационные и т.п. решения, реализующие результаты, являющиеся вкладом в науку. Акцентируйте внимание на получении новых научных результатов, являющихся вкладом в науку. Другие новые результаты исследования излагайте в качестве доказательства значимости результатов, являющихся вкладом в науку.

8. При изложении научной новизны во введении к диссертации и в разделе автореферата *"Общая характеристика диссертационного исследования"* формулируйте наиболее существенные положения, выдвигаемые для защиты, в виде обладающих научной новизной неочевидных выводов и рекомендаций, доказательство которых содержится в основных разделах диссертации, а также выдвигаемые для защиты наиболее существенные новые научные результаты (научно-методического характера – модели, методы, методики и т.д.) не только перечислением наименований соответствующих результатов, но и указанием их конкретных отличительных признаков научной новизны.

9. Существенную часть диссертационного исследования посвятите построению моделей исследуемых объектов и процессов, разработке и обоснованию метода (методов) решения частных научных задач, а также анализу их достоверности и практической применимости.

10. Имейте в виду, что новое решение научной задачи немыслимо без внесения элементов новизны в постановку задачи и (или) в метод (методы) её решения.

11. Описание решения каждой частной научной задачи начинайте с изложения её постановки: что требуется, при каких заданных исходных данных, а также, при необходимости, каковы допущения и ограничения.

12. Помните, что к научным результатам диссертаций предъявляются требования мировой новизны, поэтому оценивайте получаемые вами научные результаты с этих позиций, активно добывая информацию по теме диссертации во всех доступных источниках.

13. Не анализируйте в тексте диссертации те стороны объекта и предмета исследования, которые проанализированы в публикациях других исследователей; не цитируйте других авторов и не реферируйте известные работы, если можно ограничиться ссылками на литературу, за исключением случаев, когда цитируемые (реферируемые) материалы подвергаются детальному критическому анализу или оценке в последующем тексте диссертации.

14. Избегайте декларативных (бездоказательных), а также уже известных и не подвергаемых сомнению выводов и рекомендаций – они не засчитываются в квалификационную часть работы и подрывают впечатление о ней.

15. Заботьтесь о признании вашего приоритета в получении новых научных результатов, стремитесь быстрее опубликовать возникшую новую научную идею и результат исследования, обладающие новизной.

16. Отработайте текст диссертации и автореферата таким образом, чтобы было совершенно ясно, в какой степени каждая конкретная формула, график, таблица, вывод, рекомендация принадлежит вам, а в какой другим авторам. Постарайтесь исключить все двусмысленности и недомолвки на этот счёт.

17. Стремитесь, чтобы в актах о реализации результатов научных исследований обязательно было указано, *что внедрено* (перечислением наименований научных выводов и рекомендаций со ссылками на официальные публикации, в которых содержится их обоснование) и *в какой форме внедрено* (указанием документа с приведением его реквизитов).

И ещё один практический совет: проследите, чтобы формулировки решаемой общей научной задачи, наиболее существенных положений и наиболее существенных новых научных результатов, выдвигаемых для защиты, приводимые во введении к диссертации, в разделе *автореферата "Общая характеристика диссертационного исследования"* и на плакатах, используемых при защите, взаимно соответствовали.

БИБЛИОГРАФИЧЕСКИЙ СПИСОК

1. Большая Советская энциклопедия. – М.: Советская энциклопедия, 1972.
2. Военный энциклопедический словарь. – М.: Воениздат, 1983.
3. Словарь иностранных слов. – М.: Русский язык, 1990.
4. Философский энциклопедический словарь. – М.: Политиздат, 1987.
5. Ожегов С.И. Словарь русского языка / С. И. Ожегов. – М.: Русский язык, 1981.
6. Кондаков Н.И. Логический словарь-справочник / Н.И. Кондаков. – М.: Наука, 1975.
7. Федеральный закон от 23.08.96 N 127-ФЗ (ред. от 03.12.2012 с изменениями, вступившими в силу 15.12.2012) "О науке и государственной научно-технической политике". [Электрон. ресурс]. – Режим доступа: <http://www.referent.ru/1/67513>. Дата обращения 2.03.2013.
8. Словарь русского языка в четырёх томах. – М.: Русский язык, 1985.

9. Положение о порядке присуждения учёных степеней. Утверждено постановлением Правительства РФ от 20.06.2011 № 475). [Электрон. ресурс]. – Режим доступа: <http://www.tsu.ru/content/disadvice/stepen.php>. Дата обращения 2.03.2013.

10. ГОСТ 7.60-2003 "Издания. Основные виды. Термины и определения". [Электрон. ресурс]. – Режим доступа: <http://www.stroyplan.ru/docs.php?showitem=42116>, 2.03.2013.

11. ГОСТ 7.32-2001 "Отчёт о научно-исследовательской работе. Структура и правила оформления". [Электрон. ресурс]. – Режим доступа: <http://www.ifar.ru/library/gost/7322001.pdf>. Дата обращения 2.03.2013.

12. ГОСТ 7.9-95 "Система стандартов по информации, библиотечному и издательскому делу. Реферат и аннотация. Общие требования". [Электрон. ресурс]. – Режим доступа: <http://www.zakonprost.ru/content/base/45987/>. Дата обращения 2.03.2013.

13. Административный регламент исполнения Федеральной службой по интеллектуальной собственности, патентам и товарным знакам государственной функции по организации приема заявок на изобретение и их рассмотрения, экспертизы и выдачи в установленном порядке патентов РФ на изобретение. Утвержден приказом № 327 Министерства образования и науки РФ от 29.10.2008. [Электрон. ресурс]. – Режим доступа: <http://nns.vstu.ru/materialproekta/37>. Дата обращения 2.03.2013.

14. Лопатенко А.А. Плагиат. Что это значит? / А.А. Лопатенко // Медицинская газета от 11.1.1985.

15. ГОСТ Р 7.0.11-2011 "Диссертация и автореферат диссертации. Структура и правила оформления". [Электрон. ресурс]. – Режим доступа: <http://www.cntd.ru/assets/files/upload/060912/7.0.11-2011.pdf>. Дата обращения 2.03.2013.

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Учебное издание

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Цифровизация промышленного производства в регионах России: пространственные взаимосвязи¹

Новый общемировой тренд цифровизации оказывает существенное влияние на экономическое и социальное развитие территориальных систем различного уровня, от муниципального до макроэкономического. Цифровая трансформация промышленных предприятий, согласно нашей гипотезе, становится ключевым фактором территориальной конкурентоспособности, который определяет перспективы развития регионов и возможности повышения темпов роста национальной экономики. Исследование пространственных взаимосвязей в процессах использования цифровых технологий производственными предприятиями на региональном уровне и оценка влияния процессов цифровизации на обновление кадрового потенциала промышленности регионов стали главной целью первого этапа обоснования представленной гипотезы. Для анализа цифровой модернизации промышленности в регионах мы использовали официальные статистические данные по удельному весу организаций, использующих RFID-технологии, которые позволяют осуществлять автоматическую идентификацию объектов. Выбор данного показателя обусловлен тем, что технологии RFID являются наиболее близкими к киберфизическим системам, которые и обеспечивают так называемое умное производство — главный индикатор четвертой промышленной революции.

Исследование пространственной неоднородности цифровой трансформации промышленности по регионам России было произведено с помощью глобального и локальных индексов Морана с использованием миграционной матрицы пространственных весов. Для исследования межрегиональных взаимосвязей в процессах использования цифровых технологий производственными предприятиями использовалась матрица локальных индексов автокорреляции Л. Анселина.

Полученный в ходе расчетов отрицательный индекс пространственной автокорреляции доказывает, что процессы цифровизации промышленного производства имеют высокую пространственную неоднородность: лишь малая часть регионов отличается высоким уровнем использования RFID-технологий производственными предприятиями. С помощью матрицы миграционных потоков выпускников было выявлено, что субъекты РФ отличаются не только показателями использования цифровых технологий, но и уровнем привлекательности для молодых высококвалифицированных кадров. Результаты проведенного пространственного анализа доказывают, что внедрение технологий умного производства промышленными предприятиями является значимым фактором прогрессивного социально-экономического развития территорий. Данный вывод открывает широкие горизонты в области исследования как теории регионального экономического роста, так и вопросов трансформации цифрового пространства национальной экономической системы.

Ключевые слова: цифровая трансформация, промышленное предприятие, RFID-технологии, матрица миграционных потоков, индекс Морана, пространственная автокорреляция, локальный индекс пространственной автокорреляции, пространственная неоднородность, высококвалифицированные кадры, цифровое пространство

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Digitalisation of Industrial Production in the Russian Regions: Spatial Relationships

Digitalisation is a new global trend that significantly influences the economic and social development of various territorial systems (from municipal to macroeconomic level). We hypothesise that the digital transformation of industrial enterprises is becoming a key factor of territorial competitiveness that determines regional development prospects and the possibility of increasing the growth rate of the national economy. To substantiate this hypothesis, we examined the spatial relationships, which emerge when industrial enterprises introduce digital technologies at the regional level, as well as assessed the impact of digitalisation processes on the renewal of the human resource capacity of the regional industry. For analysing the digital modernisation of the regional industry, we used official statistics on the share of organisations using radio-frequency identification (RFID). We chose this particular indicator because RFID-technology is the closest to cyber-physical systems, which enable the so-called smart production (the main indicator of the fourth industrial revolution). Using the global and local Moran's indexes and the migration matrix of spatial weights, we studied the spatial heterogeneity of the digital industry transformation across the Russian regions. Anselin's local autocorrelation matrix was applied to analyse inter-regional relationships, which emerge when manufacturing enterprises use of digital technologies. The calculated negative spatial autocorrelation index proves that digitalisation processes in industrial production have a high spatial heterogeneity: only a small part of the regions is characterised by a high level of RFID use by manufacturing enterprises. Using the migration flow matrix of graduates, we revealed that the constituent entities of the Russian Federation differ not only in indicators of using digital technologies but also in attractiveness to young, highly qualified personnel. The results of the spatial analysis confirm that the introduction of smart production technologies by industrial enterprises significantly influences the progressive socio-economic development of territories. This conclusion opens up new topics for research, including the theory of regional economic growth and the issues of transformation of the digital space of the national economic system.

Keywords: digital transformation, industrial enterprise, RFID-technology, migration flow matrix, Moran's index, spatial autocorrelation, local index of spatial autocorrelation, spatial heterogeneity, highly qualified personnel, digital space

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Введение

Цифровая трансформация предприятий в настоящее время рассматривается в качестве новой объективной реальности общественного и хозяйственного развития. Ее появление связывают с четвертой промышленной революцией, обусловившей переход к неоиндустриальной модели экономического развития. Главной предпосылкой для реализации данной модели является полномасштабное внедрение умного производства, что означает «интеграцию цифровых технологий в производственные процессы на основе «умных машин» [1, с. 97], а также создание специализированных ИКТ-платформ, координирующих управление полным жизненным циклом создаваемого продукта.

При этом очевидно, что изменение порядка организации производственных про-

цессов приведет к возникновению новых факторов конкурентоспособности. Рассказывая о мировой угрозе монополизации в сфере информационных технологий на деловом инвестиционном саммите Ассоциации государств Юго-Восточной Азии, Д. Медведев отметил, что новые технологии усиливают социально-экономический разрыв между странами¹.

В контексте вышеизложенного важно отметить, что удельный вес отечественных промышленных предприятий в общей численности предприятий, использующих в 2018 г. технологии автоматической идентификации объектов (RFID), на 45 % ниже аналогичного показателя, рассчитанного по 28 странам

¹ Дмитрий Медведев принял участие в Деловом инвестиционном саммите Ассоциации государств Юго-Восточной Азии (АСЕАН) // Правительство России. URL: <http://government.ru/news/38266/> (дата обращения: 27.02.2020).

европейского союза (11,4 % против 16,6 %)¹. При этом доля промышленных предприятий России, использующих в 2018 г. CRM (17,3 %) и ERP-системы (27,6 %)², почти в 2 раза ниже аналогичных показателей в 2019 г. по 28 европейским странам (32,8 % и 45,8 % соответственно)³.

Таким образом, фактический уровень цифровизации в промышленном секторе национальной экономики намного ниже потенциального. Вместе с тем, в исследовании, посвященном определению зависимости между цифровизацией и успешностью бизнеса (ОЭСР 2019 г. «Динамика бизнеса и цифровизация» [2]), важным эмпирическим результатом является то, что именно технологии объясняют порядка 40 % наблюдаемой динамики развития бизнеса. Учитывая высокий потенциал цифровизации бизнеса в России, авторы настоящей работы попытались рассмотреть цифровую трансформацию промышленных предприятий как ключевой фактор территориальной конкурентоспособности, определяющий перспективы развития субъектов РФ и возможности повышения темпов роста национальной экономики.

Теоретические вопросы исследования

Говоря о цифровизации как «значимом ресурсе экономического развития и повышения конкурентоспособности территорий» [1, с. 98] следует отметить, что большинство публикуемых рейтингов конкурентоспособности практически не учитывают уровень цифровизации (в том числе цифровизации бизнеса) при расчете интегральных индексов конкурентоспособности [3]. Исключение составляют индекс готовности стран к сетевому обществу *NRI* (*Networked Readiness Index*), рассчитываемый с 2001 г. международной организацией «Всемирный экономический форум» совместно с Международной школой бизнеса «INSEAD» [4], и международный интегральный индекс цифровой экономики и общества, *I-DESI* (*International Digital Economy and Society Index*), публикуемый Европейской комис-

сией с 2016 г. [5]. Остановимся более подробно на методиках их оценки.

Первый индекс (*NRI*) отражает степень готовности стран к повсеместному использованию ИКТ через уровень развития информационного общества. В основе исследования лежит предположение о высокой зависимости экономического благополучия населения от развития ИКТ прежде всего за счет того, что ИКТ являются основой повышения производительности и диверсификации экономики.

Начиная с 2019 г. индекс готовности стран к сетевому обществу измеряет уровень развития ИКТ по 62 параметрам, объединенным в четыре основные группы:

- уровень развития технологий;
- уровень использования ИКТ в общественном, коммерческом и государственном секторах;
- уровень безопасности национальной цифровой среды (с точки зрения защищенности данных и обеспечения неприкосновенности частной жизни);
- оценка зависимости параметров общего благосостояния (экономического, социального, человеческого капитала) от участия в сетевой экономике.

По итогам 2019 г. Россия заняла 48-е место из 121 страны, опустившись на 7 позиций по сравнению с 2016 г. и пропустив вперед Уругвай, Румынию и Чили. Главными субиндексами, обусловившими понижение России в общемировом рейтинге, являются:

- субиндекс «технологии будущего» (72-е место), включающий такие показатели, как расходы на программное обеспечение, уровень роботизации и др.;
- субиндекс «государственное регулирование ИКТ сектора» (91-е место), включающий такие показатели, как простота ведения бизнеса, адаптивность правовой базы к цифровым технологиям, качество нормативно-правовой базы в области электронной торговли и ИКТ;
- субиндекс «качество жизни россиян» (85-е место), включающий такие показатели, как оценка счастья и свободы выбора, неравенство доходов, ожидаемая продолжительность здоровой жизни при рождении.

Второй индекс (*I-DESI*) состоит из пяти групп показателей (связь, человеческий капитал, использование интернета, интеграция цифровых технологий в бизнесе, цифровые государственные услуги), характеризующих уровень цифровой инфраструктуры и охват использования ИКТ-технологий различными

¹ Рассчитывается, как отношение числа промышленных предприятий, использующих RFID-технологии, к общему количеству предприятий, расположенных на территории 28 стран Европейского союза в 2018 г.

² Цифровая экономика: 2020. Краткий стат. сб. / Г.И. Абдрахманова, К.О. Вишневский, Л.М. Гохберг и др.; Иб60 Нац. исслед. ун-т «Высшая школа экономики». М.: НИУ ВШЭ, 2020. 112 с.

³ OECD Data. URL: https://stats.oecd.org/Index.aspx?DataSetCode=ICT_BUS (дата обращения 29.05.2020).

экономическими макроагентами (домохозяйствами, фирмами, государством). Для расчета интегрального индекса цифровой экономики используются известные международные источники данных. В итоговом рейтинге за 2016 г. Россия заняла 39-е место из 45 стран (28 — Европейского союза и 17 других стран), обогнав Мексику, Бразилию, Турцию, Чили. Важно отметить, что по параметру «интеграция цифровых технологий в бизнесе», характеризующему цифровизацию промышленности, Россия в общем списке заняла предпоследнее место, опережая только Сербию.

Таким образом, национальная экономика обладает значительным потенциалом цифровизации промышленного сектора. Важность его реализации закреплена на высшем уровне страны Программой «Цифровая экономика Российской Федерации»¹, а также подчеркивается в Указе Президента «О Стратегии развития информационного общества в Российской Федерации на 2017–2030 годы». При этом, согласно данному Указу, одним из основных направлений развития российских информационно-коммуникационных технологий является индустриальный интернет². Законодателем отмечается высокая роль развития технологий сбора и обработки больших данных, накапливаемых промышленными объектами. Отметим, что оценки развития ИКТ-сектора в России составляются Федеральной службой государственной статистики начиная с 2005 г., а с 2017 г. выпускается статистический сборник «Индикаторы цифровой экономики», в котором представлены данные по показателям инфраструктуры цифровой экономики.

Кроме того, Госкомстат РФ, проводя ежегодный анализ социально-экономического состояния регионов, отдельным блоком выделяет раздел «информационные и коммуникационные технологии». Научные организации и рейтинговые агентства оценивают на основе указанных статистических данных общий уровень цифровизации субъектов Российской

Федерации³ [6]. При этом совершенно объективно отмечается, что страна не входит в группу лидеров цифровой экономики по многим показателям — доле цифровой экономики в ВВП (3,9 %, что в 2–3 раза ниже, чем у стран-лидеров), количеству публикаций в области ИКТ в изданиях, индексируемых в международных базах, и патентных заявок в области ИКТ (2 и 0,35 % от общемирового количества соответственно), доле специалистов по ИКТ в общей численности занятых (1,2 % в общей численности занятых) и т. д. Также подтверждая результаты оценок международных организаций, отмечается, что Россия заметно отстает от ведущих стран по такому важнейшему показателю с точки зрения конкурентоспособности, как цифровизация бизнеса.

Понимая возможные негативные последствия отставания национальной экономики от общемировых тенденций цифровизации, отечественные ученые активно ищут рецепты интенсификации цифровой трансформации хозяйственной системы. По проблематике цифровой экономики в последние годы опубликовано значительное количество исследований, что подтверждается библиографическими оценками: в 2015 г. в базе библиографической информации РИНЦ было зафиксировано 12 научных публикаций со словосочетанием «цифровая экономика» в названии статьи, в 2016 г. — 55 [7]. После принятия госпрограммы «Цифровая экономика РФ», в 2017 г. уже было опубликовано 500 публикаций, в 2018 г. число публикаций выросло более чем в 3 раза — до 1876, в 2019 г. — до 2042.

В качестве основных проблем цифровизации различных секторов экономики, выделенных учеными, отмечаются низкий уровень «цифровых компетенций» кадров в сфере АПК, а также неразвитость ИКТ в малых городах и сельской местности [8, 9], отсутствие необходимой нормативно-правовой базы [10], высокий износ оборудования [11, 12], технологическая некомпетентность пользователей — потенциальных покупателей онлайн-магазинов и недостаточно развитая цифровая инфраструктура, несоответствие веб-ресурсов муниципалитетов уровню федеральных и региональных интернет-порталов [13–15].

¹ Программа «Цифровая экономика Российской Федерации». Утв. распоряжением Правительства Российской Федерации от 28 июля 2017 г. №1632-р // Правительство РФ. URL: <http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf> (дата обращения: 07.02.2020).

² О Стратегии развития информационного общества в Российской Федерации на 2017–2030 годы. Указ Президента Российской Федерации от 09.05.2017 г. № 203 // Президент РФ. URL: <http://www.kremlin.ru/acts/bank/41919/page/1> (дата обращения: 07.02.2020).

³ Индекс «Цифровая Россия». URL: <https://finance.skolkovo.ru/ru/sfice/research-reports> (дата обращения 10.02.2020); Индикаторы цифровой экономики: 2019. Стат. сб. / Г. И. Абдрахманова, К. О. Вишневский, Л. М. Гохберг и др.; Нац. исслед. ун-т И60 «Высшая школа экономики». М. : НИУ ВШЭ, 2019. 248 с.

Основной вывод проведенного обзора литературы — конкурентоспособность организации в любой сфере деятельности в настоящий момент связана с уровнем цифровой трансформацией в решении бизнес-задач. При этом учеными доказано, что цифровые технологии неодинаково влияют на различные сферы деятельности. Учитывая, что основной мультипликационный эффект на экономический рост оказывает такой важный сектор национальной экономики, как обрабатывающая промышленность [11, 16–18], считаем, что цифровизация именно промышленного сектора является ключевым фактором интенсификации экономического роста.

По официальным статистическим данным за 2017 г., доля обрабатывающей промышленности в отраслевой структуре ВВП России составляет 17,4 %, лидируя среди других отраслей экономики. Второе место занимает оптовая и розничная торговля 16,7 %, третье место — добывающий сектор — 12,1 %¹. Несмотря на это, прирост ВВП национальной экономики за 2017 г. обусловлен развитием таких отраслей, как добыча полезных ископаемых (+0,34 п. п.), строительство (+0,26 п. п.), деятельность финансовая и страховая (+0,24 п. п.), государственное управление и обеспечение военной безопасности (+0,24 п. п.)².

При этом, если в 1995 г. на долю минеральных продуктов приходилось 42,5 % экспорта, то в 2000 г. уже 53,8 %, в 2007 г. — 64,9 %, в 2011 г. — 70,3 %³. К концу 2019 г. данное значение снизилось на 7 п. п. — до 63,3 %⁴. Пропорционально указанным трендам изменяется и доля нефтегазовых доходов в федеральном бюджете: с 24,4 % в 1997 г. до 32,3 % в 2002 г., 40,7 % в 2007 г., 50,4 % в 2012 г. и 46,4 % в 2018 г.⁵ В результате индекс произ-

водства по виду экономической деятельности «добыча полезных ископаемых» за последние годы (2015–2018 гг.) рос, в то время как по виду экономической деятельности «обрабатывающие производства» — нет (например, в 2015 г. индекс упал на 2,3 %) ⁶.

В данном контексте стоит отметить, что доля нашей страны в мировом промышленном производстве снизилась с 16,2 % в 1980 г. [17] до 1,4 % в 2018 г.⁷ С целью анализа и объяснения данных негативных тенденций нами был проведен дополнительный литературный обзор публикаций отечественных ученых на тему перспектив развития обрабатывающей промышленности в национальной экономике и потенциала его цифровой трансформации.

Было выявлено, что учеными доказана высокая зависимость между затратами на информационно-коммуникационные технологии и объемом промышленного производства [19, 20], а также повышением конкурентоспособности продукции [21] и прибыльности предприятий⁸, раскрыты тенденции и актуализированы проблемы развития промышленного сектора национальной экономики в условиях цифровизации [22], обосновано, что успешное инновационно ориентированное развитие промышленного комплекса региона может быть обеспечено за счет создания адекватной институциональной структуры [23, 24].

В результате проведенного теоретического анализа было обосновано, что ключевой проблемой цифровизации промышленности национальной экономики является факт незавершенности этапа Индустрии 3.0. Это обусловлено, в частности, высокой степенью износа основных фондов в обрабатывающей промышленности (50,6 % от общего объема основных фондов по данным Росстата на конец 2018 г.⁹). В связи с тем, что цифровые ин-

¹ Регионы России. Социально-экономические показатели // Федеральная служба государственной статистики. URL: <https://www.gks.ru/folder/210/document/13204> (дата обращения: 06.03.2020).

² Бюллетень о текущих тенденциях российской экономики. 2019. Вып. №48 (апр.). URL: <https://ac.gov.ru/files/publication/a/21974.pdf> (дата обращения: 12.02.2020).

³ Сырьевая специализация может быть благом для России // ГБУ «Центр перспективных экономических исследований Академии наук Республики Татарстан». URL: <https://crei.tatarstan.ru/index.htm/news/217568.htm> (дата обращения: 10.02.2020).

⁴ Товарная структура экспорта // Федеральная таможенная служба. URL: <http://customs.ru/folder/519> (дата обращения: 08.02.2020).

⁵ Краткая информация об исполнении федерального бюджета // Министерство финансов России. URL: https://www.minfin.ru/ru/statistics/fedbud/execute/?id_65=80041-

yezhegodnaya_informatsiya_ob_ispolnenii_federalnogo_byudzheta_dannye_s_1_yanvarya_2006_g (дата обращения: 10.02.2020)

⁶ Индекс производства // ЕМИСС. Государственная статистика. URL: <https://www.fedstat.ru/indicator/57807> (дата обращения: 10.02.2020).

⁷ Manufacturing, value added (current US\$) // World Bank national accounts data. URL: <https://data.worldbank.org/indicator/NV.IND.MANF.CD?end=2018&start=1960&view=chart> (дата обращения: 12.02.2020).

⁸ Цифровое будущее России. Что нам готовит программа «Цифровая экономика» // Цифровое производство. Сегодня и завтра российской промышленности. 2017. №2. С. 6–18. URL: http://up-pro.ru/imgs/specprojects/digital-pro/Digital_production_2.pdf (дата обращения: 07.02.2020).

⁹ Степень износа основных фондов на конец года // Федеральная служба государственной статистики России.

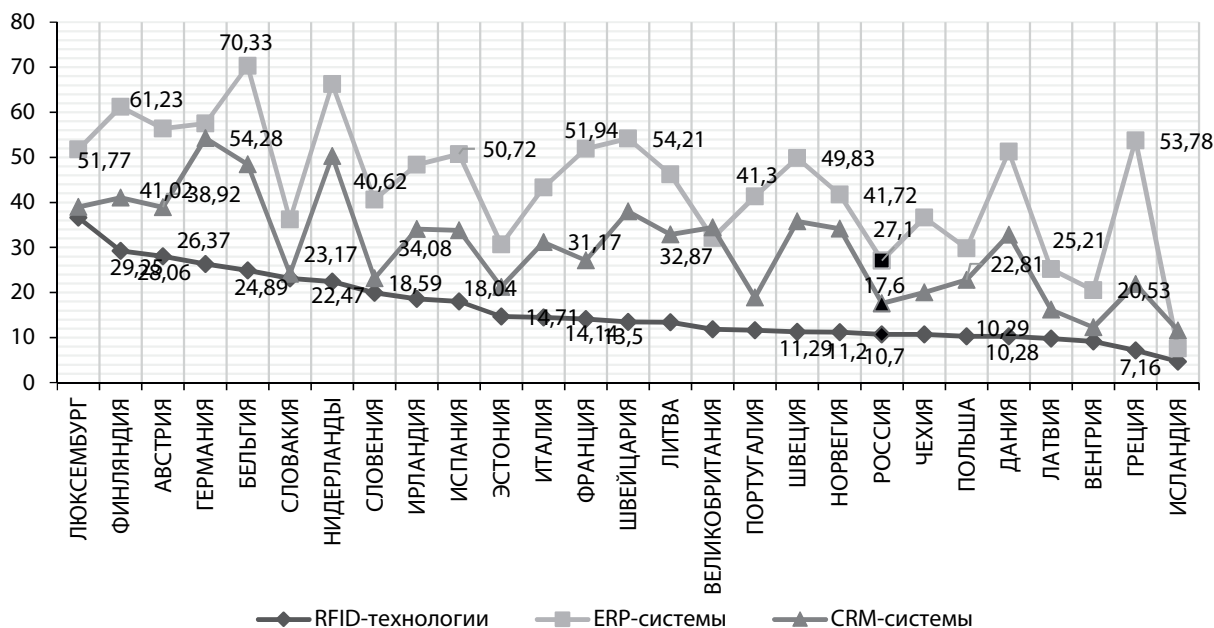


Рис. 1. Использование RFID-технологий, ERP- и CRM-систем в обрабатывающей промышленности в 2017 г. (% от общего числа организаций)

Figure 1. The use of RFID technologies, ERP and CRM systems in the manufacturing industry in 2017 (percentage of the total number of organizations)

струменты (RFID-технологии, ERP-системы, CRM-системы, облачные сервисы и прочее) адаптированы под инновационное оборудование, полномасштабная цифровизация создает угрозу отставания для стран (в том числе и России), не прошедших полноценную модернизацию оборудования. На рисунке 1 представлены сравнительные данные по доле предприятий от общего числа организаций обрабатывающей промышленности, использующей цифровые технологии, в России¹ и странах Европейского союза в 2017 г.²

Согласно рисунку 1, в России CRM- и ERP-системы используют только 17,6 % и 27,1 % соответственно промышленных предприятий среди анализируемых стран (при максимальных значениях 54,3 % и 70,3 % соответственно). RFID-технологии в России используют 10,7 % промышленных предприятий при максимальном значении 26,4 %.

На основе вышеизложенного теоретического и аналитического обобщения можно объективно заключить, что именно от развития сектора обрабатывающей промышленности,

его технической и цифровой модернизации зависят как повышение конкурентоспособности национальной экономики, так и темпы экономического роста страны.

Данные и методы исследования

В нашем исследовании для анализа цифровой модернизации промышленности мы использовали показатель «удельный вес организаций (в общем числе организаций), использующих технологии автоматической идентификации объектов, позволяющих посредством радиосигналов считывать или записывать данные, хранящиеся в RFID-метках». Поясним более детально, на чем был основан наш выбор.

В целом, система показателей роботизации и автоматизации отечественных организаций включает в себя широкий перечень региональных данных, публикуемых Росстатом и отражающих использование ими информационных и коммуникационных технологий. Вместе с тем, более подробное изучение статистических баз данных выявило две актуальные проблемы формирования выборки при проведении территориальных исследований в области цифровизации: во-первых, высокая агрегация показателей с точки зрения типов хозяйствующих субъектов, во-вторых, отсутствие в большинстве случаев детализации в разрезе отраслевой структуры деятельности организаций. Например, интересным в данном контексте является показатель «передовые производствен-

URL: https://gks.ru/free_doc/new_site/business/osnfond/STIZN_ved.htm (дата обращения: 09.02.2020).

¹ Индикаторы цифровой экономики: 2019. Стат. сб. / Г.И. Абдрахманова, К.О. Вишневский, Л.М. Гохберг и др.; Нац. исслед. ун-т И60 «Высшая школа экономики». М.: НИУ ВШЭ, 2019. 248 с.

² OECD Data. URL: <https://data.oecd.org/searchresults/?r=+f/type/indicators> (дата обращения: 12.02.2020).

ные технологии». Но он представлен Росстатом в общей структуре предприятий, без детализации по отраслевой принадлежности.

Вместе с тем, в нашем исследовании такая детализация имеет ключевое значение. Это связано с тем, что большая часть ИКТ ответственных предприятий развивается в области систем, предназначенных для учета и планирования взаимоотношений с клиентами и поставщиками (системы *CRM, ERP, SCM*), а не в области производственных систем. Вместе с тем, указанные системы (*CRM, ERP, SCM*) — это та электроника, которая не участвует в модернизации производственного процесса, а обслуживает пусть не менее важные, но вспомогательные процессы деятельности предприятия¹.

Принципиально иные задачи возложены на технологии *RFID*, использование которых на любом из этапов управления цепочками поставок предоставляет компании уникальные возможности управления процессом производства и управления запасами [25]. Благодаря применению систем бесконтактной идентификации осуществляется автоматический сбор информации о перемещении промаркированных объектов, участвующих в технологических цепочках производства. Так, наиболее показательным примером эффективного использования *RFID* на производстве является автомобильная промышленность, когда в каждом технологическом цикле в *RFID*-транспондер записывается информация об уже произведенных операциях и о том, кто эти операции выполнил, для использования ее при последующем контроле качества [26].

Таким образом, *RFID* действительно является технологией, наиболее близкой к киберфизическим системам, обеспечивающим «умное производство», что обуславливает выбор нами данного показателя в качестве индикатора уровня цифровизации промышленности.

Данные по 83 субъектам Российской Федерации за 2017 г. представлены в сборнике «Индикаторы цифровой экономики: 2019», посвященном основным аспектам развития цифровой экономики в России². Так, меньше всего предприятий (1,6 % от общего числа предприятий) использует технологию *RFID* в Республике

Дагестан, больше всего (8,5 % от общего числа предприятий) — в г. Москве. В среднем по России лишь 4,5 % предприятий использует данную технологию.

Исследование пространственной неоднородности цифровой трансформации промышленности по регионам России было произведено с помощью инструментария пространственной эконометрики, в частности, путем расчета глобального индекса Морана (глобальная пространственная автокорреляция), который позволяет определить наличие или отсутствие пространственной кластеризации регионов в исследуемой сфере, центры локализации и концентрации ресурсов («полюса роста») и связанные с ними территории. Индекс Морана рассчитывается по формуле (1):

$$I = \frac{\sum_i \sum_j w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\frac{1}{n} \sum_i (x_i - \bar{x})^2 \sum_i \sum_j w_{ij}}, \quad (1)$$

где w_{ij} — элемент матрицы весов W ; x_i — исследуемый показатель региона I ; n — общее число объектов (число регионов).

При анализе пространственной неоднородности важным вопросом качества полученных результатов является проблема выбора подходящей взвешивающей матрицы, с помощью которой присваиваются веса наблюдениям из других географических ареалов в соответствии с их местоположением относительно искомого региона. Каждый элемент такой матрицы (w_{ij}) идентифицирует взаимосвязь между регионами i и j . Отражая природу пространственного взаимодействия моделируемых объектов, взвешивающая матрица W является ключевым элементом в моделях пространственной эконометрики [27]. Учеными доказана высокая чувствительность результатов оценки модели к выбору взвешивающей матрицы [28]. В нашем исследовании расчет глобального (далее, локального) индекса Морана осуществлялся с использованием миграционной матрицы, содержащей информацию об уехавших из регионов приехавших них выпускников. Считаем, что именно данная матрица является наиболее подходящей, т. к. миграционные потоки выпускников явно демонстрируют наличие связей между регионами как с социальной точки зрения, так и с экономической. Как правило, наиболее активные выпускники переезжают в регионы с высоким уровнем жизни.

Миграционная матрица была сформирована на основании данных портала Министерства

¹ Нужна ли нам «кибернетическая» цифровизация промышленности? // Капитал страны. URL: http://kapital-rus.ru/articles/article/nujna_li_nam_kiberneticheskaya_cifrovizaciya_promyshlennosti/ (дата обращения: 02.03.2020).

² Индикаторы цифровой экономики: 2019 : статистический сборник / Г.И. Абдрахманова, К.О. Вишневецкий, Л.М. Гохберг и др.; Нац. исслед. ун-т И60 «Высшая школа экономики». М. : НИУ ВШЭ, 2019. 248 с.

образования и науки РФ¹. Построенная матрица представляет собой подобие матрицы расстояний (квадрат, столбцы и строки которого соответствуют регионам РФ) [29], однако вместо расстояний между регионами основу матрицы составляют данные об уехавших и приехавших в регионы выпускниках. Так, по горизонтали содержатся данные о числе выпускников, уехавших из региона i в регион j ² (к примеру, из г. Москвы в Московскую область уехало 9014 выпускников). А по вертикали размещены данные о числе выпускников, приехавших в регион j из региона i (к примеру, из Московской области в г. Москву уехало 14043 выпускника). Целью данного исследования был анализ пространственных взаимосвязей в процессах цифровизации промышленности на региональном уровне, поэтому мы использовали матрицу, которая не учитывает внутрорегиональные потоки (главная диагональ матрицы равна 0).

Для исследования пространственных автокорреляционных взаимосвязей между региональными системами в процессах осуществления цифровой модернизации промышленности мы использовали матрицу пространственной автокорреляции Люка Анселина [30]. Сформированная в результате расчета локальных индексов пространственной автокорреляции Морана по формулам (2) и (3) матрица отражает корреляционные взаимосвязи между исследуемыми территориальными системами. Положительные значения локальных индексов автокорреляции между парами регионов в матрице характеризуют схожесть данных территориальных систем по исследуемому показателю (рост показателя в одном регионе способствует его росту в другом).

$$LISA_{ij} = z_i \times z_j \times w_{ij}, \quad (2)$$

где $LISA_{ij}$ — индекс локальной автокорреляции между регионом i и регионом j ; w_{ij} — элемент матрицы пространственных весов W для регионов i и j ; z_i — стандартизированные значения исследуемого показателя региона i ; z_j — стандартизированные значения исследуемого показателя региона j .

$$z_i = \frac{(x_i - \bar{x})}{\sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}}; \quad z_j = \frac{(x_j - \bar{x})}{\sqrt{\frac{\sum (x_j - \bar{x})^2}{n}}}. \quad (3)$$

¹ Мониторинг трудоустройства выпускников // Министерство образования и науки РФ. URL: <http://vo.graduate.edu.ru/passport/#/?slice=6&items=57&year> (дата обращения: 12.01.2020).

² i — индекс строки, j — индекс столбца ($i, j = \overline{1, n}$), n — число регионов.

Отрицательные значения локальных индексов автокорреляции, наоборот, отражают противоположные взаимосвязи между рассматриваемыми территориальными системами. Для выявления наиболее тесных, устойчивых межрегиональных взаимосвязей в процессах цифровизации в матрице Л. Анселина нами использовались средние величины, рассчитанные как для положительных, так и для отрицательных значений локальных индексов автокорреляции. Выделение в матрице значений, превышающих средние положительные и отрицательные локальные индексы автокорреляции, позволило нам установить зоны взаимовлияния полюсов роста у выявленных пространственных кластеров, то есть территории, получающие импульс от их развития или способствующие их развитию.

Результаты исследования

В результате расчета глобального индекса Морана с применением миграционной матрицы была выявлена отрицательная пространственная автокорреляция среди регионов, связанных миграционными потоками выпускников, то есть кластеризация регионов не наблюдается. В таблице представлены ре-

Таблица

Индекс Морана по показателю «удельный вес организаций (в общем числе организаций), использующих RFID-технологии», 2017 г. (весовая матрица — миграционная матрица)

Table

Moran's I for the indicator "The share of organizations (of the total number of organizations) using radio-frequency identification", 2017 (weight matrix — migration matrix)

| Индекс Морана | $E(I)$ | $Sd(I)$ | z -статистика | p -value |
|---------------|--------|---------|-----------------|------------|
| -0,101 | -0,012 | 0,042 | -2,146 | 0,032 |

зультаты расчета индекса Морана и его тестовых статистик.

Рассчитанный индекс пространственной автокорреляции показал, что процессы цифровизации промышленного производства имеют высокую пространственную неоднородность: лишь малая часть регионов отличается высоким уровнем использования RFID-технологий производственными предприятиями. К таким регионам, согласно результатам пространственного автокорреляционного анализа, относятся: г. Москва, г. Санкт-Петербург, Московская, Нижегородская, Свердловская, Тюменская, Кемеровская области, республика

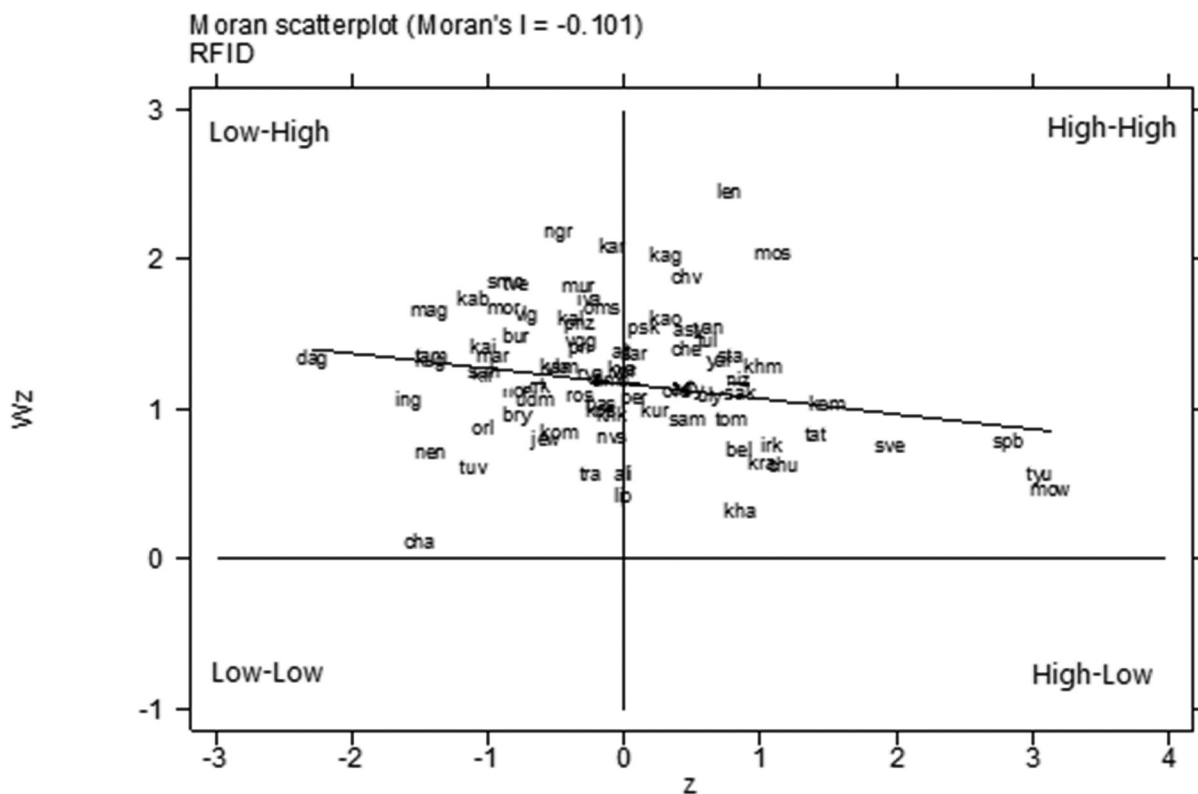


Рис. 2. Пространственная диаграмма рассеяния по показателю «удельный вес организаций (в общем числе организаций), использующих RFID-технологии», 2017 г.

Figure 2. Spatial scatter plot for the indicator "The share of organizations (of the total number of organization) using radio-frequency identification", 2017

Татарстан и Ханты-Мансийский автономный округ, располагающиеся в квадранте *HH* (*High-High*) диаграммы рассеивания П. Морана (рис. 2). Указанные регионы отличаются не только высокими показателями использования цифровых технологий предприятиями, но и, как показала сформированная матрица миграционных потоков, значительным притоком молодых высококвалифицированных кадров. Развитая в данных регионах инженерная и научно-образовательная инфраструктура, мощный производственный потенциал, высокая концентрация инвестиционных ресурсов, высокий уровень доходов и благоприятные социальные условия для самореализации, воплощения идей привлекают молодых специалистов, начинающих свою карьеру в области цифровых технологий.

Регионы, из которых активно уезжают молодые специалисты, не обладают достаточными ресурсами и условиями для трудоустройства и самореализации подготовленных кадров. К таким регионам, как показал пространственный автокорреляционный анализ, относятся: Кировская, Курганская, Магаданская область, республики Дагестан, Ингушетия, Калмыкия, Карачаево-Черкесия, Кабардино-Балкария, Карелия, Коми, Марий Эл, Мордовия и Саха

(Якутия). В данных регионах, находящихся в квадранте *LH* (*Low-High*) диаграммы рассеивания П. Морана, наблюдается низкий уровень использования производственными предприятиями RFID-технологий.

Полученные выводы подтверждает анализ взаимосвязи между уровнем использования RFID-технологий предприятиями и долей обрабатывающих производств в общем объеме ВРП соответствующих территорий. На рисунке 3 представлены данные по регионам аутлаерам. При этом, жирным шрифтом выделены регионы-реципиенты (притягивающие выпускников вузов), остальные территории — это регионы-доноры (из них происходит отток выпускников).

Согласно рисунку 3, большинство выпускников уезжают из регионов, имеющих низкую долю предприятий, которые используют RFID-технологии, и низкую долю обрабатывающих производств в общем объеме ВРП. А приезжают выпускники в основном в регионы с высоким уровнем применения RFID-технологий предприятиями и высокой долей обрабатывающих производств. Исключениями являются Кировская область, Республика Мордовия, Курганская область, Ханты-Мансийский автономный округ. Причины миграционных пото-

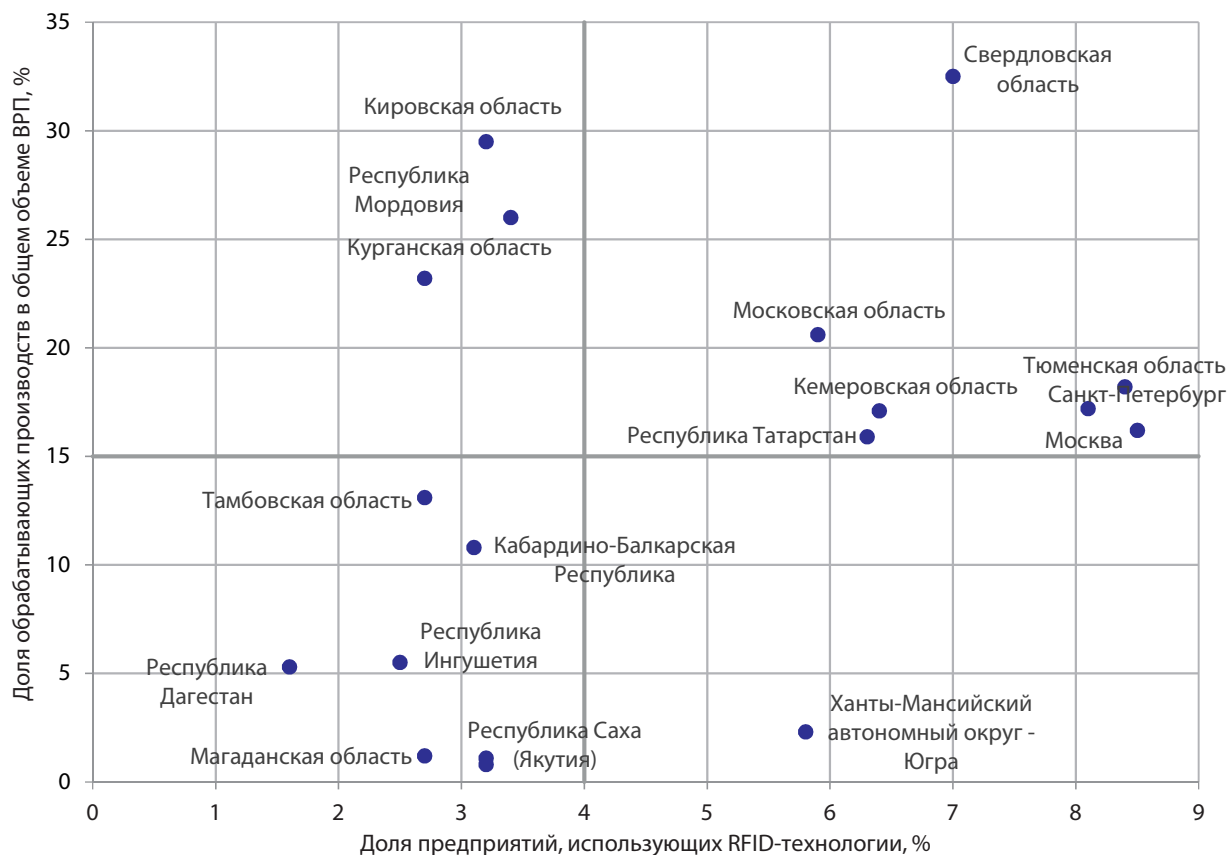


Рис. 3. Распределение регионов по доле обрабатывающих производств в общем объеме ВРП и по уровню использования RFID-технологий предприятиями

Figure 3. Distribution of the regions by the share of manufacturing industries in the total gross regional product, as well as by the level of RFID use by enterprises

ков выпускников в данных субъектах требуют дополнительного анализа.

Кроме того, в результате пространственного автокорреляционного анализа была выявлена одна интересная особенность. По методологии П. Морана, регионы, находящиеся в квадранте *LH*, обычно рассматриваются как зона влияния территориальных систем с высоким уровнем активности использования цифровых технологий, находящихся в квадранте *HH*. Однако детальное исследование пространственного взаимовлияния регионов с помощью индексов локальной автокорреляции и матрицы Люка Анселина (*LISA*) показало, что окружающие их регионы, с точки зрения миграционных потоков, с высоким уровнем использования цифровых технологий предприятиями не способствует активизации процессов цифровизации в регионах, входящих в квадрант *LH*. Отрицательная пространственная автокорреляция между ними свидетельствует об обратном воздействии регионов — центров активного использования цифровых технологий на данные территории: удельный вес организаций, использующих RFID-технологии, в них незначительный, по-

мимо этого, наблюдается отток высококвалифицированных кадров в регионы, тесно связанные с ними. Выявленные устойчивые обратные взаимосвязи между регионами мы отметили пунктирными линиями на рисунке 4.

Наиболее сильная пространственная отрицательная автокорреляция по матрице Л. Анселина (выше среднего значения) наблюдается между г. Москва и Республикой Дагестан (индекс *LISA* между ними составил 2,35), между г. Москва и Магаданской областью (-1,74), Тамбовской областью (-1,69), Кабардино-Балкарской Республикой (-1,56), Смоленской областью (-1,44), Республикой Ингушетия (-1,21). Рассчитанная матрица Л. Анселина позволила установить обратные взаимосвязи и между другими регионами, однако их значения локальных индексов автокорреляции находятся существенно ниже отрицательного среднего, и это не позволяет нам признать данные корреляционные связи тесными. Город Москва, как показал данный анализ, является территорией активного внедрения цифровых технологий в производстве, центром притяжения молодых высококвалифицированных

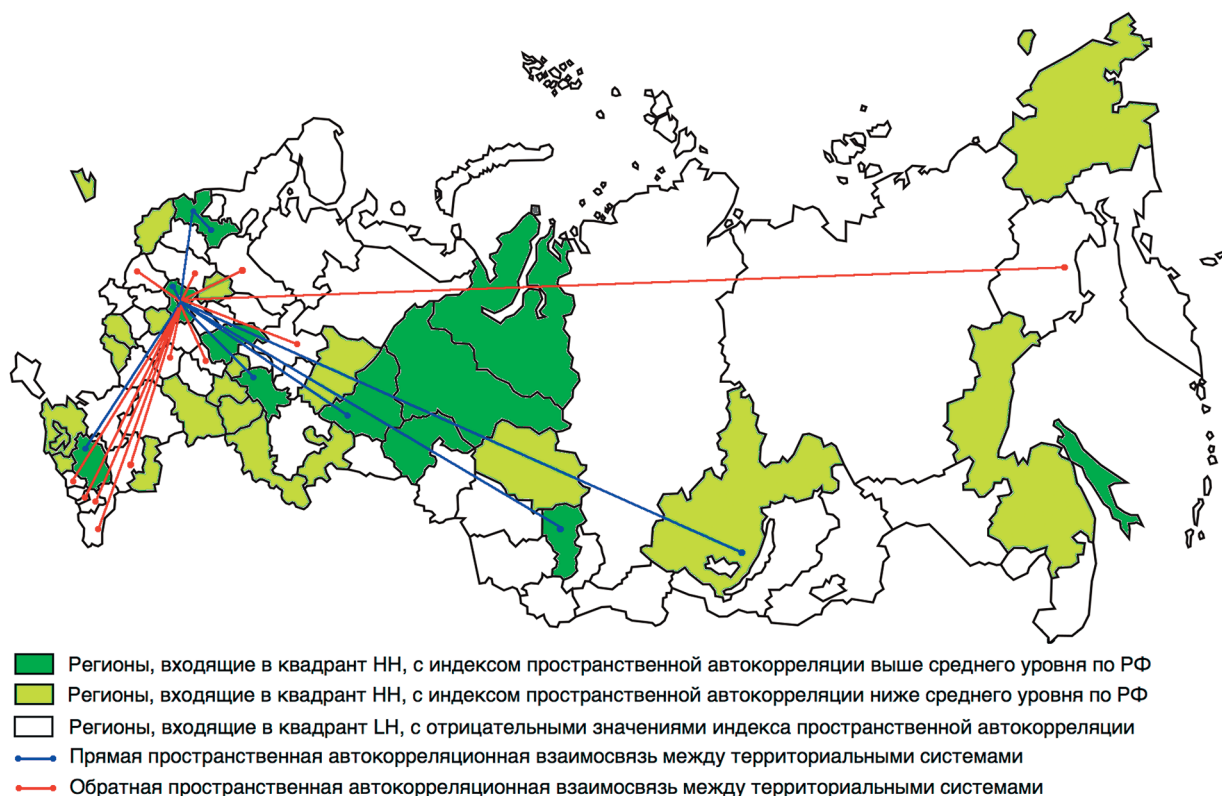


Рис. 4. Пространственная автокорреляция и межрегиональные взаимосвязи по уровню использования RFID-технологий в 2017 г.

Figure 4. Spatial autocorrelation and interregional relationships by the level of RFID use, 2017

кадров не только из центральных регионов, но и регионов, входящих в Северо-Кавказский федеральный округ.

Прямые тесные автокорреляционные взаимосвязи были выявлены между г. Москва и Московской областью (индекс LISA между ними составил 2,06), г. Санкт-Петербург (1,63), Кемеровской областью (0,92), Ставропольским краем (0,91), Республикой Татарстан (0,89), Иркутской областью (0,89) и Свердловской областью (0,8) а также между г. Санкт-Петербург и Ленинградской областью (1,73). Как мы видим, прямые автокорреляционные взаимосвязи наблюдаются только между регионами, входящими в квадрант *НН* диаграммы рассеивания П. Морана, то есть между регионами, отличающимися самыми высокими показателями использования RFID-технологий производственными предприятиями и являющимися центрами притяжения молодых высококвалифицированных кадров.

Полученные результаты проведенного пространственного анализа доказали то, что регионы, предприятия которых внедряют технологии умного производства, являются наиболее привлекательными для самого главного ресурса экономики региона — высококвалифицированных специалистов. Данный вывод со-

гласуется с ранее полученными результатами, доказавшими негативное влияние полюсов роста на окружающее пространство в результате «опустынивания» соседних территорий путем истощения их экономического потенциала [31, 32].

Заключение

По результатам проведенной работы было выявлено, что изменение пространственной организации национальной экономики в условиях цифровизации объективно имеет место. Так, детальное исследование пространственного взаимовлияния регионов с помощью матрицы Л. Анселлина (*LISA*) показало, что процессы, происходящие в регионах с высоким уровнем использования цифровых технологий, не способствуют активизации процессов цифровизации в регионах, имеющих низкий уровень использования цифровых технологий. В данных регионах наблюдается низкий удельный вес организаций, использующих RFID-технологии и значительный отток высококвалифицированных кадров в регионы, тесно связанные с ними, например, г. Москва. Прямые автокорреляционные взаимосвязи по матрице Л. Анселлина были выявлены только между регионами, входящими в квадрант *НН*, отлича-

юшимися самыми высокими показателями использования *RFID*-технологий производственными предприятиями и являющимися центрами притяжения молодых высококвалифицированных кадров.

Таким образом, потенциал созданной в регионе цифровой инфраструктуры является значимым конкурентным преимуществом в борьбе как за инвесторов, так и за высококвалифицированных рабочих кадров. Вместе с тем, выявленное в исследовании наличие взаимосвязи между развитием цифровой инфраструктуры в регионах и их привлекательностью для молодых специалистов может яв-

ляться следствием результативности экономической деятельности, осуществляемой в пространстве региона в целом. Этот вывод открывает широкие горизонты для дальнейших исследований в области трансформации экономического и цифрового пространства национальной экономической системы. В частности, с целью получения объективной характеристики выявленных взаимосвязей интересным направлением развития настоящей работы может стать построение авторегрессионной модели влияния активности использования *RFID*-технологий на показатели экономического развития регионов.

Список источников

1. Дубровская Ю. В. К вопросу исследования особенностей пространственной организации отечественной экономики с учетом глобальных вызовов // Пермский край. Цифровое будущее здесь и сейчас. Мат-лы V Пермского экономического конгресса, г. Пермь, 28 марта 2019 г. Пермь, 2019. С. 97–101. URL: <http://www.psu.ru/files/docs/science/books/sborniki/v-economicheskikongress-cifrovoe-budushee.pdf> (дата обращения: 08.02.2020).
2. Calvino F., Criscuolo C. Business dynamics and digitalization. URL: <https://www.oecd-ilibrary.org/docserver/6e0b011a-en.pdf?expires=1583704850&id=id&accname=guest&checksum=66F7749DEA4D005E17140C0296A0B7BB> (дата обращения: 04.03.2020).
3. Schwab K. The Global Competitiveness Report 2018. URL: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf> (дата обращения: 24.02.2020).
4. The Global Information Technology Report 2016: Innovating in the Digital Economy / Baller S., Dutta S., Lanvin B., eds. URL: http://www3.weforum.org/docs/GITR2016/GITR_2016_full%20report_final.pdf (дата обращения: 20.02.2020).
5. International Digital Economy and Society Index 2018 / Foley P., Sutton D., Wiseman I., Green L., Moore J. DOI: 10.2759/745483. URL: <https://ec.europa.eu/digital-single-market/en/news/international-digital-economy-and-society-index-2018> (дата обращения: 26.02.2020).
6. Банке Б., Бутенко В., Котов И., Рубин Г., Тушен Ш., Сычева Е. Россия онлайн? Догнать нельзя отстать // The Boston Consulting Group. 2016. С. 30–32.
7. Плотников В. А. Цифровизация производства. Теоретическая сущность и перспективы развития в российской экономике // Известия Санкт-Петербургского государственного экономического университета. 2018. № 4 (112). С. 16–24.
8. Воронин Б. А., Митин А. Н., Пичугин О. А. Управление процессами цифровизации сельского хозяйства России // Аграрный вестник Урала. 2019. № 4 (183). С. 86–95.
9. Афонина В. Е. Влияние цифровизации на развитие аграрного сектора экономики // Международный сельскохозяйственный журнал. 2018. № 3 (363). С. 15–17.
10. Истомина Е. А. Оценка трендов цифровизации в промышленности // Вестник Челябинского государственного университета. Экономические науки. 2018. № 12 (422). С. 108–116.
11. Харченко И. С., Харченко Л. И. Промышленность как основа национальной экономики // Государственное и муниципальное управление. Ученые записки. 2014. № 2. С. 35–45.
12. Маммаев Р. А. Некоторые аспекты проблемы амортизации основных фондов в условиях цифровой экономики // УЭПС. Управление, экономика, политика, социология. 2019. № 1. С. 61–62.
13. Ключкова Е. Н., Садовникова Н. А. Трансформация образования в условиях цифровизации // Открытое образование. 2019. Т. 23, № 4. С. 13–22.
14. Прокопьев Е. А., Курило А. Е., Губина О. В. Формирование цифрового пространства на муниципальном уровне. Обзор сайтов поселений // Экономические и социальные перемены. Факты, тенденции, прогноз. 2019. Т. 12, № 5. С. 76–90.
15. Васильева Е. В., Пуляева В. Н., Юдина В. А. Развитие цифровых компетенций государственных гражданских служащих Российской Федерации // Бизнес-информатика. 2018. № 4(46). С. 28–42.
16. Неровня Т. Н., Хачиров А. Д. Оценка мультипликативных эффектов от инвестиций в промышленность // Terra economicus. 2013. Т. 11, № 1, ч. 3. С. 28–34.
17. Спасский Н. С. О твердой силе и реиндустриализации России // Россия в глобальной политике. 2011. Т. 9, № 6. С. 28–42.
18. Ратнер В. С., Иосифов В. В. Стимулирование развития высокотехнологичных отраслей экономики (на примере машиностроения в Германии // Вестник Уральского Федерального университета. 2012. № 4. С. 46–58. (Экономика и управление).

19. Урасова А. А. Региональный промышленный комплекс в цифровую эпоху. Информационно-коммуникационное измерение // Экономика региона. 2019. Т. 15, № 3. С. 684–694.
20. Трачук А. В., Линдер Н. В. Инновации и производительность российских промышленных компаний // Инновации. 2017. № 4(222). С. 53–65.
21. Яковлев Г. И. Развитие конкурентоспособности предприятий на основе цифровых технологий // Синергия. Электронный научно-практический журнал. 2018. № 3. С. 29–34. URL: <https://orel.vepi.ru/wp-content/uploads/sites/10/2019/01/Sinergiya-2018.-3.pdf> (дата обращения: 05.02.2020).
22. Проблемы развития промышленного сектора экономики старопромышленных регионов России / Ускова Т. В., Лукин Е. В., Мельников А. Е., Леонидова Е. Г. // Экономические и социальные перемены. Факты, тенденции, прогноз. 2017. Т. 10, № 4. С. 62–77.
23. Никитаева А. Ю. Институциональная структура региона в контексте инновационного развития промышленности // Journal of institutional studies. 2017. Т. 9, № 1. С. 134–149.
24. Абдикеев Н. М., Богачев Ю. С., Бекулова С. Р. Институциональные механизмы обеспечения научно-технологического прорыва в экономике России // Управленческие науки. 2019. Т. 9, № 1. С. 6–19.
25. Баевский А. А. RFID-технологии и ее перспективы в России // Труды Нижегородского государственного технического университета им. П. Е. Алексеева. 2015. № 3 (110). С. 98–103.
26. Черепков С. Технология RFID. Опыт использования и перспективные направления // Компоненты и технологии. 2005. № 9. С. 154–157.
27. Семерикова Е. В. Использование пространственной зависимости в региональных исследованиях на примере анализа безработицы в России и Германии : дис. ... канд. экон. наук. М., 2017.
28. Bell K. P., Bockstael N. E. Applying the generalized-moments estimation approach to spatial problems involving micro-level data // Review of Economics and Statistics. 2000. Т. 82, № 1. С. 72–82.
29. Лободина О. Н., Шмидт Ю. Д. Оценка влияния пространственных факторов на интенсивность инновационных процессов // Вестник Тихоокеанского государственного экономического университета. 2013. № 3(67). С. 20–30.
30. Anselin L. Local indicators of spatial association — LISA // Geographical Analysis. 1995. Т. 27, № 2. С. 93–115.
31. Суворова А. В. Развитие полюсов роста в Российской Федерации. Прямые и обратные эффекты // Экономические и социальные перемены. Факты, тенденции, прогноз. 2019. Т. 12, № 6. С. 110–128. DOI: 10.15838/esc.2019.6.66.6.
32. Русановский В. А., Марков В. А. Занятость и производительность труда в макрорегионах России. Пространственные взаимозависимости // Проблемы прогнозирования. 2018. № 2 (167). С. 36–48.

References

1. Dubrovskaya, J. V. (2019). To the question of research the features of the domestic economy spatial organization taking into account global challenges. In: *Permskiy kray. Tsifrovoye budushchee zdes i seychas. Materialy V Permskogo ekonomicheskogo kongressa, g. Perm, 28 marta 2019 g. [Perm Territory: the digital future here and now. Materials of the V Perm Economic Congress (Perm, March 29, 2019)]* (pp. 97–101). Perm. Retrieved from: <https://elis.psu.ru/node/570809> (Date of access: 08.02.2020) (In Russ.).
2. Calvino, F. & Criscuolo, C. (2019). *Business dynamics and digitalisation*. Retrieved from: <https://www.oecd-ilibrary.org/docserver/6e0b011a-en.pdf?expires=1583704850&id=id&accname=guest&checksum=66F7749DEA4D005E-17140C0296A0B7BB> (Date of access: 04.03.2020).
3. Schwab, K. (2018). *The Global Competitiveness Report 2018*. Retrieved from: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf> (Date of access: 24.02.2020).
4. Baller, S., Dutta, S. & Lanvin, B. (Eds.). (2016). *The Global Information Technology Report 2016: Innovating in the Digital Economy*. Retrieved from: http://www3.weforum.org/docs/GITR2016/GITR_2016_full%20report_final.pdf (Date of access: 20.02.2020).
5. Foley, P., Sutton, D., Wiseman, I., Green, L. & Moore, J. (2018). *International Digital Economy and Society Index 2018*. Retrieved from: <https://ec.europa.eu/digital-single-market/en/news/international-digital-economy-and-society-index-2018> (Date of access: 26.02.2020)
6. Banke, B., Butenko, V., Kotov, I., Rubin, G., Tushen, Sh. & Sycheva, E. (2016). *Rossiya onlayn. Dognat nelzya otstat [Russia online. Catch up cannot lag behind]*. Moscow: BCG, 360. (In Russ.)
7. Plotnikov, V. A. (2018). Digitalisation of production: the theoretical essence and development prospects of the Russian economy. *Izvestiya Sankt-peterburgskogo gosudarstvennogo ekonomicheskogo universiteta*, 4(112), 16–24. (In Russ.)
8. Voronin, B. A., Mitin, A. N. & Pichugin, O. A. (2019). Management of digitalisation processes in agriculture of Russia. *Agrarnyy vestnik Urala [Agrarian Bulletin of the Urals]*, 4(183), 86–95. (In Russ.)
9. Afonina, V. E. (2018). Influence of digitalisation on the development of agrarian sector of economy. *Mezhdunarodnyy selskokhozyaystvennyy zhurnal [International Agricultural Journal]*, 3(363), 15–17. (In Russ.)
10. Istomina, E. A. (2018). Methodology assessment of trends in the digital economy of industry. *Vestnik Chelyabinskogo gosudarstvennogo universiteta. Ekonomicheskie nauki [Bulletin of Chelyabinsk State University. Economic sciences]*, 12(422), 108–116. (In Russ.)
11. Kharchenko, I. S. & Kharchenko, L. I. (2014). Industry as basis of national economy. *Gosudarstvennoe i munitsipalnoe upravlenie. Uchenye zapiski [State and Municipal Management. Scholar Notes]*, 2, 35–45. (In Russ.)

12. Mammaev, R. A. (2019). Some aspects of the problem of depreciation of fixed assets in a digital economy. *UEPS: upravleniye, ekonomika, politika, sotsiologiya [UEPS: management, economics, politics, sociology]*, 1, 61–62. (In Russ.)
13. Klochkova, E. N. & Sadovnikova, N. A. (2019). Transformation of education in the conditions of digitalisation. *Otkrytoe obrazovanie [Open education]*, 23(4), 13–22. (In Russ.)
14. Prokop'ev, E. A., Kurilo, A. E. & Gubina, O. V. (2019). The formation of digital space at the municipal level: overview of settlement websites. *Ekonomicheskie i sotsialnye peremeny. Fakty, tendentsii, prognoz [Economic and social changes: facts, trends, forecast]*, 12(5), 76–90. (In Russ.)
15. Vasilieva, E. V., Pulyaeva, V. N. & Yudina, V. A. (2018). Digital competence development of state civil servants in the Russian Federation. *Biznes-informatika [Business Informatics]*, 4(46), 28–42. (in Russ.)
16. Nerovnya, T. N. & Khachirov, A. D. (2013). The problem of estimation of the multiplicative effects from investment in industry. *Terra economicus*, 11(1), 3, 28–34. (In Russ.)
17. Spasskiy, N. (2011). On the solid power and reindustrialization of Russia. *Rossiya v globalnoy politike [Russia in global affairs]*, 9(6), 28–42. (In Russ.)
18. Ratner, S. V. & Iosifov, V. V. (2012). Stimulation of high-tech industries development (on the example of machine-building industry in Germany). *Vestnik Uralskogo Federalnogo universiteta. Seriya «Ekonomika i upravleniye» [Bulletin of Ural Federal University. Series Economics and Management]*, 4, 46–58. (In Russ.)
19. Urasova, A. A. (2019). Regional Industry in the Digital Era: Information and Communication Dimension. *Ekonomika regiona [Economy of region]*, 15(3), 684–694. (In Russ.)
20. Trachuk, A. V., Linder, N. V. (2017). Innovations and productivity of the Russian industrial companies. *Innovatsii [Innovations]*, 4(222), 53–65. (In Russ.)
21. Yakovlev, G. I. (2018). The development of the competitiveness of enterprises on the basis of digital technologies. *Elektronnyy nauchno-prakticheskiy zhurnal «Sinergiya» [Synergy]*, 3, 29–34. Retrieved from: <https://orel.vepi.ru/wp-content/uploads/sites/10/2019/01/Sinergiya-2018.-3.pdf> (Date of access: 05.02.2020). (In Russ.)
22. Uskova, T. V., Lukin, E. V., Mel'nikov, A. E. & Leonidova, E. G. (2017). Industrial development issues in the economy of the old industrial regions of Russia. *Ekonomicheskie i sotsialnye peremeny. Fakty, tendentsii, prognoz [Economic and social changes: facts, trends, forecast]*, 10 (4), 62–77. (In Russ.)
23. Nikitaeva, A. Yu. (2017). Regional institutional structure in the context of innovative industry development. *Journal of institutional studies*, 9(1), 134–149. (In Russ.)
24. Abdikeev, N. M., Bogachev, Yu. S. & Bekulova, S. R. (2019). Institutional Mechanisms for Ensuring a Scientific and Technological Breakthrough in the Russian Economy *Upravlencheskiye nauki [Management Sciences in Russia]*, 9(1), 6–19. (In Russ.)
25. Bayevskiy, A. A. (2015). RFID-technology and its perspectives in Russia. *Trudy Nizhegorodskogo gosudarstvennogo tekhnicheskogo universiteta im. R. E. Alekseeva [Transactions of Nizhni Novgorod State Technical University n.a. R. E. Alekseeva]*, 3(110), 98–103. (In Russ.)
26. Cherepkov, S. (2005). RFID technology. Experience of using and prospective directions. *Komponenty i tekhnologii [Components & Technologies]*, 9, 154–157. (In Russ.)
27. Semerikova, E. V. (2017). *Ispolzovanie prostranstvennoy zavisimosti v regionalnykh issledovaniyakh na primere analiza bezrabotitsy v Rossii i Germanii. Dis. ... cand. econom. sciences [The use of spatial dependence in regional studies on the example of the analysis of unemployment in Russia and Germany. Thesis ... Cand. Econ. Sci.]*. Moscow. (In Russ.)
28. Bell, K. P. & Bockstael, N. E. (2000). Applying the generalized-moments estimation approach to spatial problems involving micro-level data. *Review of Economics and Statistics*, 82(1), 72–82.
29. Lobodina, O. N. & Schmidt, Yu. D. (2013). Estimation of the influence of spatial factors on the intensity of innovation processes. *Vestnik Tikhookeanskogo gosudarstvennogo ekonomicheskogo universiteta [Bulletin of the Pacific State University of Economics]*, 3(67), 20–30. (In Russ.)
30. Anselin, L. (1995). Local indicators of spatial association — LISA. *Geographical Analysis*, 27(2), 93–115.
31. Suvorova, A. V. (2019). Development of growth poles in the Russian Federation: direct and reverse effects. *Ekonomicheskie i sotsialnye peremeny. Fakty, tendentsii, prognoz [Economic and social changes: facts, trends, forecast]*, 12(6), 110–128. DOI: 10.15838/esc.2019.6.66.6. (In Russ.)
32. Rusanovsky, V. A. & Markov, V. A. (2018). Employment and labor productivity in macroregions of Russia: spatial interdependence. *Problemy prognozirovaniya [Studies on Russian Economic Development]*, 2(167), 36–48. (In Russ.)

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**Цифровая трансформация
промышленных предприятий
в условиях инновационной экономики**

Коллективная монография

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В монографии рассматриваются различные аспекты проблемы цифровой трансформации промышленных предприятий в условиях инновационной экономики, решение которой будет способствовать достижению устойчивого развития промышленных отраслей на основе установления коллаборационных связей на различных уровнях экономической системы. Издание может быть интересно широкому кругу читателей, интересующихся данной проблемой, в том числе предназначается для экономистов, научных и практических работников, преподавателей и студентов экономических вузов и факультетов.

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Введение

За последние годы тема цифровой трансформации становится все более актуальной для большинства российских компаний, включающих в стратегическую повестку своего развития вопросы цифровизации бизнес-процессов. В настоящее время цифровая трансформация стала востребованным инструментом создания адекватных пандемии COVID-19 условий функционирования бизнеса; достижения устойчивого развития компании в условиях неопределенности; сокращения издержек на разработку новых продуктов и времени их выведения на рынок; реализации современных подходов к формированию новых качеств компании и ее соответствию тенденции постоянного ускорения научно-технологического прогресса.

Российские компании осознали важность и преимущества цифровой трансформации: число компаний, осуществляющих системный подход к цифровым преобразованиям и реализующих их в рамках специальной стратегии, за последние два года увеличилось вдвое. Логичным следствием является рост цифровой зрелости компаний.

Главными факторами успеха цифровых преобразований рассматриваются наличие стратегического плана, четкое управление преобразованиями, внедрение ценностей и принципов «цифровой культуры», а ключевыми направлениями – цифровизация бизнес-процессов, работа с данными, управление клиентским опытом. При этом успешная трансформация подразумевает гармоничное развитие сразу по нескольким направлениям. Одновременно с этим надо понимать, что недостаточно только построить цифровую модель бизнеса – без изменения ментальности сотрудников, формирования у них цифровых компетенций цифровая трансформация не осуществится. Практика подтверждает, что наиболее востребованными компетенциями сотрудников в условиях новых вызовов являются гибкость, самообразование и способность работать и принимать решения в ситуациях неопределенности.

Ценность цифровой формы взаимодействия постоянно растет по всем отраслям – важность ее неоспорима для IT-компаний, промышленных предприятий, сферы логистики и маркетинга, а также для постоянного развития продуктов и услуг. Следует отметить и рост цифрового партнерства, которое позволяет быстро создавать и запускать новые продукты, реагируя на изменяющиеся потребности рынка. По данным исследований, рост числа компаний, реализующих или планирующих цифровое партнерство, за период 2018-2020гг. составил 13% (доля таких компаний в российской экономике составляет 74%).

Однако подобные партнерские бизнес-модели зачастую неустойчивы и имеют ограниченный потенциал. Кроме того, цифровая инфраструктура не в полной мере соответствует потребностям бизнеса – это обусловлено, с одной стороны, недостаточной зрелостью инфраструктуры ряда компаний, с другой – быстрым ростом требований бизнеса к инфраструктуре. К тому же размер бюджета российских компаний на цифровую трансформацию уступает зарубежным партнерам, варьируя от 3 до 10% годовой выручки.

Главные ожидания руководителей от цифровой трансформации фокусируются на увеличении капитализации компании и росте маржинальности продуктов и услуг. К уже полученным результатам следует отнести сокращение издержек, повышение производительности и увеличение скорости адаптации к внешним изменениям.

Безусловно, новый технологический цикл становится триггером программ кардинальных изменений бизнес-процессов и глубокой перестройки бизнес-моделей. Запуск данных процессов, сложных по своей природе и обладающих новизной, вынуждает руководителей включать в повестку обсуждения вопросы, в числе которых: поиск механизма запуска процесса цифровой трансформации и инструментов эффективного управления этим процессом; выбор соответствующих технологических решений, способных вывести бизнес на магистраль цифрового развития; прогнозирование влияния новых технологий на

операционную эффективность и окупаемость; формирование компетенций, необходимых для успешной цифровой трансформации, и настрой команды на постоянные изменения.

Следует тому, что каждая компания находится в уникальных условиях своего развития, достигая свои цели и решая свои задачи, уникального рецепта цифровой трансформации не существует. Вместе с тем авторы данной монографии сделали попытку анализа и обобщения существующих подходов к проведению цифровой трансформации промышленных предприятий в условиях инновационной экономики.

Глава 1. Современное состояние и перспективы развития цифровой трансформации промышленных предприятий

1.1. Ключевые направления цифровой трансформации промышленности

Эволюция развития промышленной индустрии насчитывает несколько этапов. В настоящий момент развивается INDUSTRY 4.0, которая базируется на цифровых технологиях, киберфизических производственных системах, нацеленных на соединение физического и цифрового производства. Она включает в себя оцифровку и интеграцию цепочек создания стоимости продуктов и услуг. В 2019 году мировой рынок решений для INDUSTRY 4.0 составил 71,7 миллиардов долларов и растет примерно на 17% в год.

Сохранение предприятиями своих конкурентных позиций в условиях глобальной цифровизации и в информационном типе экономике возможно только путем постоянного внедрения инноваций [6; 7]. Как показывают исследования, 90% руководителей промышленных компаний считают, что цифровизация предлагает больше возможностей, чем рисков, 98% респондентов считают, что повышение эффективности является основной причиной инвестирования в цифровую трансформацию: интегрированное планирование цифрового предприятия, более эффективное использование активов, снижение затрат на качество и автоматизация способствуют такому повышению эффективности [29].

Роботизированные комплексы, информационные технологии и персонал промышленных предприятий тесно связаны между собой, взаимодействуют в режиме реального времени, создавая инновационный более гибкий способ производства. Интернет вещей (IoT) и комплексный анализ данных образуют ключевые факторы создания ценности в INDUSTRY 4.0. Цифровизация производственных процессов ведет к качественному скачку производительности, снижению затрат и становится одним из важных факторов формирования конкурентоспособности предприятий [14].

Снижения затрат возможно достичь за счет внедрения интегрированного и календарного планирования производства, которые позволят синхронизировать данные внутри предприятия от датчиков до систем ERP с информацией, полученной от партнеров по горизонтальной цепочке создания стоимости, например, об уровнях запасов или изменениях потребительского спроса. Оптимизация расходов также возможна за счет оптимизации графиков ремонта и технического обслуживания ключевых активов, что обеспечит увеличение времени их безотказной работы.

Цифровизация преобразует исходную бизнес-модель предприятия и создает новые возможности для бизнеса за счет использования глобально распределенных оцифрованных активов и организационных ресурсов, объединяя нематериальные процессы разработки продуктов и планирования производства с физическим производством и операционной поддержкой [10; 17]. Для получения максимального эффекта от цифровизации необходимо преобразовать бизнес-процессы в цифровые по всей цепочке создания стоимости от идеи до реализации и эксплуатационного использования.

В Указе «О национальных целях развития Российской Федерации на период до 2030 года» цифровая трансформация рассматривается в качестве приоритетной цели развития страны, без которой невозможно успешное развитие национальной экономики [2].

Для промышленных предприятий России успешная цифровизация предполагает повышение технологического уровня и инновационного потенциала [8].

В рамках проекта «Цифровая промышленность», который разработан и реализуется Минпромторгом, работа ведется по трем направлениям:

- создание регуляторной инфраструктуры, которая включает разработку актуального законодательства и нормативно-технического обеспечения цифровых технологий, меры государственной поддержки цифровой трансформации, создание необходимого методического обеспечения и программ

переподготовки и повышения квалификации персонала промышленных предприятий с целью формирования у них цифровых компетенций для работы в цифровой среде;

- создание платформ государственной информационной системы промышленности (ГИСП), включающих платформы инвестирования, создания и развития промышленных предприятий, мероприятий господдержки, продвижения промышленной продукции на внутреннем и на внешнем рынках, анализа и прогноза развития производства;

- обеспечение функционирования центра компетенций, разработку мер господдержки цифровых платформ, программных продуктов, базовых технологий производства приоритетных электронных компонентов и радиоэлектронной аппаратуры.

С точки зрения цифровой экономики ее ключевыми активами являются информация и человеческий капитал [11]. Уровень подготовленности персонала с точки зрения владения цифровыми компетенциями является определяющим условием успешной цифровой трансформации бизнеса [27; 28]. При этом надо учитывать, что скорость внедрения цифровых инноваций существенно выше, чем скорость приобретения цифровых компетенций, поэтому цифровая экономика предполагает постоянное обучение персонала [20; 21; 25].

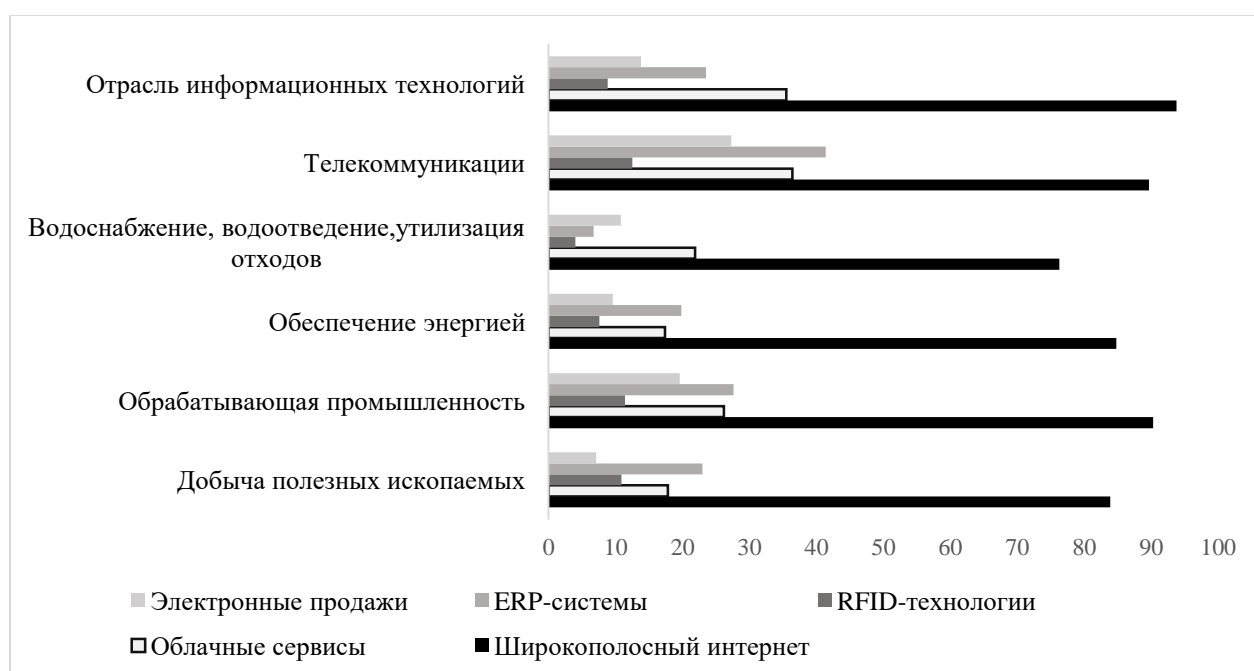
В таблице 1.1.1 представлена информация об использовании цифровых технологий на российских предприятиях в разрезе видов экономической деятельности.

Таблица 1.1.1 – Интенсивность использования цифровых технологий по видам экономической деятельности в 2018 году

| Вид экономической деятельности | Удельный вес предприятий, использующих цифровые технологии (%) | | | | |
|--|--|------------------|-----------------|-------------|---------------------|
| | Широкополосный интернет | Облачные сервисы | RFID-технологии | ERP-системы | Электронные продажи |
| Добыча полезных ископаемых | 83,9 | 17,8 | 10,9 | 23 | 7,1 |
| Обрабатывающая промышленность | 90,3 | 26,2 | 11,4 | 27,6 | 19,6 |
| Обеспечение энергией | 84,8 | 17,4 | 7,6 | 19,8 | 9,6 |
| Водоснабжение, водоотведение, утилизация отходов | 76,3 | 21,9 | 4 | 6,7 | 10,8 |
| Телекоммуникации | 89,7 | 36,4 | 12,5 | 41,4 | 27,3 |
| Отрасль информационных технологий | 93,8 | 35,5 | 8,8 | 23,5 | 13,8 |

Источник: расчёт произведен по данным источника [9]

На рисунке 1.1.1 представлена графическая интерпретация данных об использовании цифровых технологий.



Источник: расчёт произведен по данным источника [9]

Рисунок 1.1.1 – Использование цифровых технологий на предприятиях в 2018 году

Наибольший уровень интенсивности использования цифровых технологий характерен для отрасли информационных технологий и телекоммуникаций.

Для оценки скорости адаптации предприятий к цифровой трансформации применяется индекс цифровизации бизнеса BDI (Business Digitalization Index).

Он базируется на частных индексах, т.е. данных об использовании предприятием:

- каналов передачи и хранения информации (облачных технологий, корпоративной почты, мессенджеров, систем автоматизации и т.д.);
- цифровых технологий искусственного интеллекта, интернета вещей, 3D печати, электронного документооборота и других;
- интернет-инструментов для продвижения и развития предприятия;
- программ защиты цифровой информации и использования специализированных антивирусных программ;
- человеческого капитала, в частности, оценивается степень вовлеченности руководства в саморазвитие и развитие персонала в области цифровых компетенций.

В условиях цифровой трансформации персонал предприятий выступает в качестве одного из важнейших производственных ресурсов. При этом цифровой бизнес предполагает наличие у персонала предприятий цифровых компетенций, необходимых для реализации бизнес-процессов [12; 16]. Причем качество цифровых компетенций должно соответствовать тем требованиям, которые предъявляются профессиональными стандартами в соответствующей области деятельности [15].

На рисунке 1.1.2 показаны индексы цифровизации бизнеса за 2018 год для предприятий по различным видам экономической деятельности.

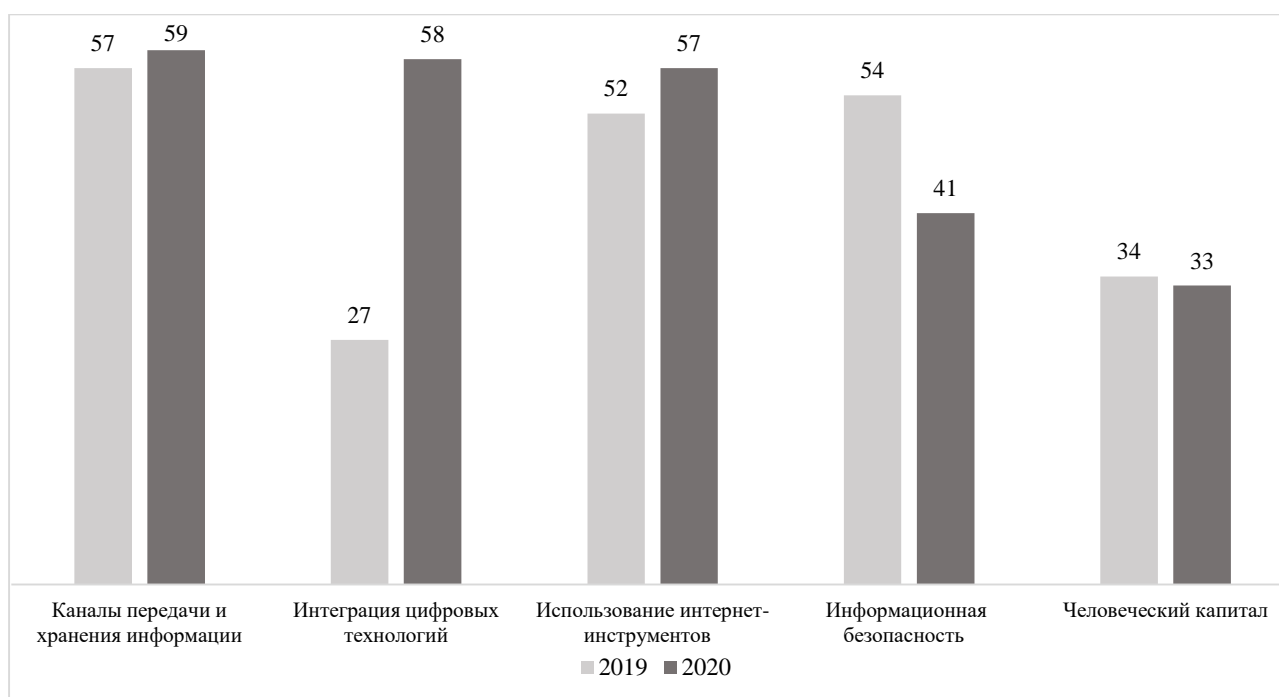


Источник: расчёт произведен по данным источника [9]

Рисунок 1.1.2 – Индекс цифровизации бизнеса по видам экономической деятельности в 2018 году (в %)

Наибольший показатель цифровизации бизнеса достигнут на предприятиях телекоммуникационной сферы (41%), информационных технологий (35%), обрабатывающей промышленности (35%).

В июле 2020 года было проведено исследование индекса цифровизации малого и среднего бизнеса [32]. Если в 2019 году индекс цифровизации малого и среднего бизнеса составлял 45%, то в 2020 году он достиг 50%. На рисунке 1.1.3 представлены частные индексы, которые использовались для расчета индекса цифровизации малого и среднего бизнеса.



Источник: расчёт произведен по данным источника [32]

Рисунок 1.1.3 – Частные индексы цифровизации малого и среднего бизнеса (в %)

В 2020 году возросло использование каналов передачи и хранения информации на 2% по сравнению с 2019 годом и использование интернет-инструментов на 5%. В наибольшей степени увеличилась интеграция цифровых технологий на 31%. Рост этих индексов во многом обусловлен теми ограничениями, которые связаны с пандемией коронавируса COVID-19, в частности, вынужденным переводом части бизнес-процессов в дистанционный режим. В основном это относится к организационным и управленческим бизнес-процессам и в наименьшей степени к производственным.

Цифровая трансформация и автоматизация сокращают затраты на обработку и повышают экономическую эффективность в обрабатывающей промышленности. Раньше компании-производители меньше уделяли внимания стоимости производства продукта, что приводило к увеличению затрат на продукт. Однако растущая интеграция цифровой трансформации, ведущая к автоматизации, помогла снизить ненужные затраты. Например, цифровое производство может сократить циклы разработки инноваций и повысить скорость их внедрения, что также скажется на стоимости производства.

Кроме того, улучшение продукции за счёт цифровизации производственных бизнес-процессов также помогает более быстрому выходу его на рынок и генерирует получение высокого дохода. Внедрение Интернета вещей в обрабатывающей промышленности помогает обнаруживать ошибки производства на ранней стадии, что, в свою очередь, снижает количество рекламаций.

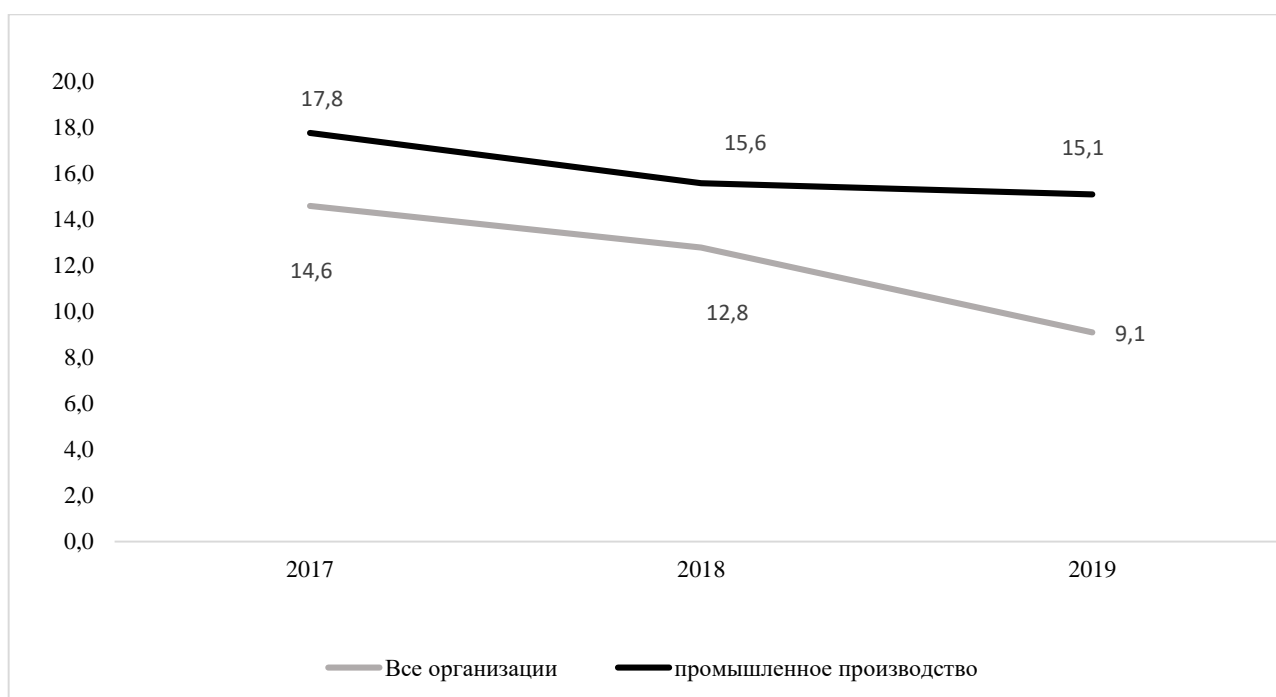
Одним из основных преимуществ интеграции цифровой трансформации, такой как робототехника и Интернет вещей, является то, что роботы могут работать круглосуточно, без каких-либо сбоев или ошибок. В результате это оказывает положительное влияние на рост производительности и промышленного рынка.

Четвертая промышленная революция охватывает широкий спектр цифровых технологий по всей цепочке создания стоимости и считается ядром информации и автоматизации. Однако быстрое внедрение автоматизации и цифровой трансформации в промышленности требует высококвалифицированных специалистов для обработки больших данных и эксплуатации необходимого оборудования, что в настоящее время становится одной из наиболее серьезных проблем [22; 23]. Для подготовки и переподготовки работников промышленности создаются специальные обучающие программы и центры компетенций, необходимые для обеспечения промышленности высококвалифицированным персоналом. Кроме того, работники маркетинговых отделов и служб должны владеть современными информационными коммуникациями, для того, чтобы обеспечить эффективное взаимодействие с партнерами и потребителями продукции [13].

По данным Билайн, 50% выручки идет от цифровых или улучшенных за счет технологий продуктов, 54% компаний перешли на удаленную работу весной, а 35,5 млн рабочих мест в России можно заменить машинами, т.е. каждого 2-го сотрудника [31].

Одной из важнейших задач цифровизации промышленного производства является создание стандартов цифровизации. В 2020 году для цифровой промышленности были разработаны первые стандарты в рамках серии ПНСТ «Умное производство», в том числе регулирующие сферу так называемых цифровых двойников, реализующих виртуальное представление физических элементов производственного процесса, Интернета вещей (IoT) и промышленного Интернета вещей (IIoT). Принято более 30 стандартов в области цифровых технологий и ведется разработка еще 50 новых стандартов. Это будет способствовать унификации инструментов цифровизации и развитию цифровых платформ. Особо важное значение имеют стандарты, связанные с промышленным Интернетом. При создании новых продуктов, сервисов и приложений использованием технологий IoT и IIoT будет обеспечена их независимость от конкретного вендора. Следует отметить, что российский проект стандарта промышленного «интернета вещей» «Information technology. Compatibility requirements and model for devices within IIoT systems» («Информационные технологии. Требования совместимости и образцы устройств промышленного «интернета вещей») одобрен экспертами международной организации по стандартизации ISO/IEC.

Цифровизация промышленных предприятий непосредственно связана с уровнем их инновационной активности [19]. На рисунке 1.1.4. показан уровень инновационной активности по всем российским организациям и по предприятиям промышленного комплекса.

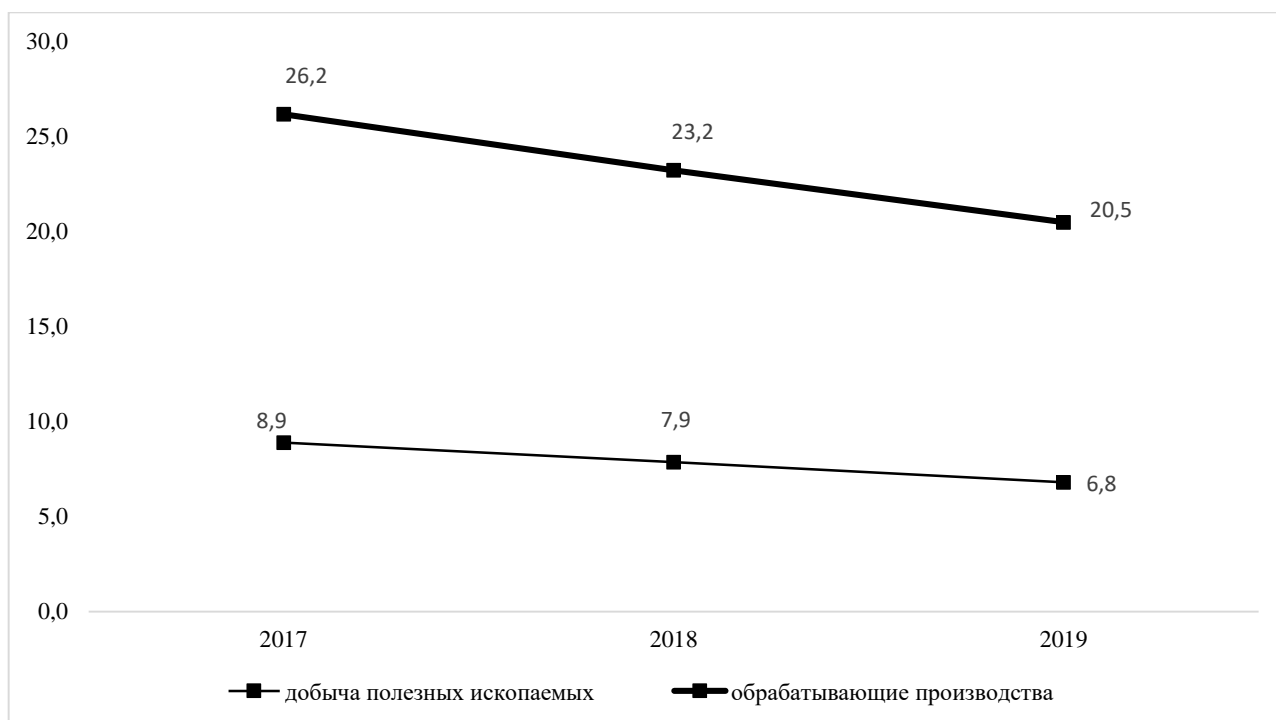


Источник: расчёт произведен по данным Росстата РФ

Рисунок 1.1.4 – Уровень инновационной активности организаций (в %)

Как видно из рисунка 1.1.4, во все годы уровень инновационной активности промышленных предприятия выше, чем у организаций по всем другим видам деятельности. Однако наблюдается тенденция спада инновационной активности, что неблагоприятно сказывается на темпах цифровизации промышленного производства. Очевидно, что в 2020 году эта тенденция продолжится в связи с негативным влиянием пандемии, которая привела к спаду как мирового производства в целом, так и в отдельных странах, в том числе в России.

На рисунке 1.1.5. показана динамика изменений уровня инновационной активности предприятий добывающей и обрабатывающей отраслей.



Источник: расчёт произведен по данным Росстата РФ

Рисунок 1.1.5 – Уровень инновационной активности предприятий добывающей и обрабатывающей отрасли (в %)

За последние три года уровень инновационной активности предприятий по добыче полезных ископаемых снизился с 8,9% до 6,8%, т.е. на 2,1%. Еще более значимое снижение на 5,7% зафиксировано на предприятиях обрабатывающего производства, причем вероятнее всего, что эта тенденция также сохранится и в 2020 году. Также снижается доля организаций в обрабатывающей промышленности, осуществляющих технологические инновации, с 28,8% в 2017 году до 28% в 2019 году. Для предприятий добывающей отрасли этот показатель в 2017 году составлял 9,5%, в 2018 году - 9%, но в 2019 году поднялся до 9,7%.

1.2. Цифровые технологии, используемые на промышленных предприятиях

На промышленных предприятиях используются различные цифровые технологии, в том числе киберфизические системы, облачные вычисления, Интернет вещей (Internet of Things, IoT) и промышленный Интернет вещей

(Industrial Internet of Things, IIoT), искусственный интеллект, машинное обучение, цифровые двойники и другие технологии.

Киберфизические системы представляют собой системы взаимодействующих устройств, средств передачи, обработки и хранения данных. Они являются базовыми составляющими архитектур существующих и перспективных средств автоматизации управления сложными объектами.

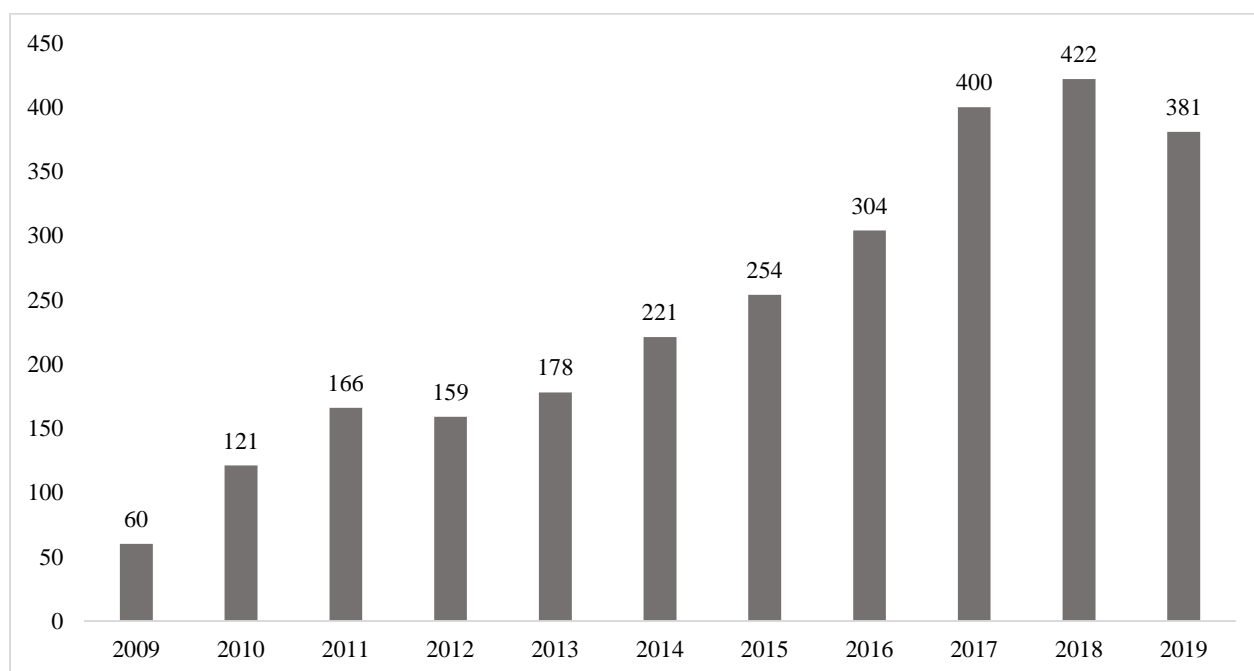
Цифровые двойники применяются для виртуальной визуализации, моделирования и изучения сложных операционных продуктов, а затем полученные данные используются для существенного улучшения времени выхода на рынок продукта, стоимости, качества и т.д. Создание цифровых двойников необходимо для проверки проектов, моделирования вариаций, анализа влияния изменений и оптимизации производительности. Цифровые двойники позволяют оптимизировать управление процессами производства, обнаруживать аномалии, осуществлять предиктивное обслуживание.

Цифровые двойники создаются как для выпускаемой промышленным предприятием продукции, так и для самого предприятия и его цехов. Цифровая имитационная модель предприятия позволяет планировать оптимальную расстановку технологического, вспомогательного и обеспечивающего оборудования, создавать схемы инженерных сетей на уровне цехов и предприятия в целом.

Цифровые двойники являются прогрессивной технологией, которая уже применяется в различных сферах промышленности и энергетики, например, системы 3D-моделирования используются для создания цифровых двойников оборудования на НПЗ «Газпром Нефть». Однако применение цифровых двойников порождает новые виды угроз информационной безопасности, в частности, обработка данных, собираемых с киберфизических устройств, проводится на базе зарубежного программного обеспечения, поэтому данные передаются в облачные хранилища, находящиеся за рубежом, что не обеспечивает технологическую независимость. Благодаря цифровым двойникам

предприятия могут воспроизводить новые продукты в цифровом виде до начала производственного процесса, что в конечном итоге снижает затраты, отходы и проблемы с качеством. В 2021 году расходы на технологию цифровых двойников вырастут на 17%.

По данным Международной федерации робототехники, на промышленных предприятиях по всему миру работает 2,7 миллиона роботов. На рисунке 1.2.1 показана динамика установки промышленных роботов в мире с 2009 по 2019 годы.



Источник: расчёт произведен по данным World Robotics 2020
https://ifr.org/img/office/World_Robotics_2020_Sales_Flyer.pdf

Рисунок 1.2.1 – Количество установок промышленных роботов по годам (в тысячах штук)

С 2012 по 2018 годы наблюдалась возрастающая динамика количества установок промышленных роботов, и их максимальное значение было достигнуто в 2018 году. В 2019 число установок снизилось на 9,7%, очевидно, это снижение продолжится в 2020 году. Больше всего промышленных роботов установлено в Сингапуре (918 тыс. штук), Южной Корее (855 тыс. штук), Китае (783 тыс. штук) [34].

В 2018 году в России насчитывалось 860 промышленных роботов, а доля промышленных роботов от отечественных производителей составила всего 4% от общего количества роботов, внедренных российской промышленностью.

Роботизированные технологические комплексы приводят к повышению качества выпускаемой продукции и практически отсутствию брака, повышению коэффициента сменности оборудования без увеличения численности работников, обеспечению ритмичности производства, снижению травматизма работников и т.п.

Технология Интернета вещей (IoT) основана на объединении в сеть физических объектов, в которые встроены датчики, программное обеспечение и другие технологии с целью подключения и обмена данными с другими устройствами и системами через Интернет. Объединяемые в сеть физические устройства могут быть как обычными бытовыми устройствами, так и сложным промышленным оборудованием. По экспертным оценкам в настоящее время в мире около 10 миллиардов подключенных устройств IoT, а к 2025 году их количество возрастет до 22 миллиардов. С помощью облачных технологий, больших данных, мобильных технологий физические объекты могут обмениваться данными и собирать информацию с минимальным вмешательством человека.

Промышленный Интернет-вещей (IIoT) представляет собой применение технологии IoT в промышленных условиях, в частности, речь идет о подключении контрольно-измерительных приборов, датчиков и устройств, управление которыми осуществляется с помощью облачных технологий. Интернет вещей для предприятий позволяет собирать и анализировать данные от подключенных ресурсов, людей и мест, предлагая практически значимую аналитику в промышленной среде. Преимущества применения промышленного Интернета вещей очевидны: получаемая на основе данных IoT аналитика обеспечивает более эффективное управление бизнесом, повышается производительность и эффективность бизнес-операций, обеспечивается более

высокий уровень контроля за бизнес-процессами, исключаются ошибки, порождаемые человеческим фактором при реализации технологических процессов. Постоянный мониторинг производственной линии предоставляет информацию для упреждающего обслуживания оборудования.

Рост использования промышленного интернета в России непосредственно зависит от развития сетей 5G, за счет которых повысится эффективность облачных хранилищ и вычислений по требованию.

В декабре 2020 года правительственная комиссия по цифровому развитию утвердила разработанные «Ростехом» дорожные карты по развитию в России Интернета вещей, объем финансирования проекта составляет 22,4 млрд рублей, включая 17,4 млрд рублей из внебюджетных источников. В рамках выполнения проекта к 2024 году объем продаж российских производителей на внутреннем рынке должен составить 207,3 млрд рублей, на внешнем – 2,5 млрд рублей, а число специалистов на этом рынке должно к 2024-му составить 4,2 млн [33].

Дополненная реальность также находит применение в промышленном производстве, в частности, в следующих производственных процессах:

- при сборке сложных изделий, в этом случае операторы пользуются проекционными дисплеями, на которых демонстрируются пошаговые инструкции, при этом руки оператора остаются свободными для выполнения операций сборки;

- для удаленного обслуживания и ремонта, в этом случае экспертам в реальном режиме времени демонстрируется видеотрансляция о работе оборудования и возникших проблемах, а затем в том же режиме получают консультационную помощь;

- для обеспечения гарантии качества, она помогает инженерам и операторам быстро сравнивать произведенную продукцию со спецификациями проекта и проверять, используются ли правильные детали и правильно ли они собраны.

Кроме того, технологии дополненной реальности успешно используются в производственном обучении на рабочем месте. Применение интерактивных электронных технических руководств для технологических процессов сборки позволяет увеличить качество сборки и повысить безопасность персонала, сокращает время обучения новых сотрудников процессу сборки.

Широкое применение находят технологии радиочастотной идентификации RFID (Radio Frequency IDentification). Они применяются при проведении интеллектуального учета перемещения объектов, принятии управленческих решений, автоматизации работы.

В промышленном производстве технология RFID применяется для маркировки готовой продукции, маркировки закупки и доставки материалов, координации работы персонала, контроля доступа и обеспечения безопасности работников, для автоматизации межцехового планирования. В бизнес-процессах складского учета и логистики технология RFID необходима для идентификации и маркировки процессов складирования, доставки и перемещения объектов, координации движения транспортных средств в режиме онлайн в рамках организации оптимальной логистики, обеспечение доступа и безопасности складских помещений, позволяет автоматизировать процесс сортировки грузов и их комплектации.

Технологии искусственного интеллекта обеспечивают так называемое машинное зрение, которое широко применяется для автоматизации производственных процессов, в частности, для контроля за соблюдением регламентов выполнения технологических операций, контроль состояния оборудования и качества выпускаемой продукции и т.п. В рамках развития этой технологии применяется машинное обучение, которое подразумевает способность машины обучаться, используя обширные массивы данных вместо жестко запрограммированных инструкций. Примером применения такой технологии является создание автоматической системы сортировки алмазов по форме и цвету в компании «Алроса». Камеры машинного зрения выполняют

съемку алмаза при его движении в свободном падении, затем анализируются характеристики изображений алмаза и проводится их сортировка. Результатом применения этой технологии машинного зрения является увеличение производительности труда, снижение себестоимости продукции за счет отказа от человеческого труда, минимизация влияния человеческого фактора, при котором возникали экономические потери из-за ошибок при сортировке.

В 2021 году ожидается быстрый рост технологий искусственного интеллекта и технологий промышленной автоматизации. Это обусловлено тем, что по мере восстановления мирового производства и цепочек поставок нехватка рабочей силы станет серьезной проблемой. Автоматизация промышленных предприятий с помощью робототехники и Интернета вещей станет ключевым альтернативным решением для управления производством.

Технологии 3D-печати активно используются промышленными предприятиями. 3D-печать применяется для изготовления прототипов (образцов) конечного продукта для проверки дизайна или функциональности продукта, для тестирования технологии его собираемости, при этом любые ошибки могут быть мгновенно исправлены путем редактирования 3D-модели и повторной печати в следующей итерации. Промышленные 3D-принтеры все чаще заменяют литье под давлением и другие процессы, такие как фрезерование с ЧПУ. 3D-принтеры имеют уникальную способность создавать сложные маленькие детали, а также полноразмерные модели, что делает их идеальными для производства прототипов высококачественных изделий. Поскольку 3D-печать – это форма аддитивного производства, вырезка материалов не приводит к отходам, например, на станках с ЧПУ, это делает промышленную 3D-печать очень ценной в отраслях, где важна экономия на дорогих материалах, таких как 3D-печать металлом. Кроме того, эта цифровая технология позволяет существенно сокращать сроки технологического внедрения новых изделий за счет минимизации времени на изготовление тестируемых образцов и практически полностью исключает ошибки, связанные с воздействием

человеческого фактора. 3D-принтеры могут работать с различными исходными материалами, используемыми в производстве, в том числе, с инженерным пластиком, пригодным для изготовления прототипов различных устройств, деталей, металлическим порошком, фотополимерами, воском.

Промышленная 3D-печать в этом году развивалась с невероятной скоростью в силу проблем, связанных с пандемией. Цифровое производство на основе 3D-печати обеспечило производство средств индивидуальной защиты (СИЗ) рядом с больницами, которые в этом нуждались. Технологии 3D-печати дают возможность повысить гибкость производства и рост производительности больше, чем в традиционном производстве. Прогнозируется, что рынок промышленной 3D-печати вырастет до 5,3 млрд долларов США к 2025 году.

1.3. Проблемные вопросы цифровизации промышленных предприятий и пути их преодоления

К ключевым факторам, ограничивающим возможности цифровизации в промышленном производстве, относятся:

- высокая стоимость IT-решений по цифровизации производственных процессов;
- недостаточный уровень цифровых компетенций у персонала промышленных предприятий;
- недоверие и сопротивление персонала промышленных предприятий к цифровизации бизнеса;
- дефицит инвестиционных ресурсов, направляемых на цифровизацию.

Пути решения этих проблем лежат в следующих плоскостях:

- обучение персонала работе с цифровыми сервисами и повышение компьютерной квалификации. Многие промышленные предприятия будут вынуждены изменить структуру инженерно-технического персонала, в частности, заменить традиционный инженерный персонал, чтобы включить людей с большим технологическим опытом, например, в программном

обеспечении и IoT. По данным Всемирного экономического Форума, к 2022 году 54% сотрудников потребуются серьезное обучение, причем 35% потребуются как минимум шесть месяцев повышения квалификации по развитию новых цифровых навыков [24]. Исследование PWC подтверждает, что 77% работников готовы пройти переобучение и повышение квалификации, чтобы получить цифровые компетенции [30]. В связи с тем, что цифровые технологии меняются очень быстро, необходимо постоянно актуализировать цифровые навыки персонала, т.е. требуется интегрировать развитие цифровых навыков в рабочие места сотрудников;

- предоставление мер поддержки промышленным предприятиям как со стороны государства, так и со стороны стейкхолдеров, особое место занимают венчурные инвестиции в цифровую экономику [18];

- разработка промышленными предприятиями комплексных стратегических планов цифровизации;

- актуализация нормативно-правового обеспечения цифровой трансформации промышленности, в частности, введение новых стандартов обеспечит скоординированные действия при проектировании и разработке различных систем Интернета вещей и промышленного интернета вещей.

Меры по стимулированию инновационной деятельности в промышленности.

Поддержка цифровых инноваций осуществляется по различным каналам. Прежде всего следует отметить субсидирование разработок и внедрения отечественных технологий и платформенных решений со стороны Минпромторга России и Фонда развития промышленности (ФРП).

Также существуют программы для поддержки высокотехнологичных стартапов, которые реализуются бизнесом, например, программа поддержки «Промтех», организованная и поддерживаемая фондом «Сколково» и Инновационным центром «Ай-Теко», крупнейший в России корпоративный акселератор проектов в сфере металлургии Severstal SteelTech Accelerator,

который финансируется Северсталью, Цифровая лаборатория Норникеля и другие.

С декабря 2020 года Фонд развития промышленности начинает выдавать займы до 2 млрд рублей под 1% годовых сроком до 7 лет на проекты во всех отраслях обрабатывающей промышленности.

Меры поддержки региональной промышленной политики.

Одним из вариантов поддержки промышленности регионов является механизм предоставления единой государственной субсидии, который был начат в 2016 году. Тогда средства господдержки были направлены Республике Крым, Ставропольскому краю и Республике Удмуртия, при этом удалось привлечь более 7 млрд руб. внебюджетных инвестиций.

Поддержка инновационной активности регионов является важным фактором их дальнейшего развития [26]. Основными целями единой региональной субсидии являются ускоренное развитие промышленного комплекса в регионах с низким уровнем социально-экономического развития и геостратегических регионах, а также докапитализация региональных фондов развития промышленности (ФРП) во всех субъектах страны.

Процедура предоставления субсидии начинается с проведения конкурса, который организует Минпромторг России. На основании поступивших заявок составляется рейтинг региональных программ. На 2021-2023 годы планируется выделять по 1 млрд рублей. Если этот инструмент поддержки окажется востребованным, средства на реализацию данной меры поддержки будут увеличены. Региональные бюджеты получают возможность возместить часть затрат промышленных предприятий на выплату 1-го взноса (аванса) при заключении договора лизинга, приобретение нового оборудования. Можно также докапитализировать региональные фонды развития промышленности.

В обновленном механизме предусмотрено стимулирование промышленной политики регионов на принципах софинансирования из федерального бюджета. Особое место отведено поддержке региональных

программ развития промышленности тех субъектов, которые относятся к приоритетным территориям.

В 2021 году планируется увеличение числа промышленных кластеров, которых в настоящее время 79, а также расширение сети индустриальных парков на 76 единиц и создание 19 промышленных технопарков.

Изменены правила предоставления субсидий на возмещение затрат на выплату купонного дохода по облигациям, выпущенным в рамках реализации инвестиционных проектов по внедрению наилучших доступных технологий. Предусматривается расширение перечня субсидируемых финансовых инструментов и упрощение процедуры подачи заявки на участие в отборе инвестиционных проектов по внедрению наилучших доступных технологий на объектах, оказывающих значительное негативное воздействие на окружающую среду. Эти изменения направлены на совершенствование инструментария поддержки промышленных предприятий при внедрении наилучших доступных технологий. Субсидии могут быть предоставлены как на возмещение затрат на выплату купонного дохода по облигациям, выпущенным в рамках реализации инвестиционных проектов по внедрению наилучших доступных технологий, так и на возмещение затрат на уплату процентов по кредитам, полученным в 2019-2024 годах на реализацию таких проектов. Кроме того, у организаций появляется возможность изменить срок реализации инвестиционного проекта, а также внести изменения в план-график его реализации или показатели эффективности.

Разрабатываются меры поддержки в форме субсидии для маркетплейсов, которые обеспечивают продажу отечественной промышленной продукции за рубежом. Маркетплейсы будут интегрированы в систему сервисов по работе с продукцией предприятий.

В декабре 2020 года Минпромторг России разработал методику оценки уровня цифровой зрелости предприятий промышленности, которая была апробирована на предприятиях различных отраслей [4]. Для расчета уровня

цифровой зрелости сформированы наборы показателей, причем они отличаются для предприятий разных отраслей.

Показатели для расчёта цифровой зрелости по предприятиям промышленности:

- цифровая зрелость основных производственных и вспомогательных процессов предприятий промышленности;

- доля предприятий, для которых сформирован цифровой паспорт в государственной информационной системе промышленности (ГИСП);

- доля предприятий, использующих технологию API (application programming interface) для обмена данными, предоставления цифровых услуг и информационного взаимодействия с государственными информационными системами;

- доля предприятий, использующих технологии имитационного моделирования и виртуальных испытаний промышленной продукции (применяющих технологию «цифровой двойник изделия»);

- доля предприятий, использующих технологии предсказательной (предиктивной) аналитики при прогнозировании и проведении послепродажного (сервисного) обслуживания промышленной продукции;

- доля предприятий, использующих технологии промышленного интернета вещей, сбора данных и диспетчерского контроля для управления производственными процессами в реальном времени;

- доля предприятий, использующих технологию «цифровой двойник производства».

Для топливно- энергетической отрасли разработан перечень, состоящий из 18 показателей.

В 2021 году Минпромторг России планирует уделить особое внимание промышленному программному обеспечению, цифровых платформах, которые позволяют работать совместно и бесшовно, передавая данные из одной системы

в другую от стадии проектирования и управления до стадии постпродажного сервисного обслуживания промышленной продукции [30].

Список использованной литературы

1. Указ Президента РФ от 09.05.2017 N 203 «О Стратегии развития информационного общества в Российской Федерации на 2017 - 2030 годы».
2. Указ Президента РФ от 21.07.2020 N 474 «О национальных целях развития Российской Федерации на период до 2030 года».
3. Распоряжение Правительства РФ от 28.07.2017 N 1632-р «Об утверждении программы «Цифровая экономика Российской Федерации».
4. Приказ Минцифры России от 18.11.2020 N 600 «Об утверждении методик расчета целевых показателей национальной цели развития Российской Федерации «Цифровая трансформация».
5. Паспорт федерального проекта «Кадры для цифровой экономики»
URL: <https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-kadryi-dlya-tsifrovoj-ekonomiki.pdf>.
6. Веселовский М.Я., Никонорова А.В. Инновационная деятельность и стратегии ее развития в современных условиях. В сборнике: инновационное развитие России: условия, инновационная деятельность и стратегии ее развития в современных условиях противоречия, приоритеты. Материалы IX Международной научной конференции. В 3-х частях. Ответственные редакторы Ю.С. Руденко, А.В. Семенов. 2013. С. 45-49.
7. Веселовский М.Я., Никонорова А.В. Управление инновационным процессом и особенности внедрения инноваций// Вопросы новой экономики. 2014. №2(30). С. 60-67.
8. Веселовский М.Я., Погодина Т.В. Цифровые технологии и их влияние на инновационное развитие регионального промышленного комплекса//Вопросы региональной экономики. 2019. №1(38). С. 21-26

9. Индикаторы цифровой экономики: 2020: статистический сборник / Г.И. Абдрахманова, К. О. Вишнеvский, Л. М. Гохберг и др.; Нац. исслед. ун-т «Высшая школа экономики». – М.: НИУ ВШЭ, 2020. – 360 с.

10. Инновационно-технологическая трансформация промышленности в регионах России как инструмент достижения стратегических целей на пути становления цифровой экономики. Коллективная монография / Под науч. ред. Веселовского М.Я., Измайловой М.А. - М., Изд-во «Научный консультант». - 2019. - 364 с.

11. Концепция эффективного предпринимательства в сфере новых решений, проектов и гипотез. Монография. 2-е издание. - М.: Дашков и К.- 2019. – 641 с.

12. Морозов М.А. Управление персоналом на предприятиях туристской индустрии// Стандарты и качество. 2006- №2. - С. 54-58.

13. Морозов М.А., Морозов М.М. Цифровые коммуникации как инструмент формирования единого информационного пространства в туризме// Вестник Российского нового университета. Серия: Человек и общество. 2019. С. 69-72.

14. Морозов М.А., Морозова Н.С. Ключевые факторы конкурентоспособности в условиях цифровой экономики. В сборнике: Теория и практика развития предпринимательства: современные концепции, цифровые технологии и эффективная система. Материалы VI Международного научного конгресса. Под научной редакцией А.В. Шарковой, О.Н. Васильевой, Б. Оторовой. 2018. С. 380-383.

15. Морозов М.А., Морозова Н.С. Подходы к оценке соответствия образовательных программ профессиональным стандартам// Высшее образование сегодня, 2017. №10. С.13-17.

16. Морозова Н.С. Особенности управления персоналом в условиях цифровой экономики. В сб. Человеческий капитал в формате цифровой экономики: Междунар.науч.конф., посвященная 90-летию С.П.Капицы, Москва,

16 февраля 2018 г.: сб. докладов.- М.: Редакционно-издательский дом РосНОУ.- 2018.

17. Развитие предпринимательства: концепции, цифровые технологии, эффективная система. Монография. - М.: Дашков и К.- 2019. – 605 с.

18. Хорошавина Н.С. Венчурное финансирование - основа цифровой экономики// Вопросы региональной экономики. 2017. №4(33). С. 84-94.

19. Хорошавина Н.С. Цифровая трансформация промышленных предприятий на основе повышения их инновационной активности // Вопросы региональной экономики. 2019. № 4(41). С. 74-83

20. Frey, C.B., Osborne, M. A. (2017). The Future of Employment: How Susceptible Are Jobs to Computerisation? *Technological Forecasting and Social Change* 114 (C): 254–280.

21. Horvat D., Kroll H., Jäger A. Researching the Effects of Automation and Digitalization on Manufacturing Companies' Productivity in the Early Stage of Industry 4.0. *Procedia Manufacturing* 39 (2019), 886–893

22. Ilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence—An emergent boundary concept for policy and educational research. *Education and Information Technologies*, 21(3), 655– 679. doi:10.1007/s10639-014-9346-4

23. Iordache, C., Mariën, I., & Baelden, D. (2017). Developing digital skills and competences: A quick- scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Education*, 9(1), 6–30.

24. Jenkins, J.A. (CEO, AARP), 2019. An Ageing Workforce Isn't a Burden. It's an Opportunity, World Economic Forum Annual Meeting, 3 Jan. 2019, <https://www.weforum.org/agenda/2019/01/an-aging-workforce-isnt-aburden-its-an-opportunity/>

25. Moncada Linares, S., & Díaz Romero, C. (2016). *Interdisciplinary Journal of e-skills and Life Long Learning*, 12, 57-93.

26. Morozov M.A., Morozova N.S., Morozov M.M., Moldazhanov M.B. Innovative development of the regional economy. Семей, 2019.
27. Ross, B., Stubbings, C., Sheppard, B., Kelly, C., 2019. Upskilling: Bridging the Digital Divide, PwC, <https://www.pwc.com/gx/en/issues/upskilling.html>
28. Spante1, M., Sofkova, S., Lundin, M., Algers A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. Cogent Education. <https://doi.org/10.1080/2331186X.2018.1519143>.
29. Digital-factories-2020-shaping-the-future-of-manufacturing [Электронный ресурс] <https://www.pwc.de/de/digitale-transformation/digital-factories-2020-shaping-the-future-of-manufacturing.pdf>
30. Industrial manufacturing trends 2020: Succeeding in uncertainty through agility and innovation [Электронный ресурс] <https://www.pwc.com/gx/en/ceo-survey/2020/trends/industrial-manufacturing-trends-2020.pdf>
31. В России состоялся онлайн-форум Forum Digital Industry по трансформации промышленности [Электронный ресурс] <https://www.atomic-energy.ru/news/2020/12/01/109322>.
32. Индекс цифровизации малого и среднего бизнеса [Электронный ресурс] <https://nafi.ru/analytics/pandemiya-i-perekhod-kompaniy-na-udalennku-indeks-tsifrovizatsii-malogo-i-srednego-biznesa/>
33. Правкомиссия утвердила «дорожные карты» развития технологий [Электронный ресурс] <https://www.kommersant.ru/doc/4605543>.
34. Промышленные роботы [Электронный ресурс] <https://www.tadviser.ru/>

Глава 2. Обоснование концепции встречного формирования спроса на научно-техническую продукцию

2.1. Современные решения в организации научно-технологического развития промышленности за рубежом

Известно, что страны мира существенно различаются по полноте реализуемого научно-технологического цикла, определяемой степенью научно-технологического развития, уровнем образования и совокупностью специальных условий, призванных обеспечить воспроизводство инноваций, которые образуют национальную инновационную систему. Характеризуя механизм организации научно-технологического развития в США следует отметить такие его основные черты, как конкурентный принцип выделения финансирования на исследования и разработки, поддержание состязательности среди потенциальных потребителей внедрения результатов НИОКР, академические свободы и независимость университетов в выборе направлений исследований, непосредственная связь научной деятельности с преподаванием и подготовкой кадров; патентная политика и законодательство, стимулирующие изобретательскую и инновационную деятельности; гибкие правовые рамки, допускающие большое разнообразие форм организации деятельности в сфере НИОКР и освоения их результатов.

Креативный блок НИС США включает в себя: исследовательские центры университетов и собственно исследовательские университеты (менее 10% от общего числа вузов [1]), исследовательские центры промышленных корпораций, национальные государственные лаборатории (национальные исследовательские центры), которых насчитывается около 1500 [2, с. 125], независимые бесприбыльные исследовательские организации, мелкие и средние коммерческие и инженерные фирмы, а также всевозможные кооперативные альянсы и ассоциации. В целом по состоянию на 2017 г. в США насчитывалось порядка 1,38 млн исследователей в эквиваленте полной занятости [3].

Основная часть фундаментальных исследований, осуществляемых в государственном секторе, проводится в национальных исследовательских центрах. Другая часть – в соответствующих подразделениях промышленных корпораций и исследовательских университетов. Роль Национальной академии наук, являющейся в отличие от РАН общественной организацией, и не имеющей в своем ведении такой разветвленной сети многочисленных научных организаций, как в России, преимущественно сводится к оказанию консультационных услуг на безвозмездной основе Правительству страны и его структурам.

Прикладные исследования и НИОКР выполняются в научно-технических отделах корпораций, взаимодействующих как с производственными подразделениями, так и с подразделениями, ориентированными на работу с потребителями. Планирование НИОКР в корпорациях базируется на потребностях, которые формулируются продуктовыми подразделениями или зарубежными дивизионами (филиалами). Корпорации взаимодействуют также с компаниями и вузами академического сектора, научно-исследовательскими институтами и сервисными компаниями. Независимо от принятой в корпорации формы централизованной или децентрализованной организации НИОКР, сотрудники исследовательских подразделений «получают указания» от функционального менеджера по НИОКР и от продуктового или регионального менеджера.

Распространению технологий призваны содействовать инновационные «кластеры и научно-промышленные парки, представляющие собой территорию обычно вокруг крупного технического университета или авторитетной производственной компании с развитой хозяйственной и научно-технической инфраструктурой. Места в парке покупаются или арендуются частными корпорациями, федеральными ведомствами, мелкими компаниями, независимыми изобретателями и т.п. На его территории размещаются научно-технические подразделения крупных корпораций, государственные

лаборатории, опытные предприятия, различные научно-исследовательские и опытно-конструкторские центры (в том числе кооперативные), фирмы венчурного капитала, консультационных и других специализированных услуг» [4].

Общий объем средств, направленных в 2017 г. на финансирование исследований и разработок (ИиР) по паритету покупательной способности, составил 543,2 млрд долл. (второе место занимает Китай – 496,0, третье Япония – 170,9 млрд долл.) [5]. Финансирование исследовательской деятельности в части фундаментальной науки в США осуществляется по двум каналам. Бюджетное финансирование является основным источником средств на эти цели. Оно покрывает 65% университетских расходов на фундаментальные исследования и 60% аналогичных затрат в неакадемическом секторе [6, 7]. Второй способ финансирования таких работ – выдача грантов ведущим ученым под конкретный проект. Такая комбинация позволяет при контроле средств на теоретические НИР экономить ресурсы при сохранении разнообразия тематики и обеспечении качества исследований. В целом соотношения бюджетного и коммерческого финансирования НИОКР в США в 2017 г. составило 25,1: 62,3% [8, с. 282].

Система государственных организаций науки стран ЕС включает в себя: независимые институты, выполняющие фундаментальные и прикладные исследования; ведомственные (отраслевые) институты и государственные прикладные исследовательские институты. Так, крупнейшим государственным научным учреждением Франции является Национальный центр научных исследований (CNRS), бюджет которого составляет около ¼ государственных расходов на гражданские исследования. Государственный сектор науки Германии представлен рядом научных объединений, крупнейшим из которых является Общество Фраунгофера, включающее в себя 67 институтов, в которых работает более 23 тыс. сотрудников. Институты Общества в основном заняты прикладными исследованиями, финансируемыми за счет бюджета и средств негосударственных заказчиков [9]. 83 научно-исследовательских института

другого научного объединения – Общества Продвижения Науки (Общество Макса Планка), объединяющие более 17 тыс. постоянных сотрудников, специализированы на выполнении фундаментальных исследований в области естественных наук, наук о жизни, общественных и гуманитарных наук. На 80% их деятельность финансируется из бюджетных средств [10]. В Соединенном Королевстве фундаментальные и прикладные исследования выполняются организациями Национальной и Королевской инженерной академий наук. «Действует также сеть центров инновационных производственных технологий, выполняющих прикладные исследования и разработки по 115 направлениям, включая производственные технологии, роботостроение, микросистемы, энергоэффективность и др.» [11].

Наряду с государственными и квазигосударственными научными организациями и объединениями в странах ЕС функционирует столь же многочисленная корпоративная наука, представленная подразделениями производственных компаний, осуществляющими исследования и разработки. По численности занятых данный сектор лишь немного превосходит государственный. Однако по объемам финансирования корпоративный сектор и в странах ЕС, и в других развитых странах значительно опережает государственный и сектор высшего образования. Рассуждая о роли и проблемах корпоративной науки, имеет смысл прислушаться к мнению американского экономиста Р. Гайгера, который утверждает, что значимость академической науки в создании производственных технологий и экономическом развитии не так высока, как многие себе представляют. Американские корпорации в большинстве своем обеспечивают себя результатами ИиР самостоятельно, причем как прикладными, так и фундаментальными. Автор подчеркивает, что университетские фундаментальные исследования крупные корпорации главным образом используют как вспомогательные, дополняя ими собственные разработки. Это связано с необходимостью держать созданное ноу-хау в секрете от конкурентов. Результаты академических исследований, напротив, публичны –

открытые публикации позволяют ученым зарабатывать себе репутацию и вес в академическом мире через систему библиометрической оценки результативности научно-исследовательской работы. По оценке автора, 94% фундаментальных и прикладных исследований, финансируемых промышленностью, выполняется в самих корпорациях [12, с. 274].

В этих условиях, очевидно, проблем внедрения новаций в принципе не возникает так, как и заказчик – производственные подразделения – и исполнитель – подразделения НИОКР – связаны отношениями административного подчинения. При этом производство формирует спрос на результаты исследований и разработок, с одной стороны, исходя из собственных производственных потребностей, а с другой, – опираясь на патентную информацию о ранее выполненных ИиР в академическом секторе науки. Обобщая результаты обзора практики организации инновационной деятельности в странах, реализующих евроатлантическую модель НИС, выделим те главные особенности, которые позволяют им занимать лидирующие места в международных рейтингах инновационно развитых государств.

Во-первых, это разветвленная сеть организаций, осуществляющих научные исследования и разработки, а также инновационную деятельность, ориентированная на создание условий для беспрепятственного развития воспроизводственного процесса в части создания новой продукции, техники, технологий и освоения результатов НИОКР в производстве.

Во-вторых, это рационально выстроенная структура источников финансирования, среди которых ведущую роль играют средства предпринимательского сектора, как основного потребителя результатов исследований и разработок.

В-третьих, это развитая система институциональной поддержки инновационной деятельности, включающая в себя объекты специальной инфраструктуры, обеспечивающей создание и коммерциализацию новой техники и технологий.

В-четвертых, это разноплановая широкая совокупность действенных мер и решений, нацеленных на стимулирование и поддержку организаций, выполняющих исследования и разработки, как деятельность с отложенным на длительный период эффектом.

Как видим, перечисленные особенности не оригинальны по сравнению с теми сведениями, которые можно получить из доступных источников информации. Однако, они нужны для полноты картины по результатам анализа.

Главный же, пятый, вывод, имеющий ключевое значение для настоящего исследования, состоит в том, что в странах, реализующих евроатлантическую модель НИС, и особенно в США, ослабевает или полностью отсутствует исторически сложившееся отношение к научно-технической деятельности, как к чему-то, сакральному, возвышенному и недоступному для понимания широким массам. Данное обстоятельство на протяжении многих лет обуславливало особую роль академической науки как единственного источника истинных знаний, что приводило к разрыву между потребностями практики и направленностью теоретических изысканий, что остается и сегодня актуальным для современной России. То есть речь идет об организации собственно процесса определения потребности (формирования спроса) в новациях и ее практической реализации. В этой связи ведущий научный сотрудник Института проблем развития науки РАН С.Г. Хромов, комментируя Федеральный закон США 110- 69 от 9.08.2007 «О соревнующейся Америке», отмечал: «в многовековом соперничестве между нарождающейся буржуазией и дряхлеющим феодализмом, составлявшем сущность истории средневековой Европы, научное, “позитивное” знание играло роль идеологического оружия. Европейская наука постепенно расшатывала влияние Церкви и опиравшейся на ее авторитет наследственной аристократии. Со временем европейское общество и особенно левые общественно-политические движения усвоили подчеркнуто уважительное, даже романтическое отношение к научному знанию. Оно признавалось (и все еще признается) самоценным – безотносительно к его практическим приложениям.

История Соединенных Штатов не знала затяжной борьбы между буржуазией и аристократией. Суровые протестантские сектанты, основавшие это государство, не только не испытывали особого почтения к научным знаниям, но даже относились к ним с подозрением, ибо знания эти противоречили библейским истинам. Их божеством был практический, материальный успех, и право науки на существование признавалось лишь постольку, поскольку она могла содействовать этому успеху. Известное противопоставление “ученье – свет, а неученье – тьма” не могло бы найти отклика в их душах, в отличие от знаменитой максимы Ф. Бэкона “знание – сила”» [13].

Поэтому и приоритеты в финансировании и организации начальных этапов цепочки создания стоимости здесь устанавливаются не в связи с привычной для нас логикой – от высокой фундаментальной науки к производству, а сугубо прагматично: заказ на ИиР формируется от потребности производства и затем последовательно адресуется к НИОКР, а если это необходимо, – то к прикладной и фундаментальной науке. Подобная постановка вопроса не умаляет значимости фундаментальных исследований, выполняемых академическими организациями, однако, если речь идет об инновациях, данный подход представляется оптимальным для сокращения инновационного цикла. На этом принципе организована система проведения НИОКР в корпорациях: предметный спрос на результаты исследований и разработок предъявляется к научным подразделениям маркетинговыми совместно с производственными службами и реализуется под их контролем при функциональном руководстве структур, владеющих исследовательскими технологиями.

2.2. Проблемы адаптации рыночных механизмов организации научно-технологического развития в отечественной промышленности

В России, также, как и в инновационно развитых странах, несмотря на произошедшее сокращение сферы ИиР, существует достаточно обширная сеть организаций, выполняющих исследования и разработки. По состоянию на 2019

год их насчитывалось 4051. Абсолютный приоритет по-прежнему имеют научно-исследовательские организации, составляющие большинство среди организаций науки. В этом состоит существенное отличие российской практики от зарубежной, где, с одной стороны, высокая доля ИиР, особенно в области фундаментальных исследований выполняется в университетских лабораториях и центрах, а с другой, – основной объем НИОКР реализуется в научных подразделениях промышленных корпораций. Вместе с тем, как отмечалось выше, российская практика пытается взять на вооружение преимущества, которые предоставляет культивируемое на Западе совмещение педагогической и исследовательской деятельности в университетах. Как следствие число вузов, выполняющих ИиР, за 20 последних лет выросло в 2,5 раза.

Динамика структуры организаций, выполнявших исследования и разработки, за более длительный период – с 1992 по 2019 гг. свидетельствует о происходящем свертывании научно-технологического потенциала России в части компаний, осуществляющих генерацию и содействие освоению новаций на 11%. Также неуклонно сокращается численность персонала, занятого в научной сфере – за 20 лет – на 23% [14]. Снижается и средняя численность работающих в одной научной организации. Если в 2000 г. на каждую из них приходилось по 216 человек, то в 2019 г. – 169 человек. В результате сегодня численность основной движущей силы науки – исследователей – составляет в российских организациях 348,3 тыс. человек, или по паритету полной занятости – 410,6 тыс. человек (2017 г.). В США данный показатель достигает 1380,0 и в Китае – 1692,2 тыс. человек [8, с. 291]. Учитывая также несопоставимый уровень технического оснащения научно-исследовательского процесса, становится очевидной разница научного потенциала России и стран-лидеров инновационного развития. По различным оценкам за период с 1990 г. из России уехало от 100 до 200 тыс. ученых. Как отмечает главный ученый секретарь президиума РАН Н.К. Долгушкин: «с 1990 г. количество исследователей в России уменьшилось в 2,7 раза, с 2000-го количество

персонала, занимающегося исследованиями и разработками, в среднем за год сокращается на 1,3%. При этом в странах Евросоюза и в США число ученых выросло на 2-3%, в Бразилии, Южной Корее и Китае – на 7-10%» [15]. Очевидно, подобные разнонаправленные тенденции не сближают позиции России и развитых стран в части методов повышения инновационной активности.

Внутренние затраты на исследования и разработки в России последовательно растут и по сравнению с 2000 к 2019 г. увеличились почти в 15 раз (в фактически действовавших ценах), достигнув 1134,8 млрд рублей. По отношению к внутреннему валовому продукту (ВВП) их величина не превышала за этот период 1,1%. Однако, по оценкам, приведенным в докладе РАН 2019 г., объем затрат на финансирование науки в настоящее время составляет лишь около 86% к уровню РСФСР в 1991 г. (в сопоставимых ценах) [16, с. 25]. Не произошло существенного увеличения расходов и в сопоставимых ценах 2000 г. (рост в 2 раза) [17, с. 27].

Объем средств, направленных на финансирование ИиР непосредственно в промышленности, увеличился за последние 10 лет в 2,6 раза, что значительно больше, нежели объем расходов на «общее развитие науки» [14]. Вместе с тем, по данным международных сопоставлений за 2017 г., общий объем финансирования науки в России составил 7,7% от расходов на эти цели в США, 8,4% – в Китае и 24,5% – в Японии [5, с. 9]. Радикально отличается от инновационно развитых стран и структура финансирования ИиР. В России более двух третей средств на исследования и разработки выделяются из государственного бюджета. При этом было понятным, если бы эти средства расходовались в государственных и академических учреждениях, а также в вузах, преимущественно работающих на условиях бюджетного финансирования. Однако, анализ показывает, что 51,4% бюджетных расходов направляется на финансирование ИиР в предпринимательском секторе, обеспечивая 56,5% общего объема затрат на исследования и разработки в частных компаниях. То есть при ведущей роли бюджетного финансирования, предпринимательский

сектор осваивает в 2 раза больше средств на ИиР, чем государственный [5, с. 9].

Из приведенных данных можно сделать несколько выводов. Во-первых, в силу реальной абсолютной ограниченности объемов финансирования ИиР в нашей стране необходимо концентрировать научно-техническую деятельность в направлениях, где имеются наиболее благоприятные для этого предпосылки и не расплывать выделяемые средства равномерно по всему спектру возможных областей научного знания. И данный процесс уже начался с утверждением приоритетных направлений развития науки, техники и технологий, а также перечня критических технологий [18]. В 2019 г. по этим направлениям было израсходовано 804,5 млрд рублей или 70,9% общих внутренних затрат на ИиР.

Во-вторых, очевидно следует прислушаться к мнению ведущих стран в области инноваций в отношении структуры источников финансирования научно-технологического развития и соответственно, структуры организаций науки. Ни одна страна-лидер не имеет столь высокого уровня бюджетного финансирования ИиР, как Россия.

По мере развития рыночных подходов к организации ИиР в России получают распространение различные формы инновационной инфраструктуры, сопровождаемое принятием соответствующих нормативных документов. Так, образованы фонды грантовой поддержки фундаментальных и поисковых исследований: Российский фонд фундаментальных исследований (РФФИ), который в 2019 г. оказал поддержку научным коллективам и отдельным ученым на сумму 22,4 млрд рублей [19], и Российский научный фонд, за тот же год профинансировавший 4,7 тыс. проектов на общую сумму 21,7 млрд рублей [20]. Несмотря на то, что гранты – это поддержка краткосрочных проектов, их распространение снижает остроту проблемы низкого уровня оплаты труда в научно-технической сфере.

В соответствии со Стратегией инновационного развития Российской Федерации на период до 2020 г. началось формирование инновационных территориальных кластеров, которых по оценкам специалистов «НИУ ВШЭ»

насчитывается порядка 110. Уровень их развития весьма неодинаков. До конца организационно сформировались 25 таких кластеров, их список был утвержден специальным поручением Председателя Правительства Российской Федерации [21]. Минпромторг России в 2015 г. инициировал постановление Правительства о создании промышленных кластеров, в задачи которых, среди прочих, входит поддержка и развитие инноваций на основе создания специальной инновационной и производственной инфраструктуры [22]. По состоянию на 2019 г. создано 44 промышленных кластера (по другим данным, содержащимся в геоинформационной системе Минпромторга России, промышленных кластеров на октябрь 2020 г. насчитывалось уже 78 [23]), объединяющих 1049 участников, из которых (кластеров) пока только 23% находятся на высоком и среднем уровне организационного развития [24].

Также по сути инновационными кластерами, но уже с законодательно закрепленным режимом финансово-правовой поддержки, являются семь созданных в России особых экономических зон технико-внедренческого типа. Под технико-внедренческой деятельностью в данном случае понимаются «инновационная деятельность, создание, производство и реализация научно-технической продукции, создание и реализация программ для электронных вычислительных машин (программ для ЭВМ), баз данных, топологий интегральных микросхем, информационных систем, оказание услуг по внедрению и обслуживанию таких продукции, программ, баз данных, топологий и систем, а также предоставление резидентам технико-внедренческой особой экономической зоны услуг инновационной инфраструктурой, необходимой для осуществления их деятельности» [25].

Согласно федеральному закону «Об инновационных научно-технологических центрах» (ИНТЦ) [26] созданы и запущены 2 таких центра: ИНТЦ «Сириус» (г. Сочи) со специализацией в области информационных технологий и ИНТЦ МГУ «Воробьевы горы»). Спектр направлений его научно-технологической деятельности: информационные технологии, материалы и

нано-технологии, когнитивные, нейро-технологии, искусственный интеллект, биотехнологии.

Широкое распространение в нашей стране получили индустриальные (промышленные) парки и технопарки [27, 28]. Согласно геоинформационной системе Минпромторга России в стране насчитывается 383 таких парка [23]. В рамках перечисленных структур обеспечения инновационной деятельности создаются и действуют также локальные объекты инновационной инфраструктуры. В перспективе следует ожидать дальнейшего развития сети этих объектов, создающих комфортные условия для развития участникам инновационного процесса.

Основным финансовым документом реализации Стратегии инновационного развития является государственная программа Российской Федерации «Научно-технологическое развитие Российской Федерации» [30], содержащая конкретный план достижения целевых показателей, характеризующих стратегические намерения государства в данной области, по 5 подпрограммам и одной федеральной целевой программе (ФЦП). Вместе с тем, как показал анализ, ее ключевые целевые показатели вряд ли будут достигнуты (таблица 2.2.1).

Таблица 2.2.1 – Целевые показатели Стратегии инновационного развития Российской Федерации [29] и результаты их выполнения

| Наименование показателя | Целевое значение, 2020 г. | Фактическое значение, 2019 г. |
|--|---------------------------|-------------------------------|
| 1 | 2 | 3 |
| Увеличение доли предприятий промышленного производства, осуществляющих технологические инновации, в общем количестве предприятий промышленного производства (в 2009 г. – 9,4%) | до 40-50% | 20,0% [14] |
| Увеличение доли инновационной продукции в общем объеме промышленной продукции (в 2010 г. – 4,9%) | до 25-35% | 6,1% [14] |
| Повышение внутренних затрат на исследования и разработки (в 2010 г. – 1,3%) | до 2,5-3% ВВП | 1,03% [14] |

Продолжение таблицы 2.2.1

| 1 | 2 | 3 |
|---|------------------------|--------------------------|
| Увеличение количества российских вузов, входящих в число 200 ведущих мировых университетов согласно мировому рейтингу университетов (Quacquarelli Symonds World University Rankings) (в 2010 г. – 1 вуз) | до 4 вузов | 1 [31] |
| Увеличение количества патентов, ежегодно регистрируемых российскими физическими и юридическими лицами в патентных ведомствах Европейского союза, Соединенных Штатов Америки и Японии (в 2009 г. – 63 патента) | до 2,5-3 тыс. патентов | 92 (2016 г.) [17, с. 17] |

Подобные результаты инновационной деятельности свидетельствуют о серьезных просчетах в выборе действенных средств и методов организации управления научно-технологическим развитием в России, реализуемых в рамках действующей нормативной базы.

Согласно статистике, по состоянию на 2019 г. в России насчитывалось 324,6 тыс. крупных и средних промышленных предприятий (виды деятельности по ОКВЭД: добыча полезных ископаемых; обрабатывающие производства; обеспечение электрической энергией, газом и паром) [32] и всего 450 организаций промышленности, имевших научно-исследовательские, проектно-конструкторские подразделения [14]. То есть менее 14 сотых процента предприятий располагали собственными подразделениями так называемой «заводской» науки, что сравнимо с погрешностью статистического учета!

Следует заметить, что в крупных промышленных корпорациях и компаниях наука представлена весьма заметно. Например, в структуре группы «Лукойл» за данное направление отвечает ООО «Лукойл-Инжиниринг», в задачи которого входит управление всей инновационной деятельностью нефтяной компании. Главным научно-исследовательским центром ПАО «Газпром» является ООО «Газпром ВНИИГАЗ», численностью 1323 человека. Однако, подобные структуры трудно отнести к категории заводской науки. Скорее их статистический учет идет по линии самостоятельных научно-исследовательских организаций.

Менее масштабные подразделения заводской науки работают на таких предприятиях, как ОАО «Электростальский завод тяжелого машиностроения», конструкторско-технологический отдел которого насчитывает 800 человек; Группа «Новолипецкий металлургический комбинат» в 2020 г., открывшая лабораторный центр микроструктурного анализа, в котором будут анализироваться свойства сталей для разработки новых премиальных продуктов и оптимизации режимов обработки металла; косметическое АО «Свобода», на котором действуют собственный научный центр и космоцевтический инкубатор – бизнес-инкубатор в сфере производства косметики. В Контрольно-аналитическом центре Кольской горно-металлургической компании, который состоит из трех основных подразделений: испытательной лаборатории, научно-исследовательской части и отдела технического контроля, работает 400 человек. Центр сотрудничает с профильными НИИ. Большинство проектов, которые реализуются в компании, выполнены институтом «Гипроникель» и Институтом химии и технологии редких элементов и минерального сырья имени И.В. Тананаева Кольского научного центра РАН. Сотрудники Центра сопровождают работу по внедрению новой технологии непосредственно на производстве [33].

Существуют примеры и совсем немногочисленных научно-внедренческих подразделений предприятий. Например, холдинг ОАО «Томская домостроительная компания» имеет в своей структуре дочернюю организацию «Стройтехинновация ТДСК», в которой работает до 30 человек. Основные направления ее работы: создание новых архитектурно-конструктивных систем индустриального домостроения; разработка новых строительных материалов и энергоэффективность в процессе строительства [34]. В целом же, опираясь на данные статистики, можно констатировать, что в отличие от инновационно развитых стран, в России корпоративной науки практически не существует, что является ключевым отличием организации научно-технологического развития в нашей стране от опыта зарубежных партнеров.

2.3. Обоснование концепции реформирования системы организации научно-технологического развития в промышленности

Между тем, как отмечают аудиторы Счетной палаты Российской Федерации, «в последние десятилетия в России также наблюдается тенденция к активному развитию ... корпоративной науки – созданию компаниями средне- и высокотехнологичных секторов собственных научно-исследовательских подразделений (лабораторий и т. п.). По мнению представителей бизнес-сообщества, причинами развития данной тенденции в России во многом является неспособность отечественных вузов и академических научно-исследовательских институтов представлять результат разработок не только в форме технического описания или прототипа, но и в виде прошедшего испытания промышленного образца с доказанной эффективностью, готового к запуску в серийное производство. Это означает неспособность научно-исследовательских институций удовлетворить запрос бизнеса на готовые решения. Усугубляет ситуацию такая существенная для развития сектора ИиР проблема, как т.н. “токсичность” получения государственного финансирования» [17, с. 18].

Как видим, специалисты авторитетного надзорного ведомства разделяют высказанные нами выше аргументы для признания сложившейся ситуации в организации научно-технической сферы неудовлетворительной и предлагают свое видение ее причин, требующих реагирования. В то же время, как мы могли убедиться, описанный аудиторами процесс формирования корпоративной науки в нашей стране развивается крайне низкими темпами и в настоящее время пока не представляет собой явно выраженной тенденции. Между тем, для подобных преобразований в организации отечественного научно-технологического развития, помимо зарубежного опыта, есть и существенные теоретические основания.

Речь идет об изменении статуса науки в современном обществе. Ранее мы уже говорили о специфике отношения американского общества к научному творчеству и тех особенностях, которые отличают его утилитарный подход к

ученым от европейской практики, исторически сложившейся еще в средние века. Подобное отношение в силу масштаба и значимости экономического потенциала США в современном мире, а также учитывая новации научно-технологического развития и доступность информационных технологий, вызвало к жизни пересмотр роли и существенности тех принципов построения научной деятельности, которые стали нам привычными в последние десятилетия. Как пишет в этой связи профессор Университетского колледжа Лондона М. Хакли, «ключевая тенденция в развитии науки в современном обществе в том, что научное знание утрачивает свой привилегированный модус (модус – от лат. *modus* – мера, способ, образ, вид – прим. авт.) существования в обществе, а сама наука как институт постепенно лишается монопольного права на производство общезначимого и особо ценного (в социокультурном смысле) знания и начинает трансформироваться в нечто новое, что мы лишь в силу институциональных и культурных причин продолжаем именовать “наукой”. Этот процесс находит отражение в концепциях “постакадемической науки”, “технонауки”, “трансдисциплинарности”, а также в рамках практик депрофессионализации научного знания, таких как “гражданская наука” (экспертиза) и “неформальный научный обмен” с помощью социальных медиа» [35].

О.Б. Кошовец и И.Э. Фролов, анализируя мнения зарубежных исследователей, считают, что «наиболее подходящий, хотя и с оговорками, термин для обозначения того, что по-прежнему называется “наукой”, но что по сути ею уже не является и последовательно занимает ее место в обществе, – это “технонаука”» [36, с. 22]. Подобную трансформацию авторы связывают со следующими обстоятельствами. Во-первых, становлению технонауки способствует тот факт, что техническая компонента в научных исследованиях приобретает ведущую роль. Сегодня чисто теоретические исследования отходят на второй план и материальные факторы, факторы технического, инструментального оснащения исследований и разработок становятся приоритетными, включая вопросы финансирования. Во-вторых, данное понятие

позволяет отразить принципиальную взаимосвязь науки и технологического развития в современной экономике, которая отражается в таких терминах, как «экономика знаний», «человеческий капитал», «капитализация науки». Авторы отмечают, что «говоря о современной науке, необходимо различать: 1) классическую науку (и ее наследницу академическую науку), где производство знания, как правило, обусловлено исторической логикой развития предметных областей и эпистемологическими (эпистемология – теория познания, гносеология – прим. авт.) целями (в т.ч. научным этосом (этос – от др.-греч. «ethos» – обычай, нрав, характер – прим. авт.), а также институционально-практическими стимулами (публикация текстов, получение званий и т.п.) и 2) капитализированную часть науки (которую часто отождествляют с прикладной наукой). Здесь производство знания включено в воспроизводство экономических отношений и подчинено целям, внешним по отношению к научным» [36, с. 23].

Следует заметить, что инструментальное, техническое оснащение процесса ИиР всегда играло значимую роль в получении искомым результатов исследований и разработок. Вместе с тем, техника, как правило, имела вспомогательное значение по отношению к теоретическим изысканиям. Однако, после второй мировой войны приоритеты изменились и ключевую роль стало играть создание новых технологий. «С помощью технических устройств происходит и процесс конструирования/проектирования объекта исследования (артефакта), и постоянное его экспериментальное, технологически опосредованное преобразование, с целью получения новых артефактов/технологий... В общественных науках происходящий под влиянием процесса капитализации знаний сдвиг к практической ориентации также ведет к своеобразной “технологизации” всего исследовательского процесса на уровне эпистемологии, что выражается в преимущественном развитии в рамках соответствующей дисциплины “методов” (способов исследования) в широком смысле этого слова – формальных техник, алгоритмов и математического

инструментария в ущерб предметным онтологиям и теории» – пишут О.Б. Кошовец и И.Э. Фролов в другой своей статье [37].

Для целей настоящего исследования из вышесказанного следует несколько выводов. Первый. Как бы мы не относились к указанной трансформации статуса классической науки, она является объективным процессом, оценка результативности которого лежит в плоскости исследования преимуществ и недостатков выбранного руководством нашей страны общественно-исторического способа производства. И если мы следуем тем ценностям, которые проповедует капитализм, значит мы вынуждены учитывать и общемировые тенденции в развитии науки.

Второй вывод. Преимущественная ориентация «технонауки» на практическую сферу человеческой деятельности, связанную с получением конкретных результатов в области материального производства, как показывает мировой опыт, действительно позволяет обеспечить высокие темпы обновления продукции, технологий, организационных и маркетинговых решений, что и составляет суть инновационного развития.

Третий вывод. Для практической материализации выявленной тенденции трансформации науки необходимы организационные преобразования в самом процессе ИиР, основанные на изменении приоритетов исследовательской деятельности, которые лежат в основе нового понимания ее предназначения, смысла и содержания. В этой связи И.Э. Фролов подчеркивает, что «спрос на научные результаты должен исходить от отраслевой, а не университетской науки, следовательно, ключевой задачей становится не реформирование, а возрождение инженерной науки и деятельности, что свою очередь потребует осуществления задачи новой индустриализации страны» [38, с. 18].

Мы же пойдем дальше и постараемся доказать, что спрос на научные результаты, лежащие в основе инноваций, должен формироваться на производстве в пределах организаций и подразделений «заводской науки», которая в свою очередь должна получить новый импульс к развитию, новые

функции и их наполнение. Учитывая аксиому, что инновации – это основа современной конкурентоспособности, рассмотрим варианты процедур их возникновения, свободные от заблуждений определенной части производителей и исследователей вопросов инноватики.

Распространенным мнением среди промышленных маркетологов является убеждение о необходимости постоянного контроля предпочтений потребителей для разработки и постановки на производство нового продукта. Между тем, как правило, потребитель не может предложить ничего принципиально нового, так как его мнение базируется лишь на прошлом опыте потребления того или иного продукта. Как в свое время писал Г. Форд, «Если бы я спросил людей, чего они хотят, они бы сказали – более быструю лошадь» [39]. Поэтому определяющим в понимании перспектив развития выпускаемого продукта или начала производства нового является знание, рождающееся во взаимодействии специалистов, досконально знающих свое производство, и маркетологов, владеющих технологиями перевода потребностей клиентов в практические задачи для предприятия.

Несмотря на крайне незначительное число подразделений заводской науки, учитываемых статистикой, практически на любом среднем и крупном промышленном предприятии, а также на высокотехнологичных предприятиях, относимых к малому бизнесу, существуют формально обособленные либо организационно не оформленные группы специалистов, в задачи которых входит конструкторско-технологическое сопровождение производства, а часто и проведение определенных научно-исследовательских работ, также связанных с текущей деятельностью предприятия. Как правило, специалисты этих подразделений досконально знают технологические процессы на своем производстве, контролируют возможности производственного оборудования и обладают полнотой информации о текущих и потенциальных проблемах производства традиционной и перспективной продукции. Вместе с тем, в соответствии со сложившейся практикой распределения ролей в системе

организации научно-технологического развития, максимум, что от них требуется, – это генерация рационализаторских предложений по текущему улучшению работы оборудования и механизмов, а также организации труда, внедрить которые можно без особых дополнительных затрат. Так было на протяжении многих лет и такая ситуация сохраняется и поныне на предприятиях, чей персонал лишен творческой инициативы, которые постепенно будут вынуждены сойти со сцены в качестве эффективных производственных единиц.

Однако, сегодня на не сырьевом промышленном рынке России в большинстве своем представлены производственные компании, прошедшие жесткий отбор в ходе испытаний периода начала рыночных преобразований, и умеющие считать деньги. Поэтому для них характерен иной, рациональный подход к использованию возможностей собственных ИТР и специалистов отраслевой науки, основанный на понимании конкурентных преимуществ инноваций. Помочь в реализации их устремлений и призвана концепция, предлагаемая в настоящем разделе. Целью концепции является разработка непротиворечивой системы организации этого процесса, объединяющей его участников на условиях, обеспечивающих превращение инновационной деятельности в востребованную и выгодную для них, обеспечивающую кратное повышение уровня инновационной активности предприятий промышленности, которая характеризуется количеством предприятий, осваивающих новации, и долей инновационной продукции в объеме их производства. Основная идея состоит в дополнении существующего сегодня потока научно-технических идей и научных продуктов, имеющего направленность от сферы науки к производству, встречным потоком спроса на действительно необходимые промышленности новые научно-технические решения, формируемого на уровне производства, непосредственно взаимодействующего с потребителем. Создаваемая система должна частично опираться на существующие элементы национальной инновационной системы, а также предусматривать внесение корректив в состав и функции ее участников, необходимых для создания условий

достижения поставленной цели. Ключевым решением концепции является воссоздание и мультиплицирование разветвленной сети подразделений заводской науки, выступающих инициатором и катализатором спроса на инновации. Ключевым источником финансирования – реформированная совокупность существующих разнонаправленных стимулов и предпочтений для организаций, занятых научно-технической деятельностью, объединенная единой идеей формирования спроса на инновации в подразделениях заводской науки.

Общая схема модели рекомендуемой системы организации научно-технологического развития приведена на рисунке 2.3.1.

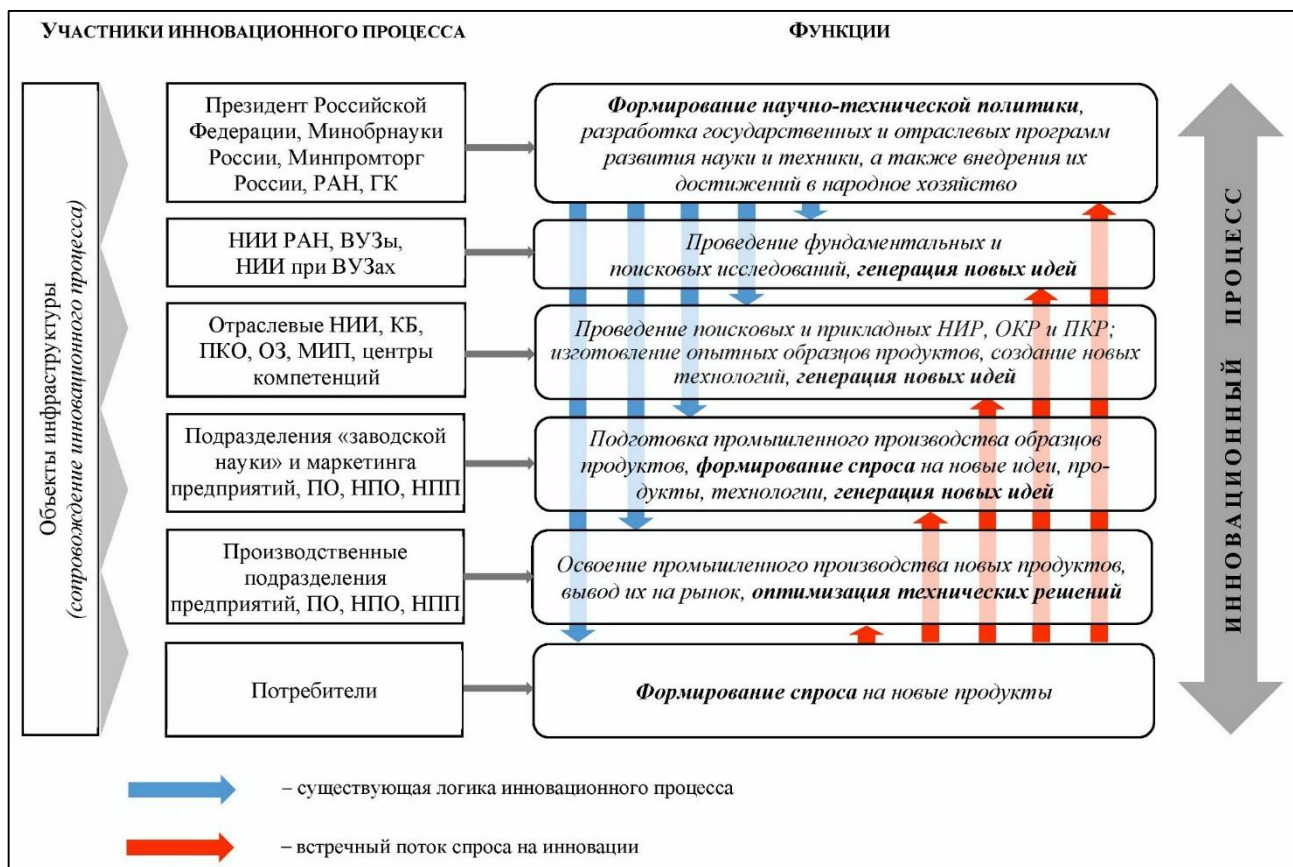


Рисунок 2.3.1 – Схема модели рекомендуемой системы организации научно-технологического развития

Отличия рекомендованной системы от действующей практики заключаются в следующем:

– во-первых, полномочия ключевого инициатора инноваций предлагается возложить на подразделения заводской (корпоративной) науки во взаимодействии с маркетинговыми подразделениями предприятий;

- во-вторых, организовать встречный по отношению к действующему потоку инновационных идей поток спроса, конкретизирующий потребности, выявленные на основе анализа предпочтений потребителей и специальных исследований, опирающихся на анализ рынка и массива имеющейся современной научно-технической информации;
- в-третьих, в дополнение к действующей практике генерации идей на уровне академических институтов, возложить наиболее сложные вопросы исследования спроса на РИД на специализированные маркетинговые компании, входящие в группу объектов инновационной инфраструктуры промышленности;
- в-четвертых, разграничить задачи участников инновационного процесса в части формирования элементов спроса на инновации и генерации новых творческих идей.

Список использованной литературы

1. Судакова Н.А. Современные тенденции развития корпоративных НИОКР в США // Россия и Америка в XXI веке. 2017. Выпуск № 2. URL: <https://rusus.jes.su/s207054760005665-8-1/> (дата обращения 28.10.2020).
2. Шпак А.С., Беляков С.А. Зарубежный опыт государственного управления исследованиями и разработками // Вестник Алтайской академии экономики и права. 2019. № 9. С. 124-130.
3. Исследователи – основа кадрового потенциала науки. URL: https://issek.hse.ru/data/2018/11/22/1141691897/NTI_N_111_22112018.pdf (дата обращения 31.10.2020).
4. Попова А.О. Организация НИОКР в американских корпорациях: основные структурные формы и новые модели // США и Канада: экономика, политика, культура. 2015. № 5. С 82-100.
5. Финансирование науки в цифрах / И.Е. Ильина, Е.Н. Жарова, А.В. Клыпин, А.В. Ясаков (Российский научно-исследовательский институт

экономики, политики и права в научно-технической сфере (РИЭПП)). – М.: IMG Print, 2019. – 48 с.

6. Система научных исследований в США. URL: <https://proza.ru/2009/12/25/1039> (дата обращения 30.09.2020).

7. Титова Е.В., Антошкина М.А. Научно-технический потенциал США: оценка и перспективы // Научные записки молодых исследователей. 2018. № 6. С. 20-27.

8. Индикаторы науки: 2019 : статистический сборник / Л.М. Гохберг, К.А. Дитковский, Е.Л. Дьяченко и др.; Нац. исслед. ун-т «Высшая школа экономики». – М.: НИУ ВШЭ, 2019. – 328 с.

9. Общество Фраунгофера. URL: <http://ru.knowledgr.com/00140726/ОбществоFraunhofer> (дата обращения 28.10.2020).

10. Общество Макса Планка. URL: <http://ru.knowledgr.com/00380939/ОбществоМаксаПланка> (дата обращения 28.10.2020).

11. EPSRC Centres for Innovative Manufacturing. URL: <https://epsrc.ukri.org/newsevents/pubs/cimbrochure/> (дата обращения 28.10.2020).

12. Гайгер Р.Л. Знания и деньги. Исследовательские университеты и парадокс рынка / Роджер Л. Гайгер. Пер. с англ. под науч. ред. А. Рябова. – М.: Изд. дом Высшей школы экономики, 2018. – 408 с.

13. О соревнующейся Америке. Федеральный закон США 110–69 от 9 августа 2007 г. Сокращенное изложение и комментарии Г.С. Хромова. URL: <https://www.issras.ru/about/personnel/docs/CompetingAmerica.pdf> (дата обращения 29.10.2020).

14. Росстат. Наука и инновации. URL: <https://rosstat.gov.ru/folder/14477> (дата обращения 30.10.2020).

15. Россия осталась без ученых и специалистов. URL: https://lenta.ru/news/2018/03/29/skill_drain (дата обращения 31.10.2020).

16. О реализации государственной научно-технической политики в Российской Федерации и важнейших научных достижениях российских ученых в 2018 г. Доклад РАН. – М.: РАН, 2019. – 622 с.

17. Результаты экспертно-аналитического мероприятия «Определение основных причин, сдерживающих научное развитие в Российской Федерации: оценка научной инфраструктуры, достаточность мотивационных мер, обеспечение привлекательности работы ведущих ученых». – М.: Счетная палата Российской Федерации, 2020. – 53 с.

18. Об утверждении приоритетных направлений развития науки, технологий и техники в Российской Федерации и перечня критических технологий Российской Федерации. – Указ Президента Российской Федерации от 07.07.2011 № 899.

19. Отчет о результатах деятельности ФГБУ «Российский фонд фундаментальных исследований» и использовании закрепленного за ним федерального имущества за 2019 г. – Утв. советом Фонда 1.03.2020. – 50 с.

20. Создавая фундамент будущего. Годовой отчет Российского научного фонда за 2019 г. – М.: РНФ, 2020. – 66 с.

21. Перечень инновационных территориальных кластеров. – Утв. поручением Председателя Правительства Российской Федерации от 12.08.2012. № ДМ-П8-5060.

22. О промышленных кластерах и специализированных организациях промышленных кластеров. – Постановление Правительства РФ от 31 июля 2015 г. № 779.

23. Геоинформационная система. Индустриальные парки. Технопарки. Кластеры. URL: <https://www.gisip.ru/#!ru/clusters/> (дата обращения 31.10.2020)

24. Сводная статистическая информация геоинформационной системы по кластерам. – М.: Минпромторг России, 2020. – 4 с.

25. Об особых экономических зонах в Российской Федерации. – Федеральный закон РФ от 22 июля 2005 г. № 116-ФЗ (ред. на 03.07.2016).

26. Об инновационных научно-технологических центрах и о внесении изменений в отдельные законодательные акты Российской Федерации. – Федеральный закон от 29.07.2017 № 216-ФЗ (ред. на 29.12.2017).

27. ГОСТ Р 56301-2014 Индустриальные парки. Требования. Дата введения 2015-09-01.

28. ГОСТ Р 56425-2015 Технопарки. Требования. Дата введения 15.12.2015.

29. Стратегия инновационного развития Российской Федерации на период до 2020 года. – Утв. Распоряжением Правительства Российской Федерации от 8.12.2011 № 2227-р.

30. Об утверждении государственной программы Российской Федерации «Научно-технологическое развитие Российской Федерации». – Постановление Правительства Российской Федерации от 29.03.2019 № 377 (ред. на 31.03.2020).

31. Российские вузы в общем и региональных рейтингах Quacquarelli Symonds (QS). URL: <https://univer.expert/rossiyskiye-vuzy-v-obshchem-i-regionalnykh-reytingakh-quacquarelli-symonds-qs/#3> (дата обращения 30.10.2020).

32. Россия в цифрах. 2020: Крат. стат. сб. / Росстат – М., 2020. – 550 с.

33. Петров И. Наука Кольской ГМК в надежных руках. URL: <https://news.myseldon.com/ru/news/index/203632851> (дата обращения 5.11.2020).

34. Охмин Д. Корпоративная наука – необходимое явление. URL: <https://gt-tomsk.ru/vip/korporativnaya-nauka-neobходимое-yavlenie/> (дата обращения 2.11.2020).

35. Haklay, M. Citizen Science and Policy: A European Perspective. Woodrow Wilson Center for Scholars, 2015, 76 pp.

36. Кошовец О.Б., Фролов И.Э. «Прекрасный новый мир»: о трансформации науки в технонауку // Эпистемология и философия науки. 2020. Т. 57. № 1. С. 20–31

37. Кошовец О.Б., Фролов И.Э. Онтология и реальность: проблемы их соотношения в методологии экономической науки // Теоретическая экономика:

онтологии и этика / Под ред. О. Ананина. – М.: Институт экономики РАН, 2013.
С. 27–112.

38. Фролов И.Э. Проблемы капитализации российской науки: продуктивность, результативность, эффективность // Проблемы прогнозирования. 2015. № 3. С. 3-20.

39. Vlaskovits, P. Henry Ford, Innovation, and That “Faster Horse” Quote // Harvard Business Review, August 29, 2011.

Глава 3. Информационные технологии в государственном управлении. История и перспективы

3.1. История развития отечественных информационных технологий

Информационные технологии, несмотря на то, что их повсеместное применение берёт своё начало в начале XXI века, обладают длительной историей. Так, общеизвестно, что отдельные принципиальные элементы, присущие современным вычислительным технологиям получили широкое распространение ещё в начале XIX века, при создании станков текстильной промышленности.

В связи с беспрецедентными возможностями, вычислительные технологии не могли не стать объектом пристального внимания государственной власти, по самой своей сущности имеющей широкий спектр их потенциального применения. Так, проведённая в первой половине XIX века Ч. Бэббиджем научно-практическая работа по созданию универсальных вычислительных машин, ставшая предвестницей построения информационного общества, была осуществлена, прежде всего, на государственные средства Великобритании [34]. Несмотря на отсутствие точных сведений о том, в какой именно сфере планировалось применять счётную машину Бэббиджа, очевиден высокий интерес государства к её созданию.

При этом работы российского чиновника и изобретателя С.Н. Корсакова по проектированию логических машин, проводившиеся им в инициативном порядке, не получили в 1832 году должной оценки со стороны Императорской Академии наук. Комиссия не учла высокий потенциал сокращения трудозатрат на вычислительную деятельность, сочтя упрощение подсчёта вредным для интеллектуального развития человека [23]. По достоинству найденные в архивах Академии наук СССР работы С.Н. Корсакова были оценены научным сообществом лишь в 1982 г.

Имеющий очевидный практический потенциал, табулятор Г. Холлерита, созданный в конце XIX века, также иллюстрирует тесную связь государственного управления и начального этапа развития вычислительных технологий. Появление данного изобретения во многом обусловлено опытом его создателя на государственной службе США, заключающейся в статистической обработке данных [24]. Первые табуляторы, несмотря на то, что их работа не предусматривает совершение машинных логических операций, фактически стали фундаментом, благодаря которому стало возможным проведение всеобщих переписей населения и иных мероприятий, требующих быструю обработку значительных массивов данных. Осуществление расчётов по готовым массивам в данный момент уже могло выполняться посредством различных узкоспециализированных аналоговых вычислительных устройств.

Показанная табуляторами Холлерита высокая эффективность механического подсчёта результатов переписи населения США 1890 году обусловила быстрый рост популярности данного изобретения и покупку табуляторов рядом иностранных государств. Закуплены табуляторы были и Российским правительством – новейшие технологии широко применялись в ходе ставшей первой и последней всеобщей переписи населения Российской империи [31].

Дальнейшее развитие информационных технологий, вплоть до 40-х гг. XX века характеризуется постепенным ростом характеристик вычислительной техники, предназначенной для решения узкого круга задач. Работы по созданию аналоговых вычислительных устройств велись и в Советском Союзе, причём концепции отдельных образцов вычислительных устройств, таких как, например, гидравлический интегратор Лукьянова, были настолько эффективными, что их использование в народном хозяйстве продолжалось вплоть до 80-х гг. XX века [21].

Значительный рывок в развитии информационных технологий произошёл в годы Второй Мировой войны, что было обусловлено потребностями армий

противоборствующих государств в ускорении вычислительных процессов. Принципиальным отличием первых настоящих электронных вычислительных машин стало возможность применения в их работе программ вычислений, в связи с чем, отпала потребность создания отдельных дорогостоящих машин под отдельные вычислительные операции.

Использование вычислительных машин в 1950-е годы, в связи с их ограниченным количеством и высокой стоимостью, не могло широко применяться в сфере гражданского государственного управления, в связи с чем, подробное рассмотрение данного периода в контексте настоящей работы не представляется актуальной.

Начало 50-х гг. XX века стало точкой отчёта прогресса советской информатизации. Так, в 1950 году под руководством академика С.А. Лебедева в Киеве была создана первая в СССР программируемая вычислительная машина, получившая название МЭСМ-1 [15]. Данная ЭВМ разрабатывалась в качестве макета более технологичной перспективной ЭВМ для отработки технологических решений, однако, несмотря на сложную систему управления и ненадёжность отдельных узлов, данная машина применялась для выполнения расчётов в интересах народного хозяйства вплоть до 1957 года.

Одним из ключевых вопросов, связанных с темой настоящей главы, является период «Борьбы с кибернетикой», зачастую указываемый в качестве причины отставания советских информационных технологий от таковых в странах Запада.

Положившая начало кибернетики как науке книга американского учёного Н. Винера «Кибернетика: Или Контроль и Коммуникация у Животных и Машин», несмотря на значительный успех за рубежом и значительный потенциал заложенных в ней идей для развития информационных технологий, была негативно встречена в СССР. Книга длительное время не переводилась на русский язык и была ограничена от публичного доступа [9]. Как идеи самой

книги, так и работы, являвшиеся реакцией на неё со стороны научного сообщества, стали объектом критики советских идеологов.

Советская идеология, не ставившая под сомнение идеи создателей марксизма-ленинизма, не могла не учитывать ряд сходных аспектов труда Н. Винера с принципами научного управления Ф. Тейлора, при том, что В.И. Ленин в своём труде «Система Тейлора – порабощение человека машиной» резко критиковал механистический, безличный подход к управлению рабочими, указывал, что система Тейлора «соединяет в себе утонченное зверство буржуазной эксплуатации и ряд богатейших научных завоеваний» [14]. В связи с этим, сходные с тейлоризмом идеологические аспекты труда Винера не могли быть одобрены советской цензурой.

При этом следует учитывать, что собственно сама необходимость развития информационных технологий, их потенциальная практическая значимость для народного хозяйства социалистических стран, не ставилась под сомнение [25].

Таким образом, необходимо отметить, что полемика против кибернетики в СССР не привела к противодействию развитию вычислительных технологий, необходимость применения которых в жизни общества ясно осознавалась руководством страны, и что чётко прослеживается в успехах советских конструкторов и учёных в сфере прикладной информатики.

В связи с низким интересом советской радиоэлектронной промышленности к концепции микропроцессора, к 1980-м годам производство вычислительной техники в СССР значительно уступало таковому в странах Запада, как по количественным, так и по качественным характеристикам. Несмотря на наличие производства на собственной элементной базе микропроцессорных ЭВМ, например серии ЕС ПЭВМ, в середине десятилетия импорт зарубежной вычислительной техники приобрёл массовый характер [13].

Ранее принятое решение о совместимости наиболее массовых вычислительных машин с зарубежными образцами предопределило кризис в сфере разработки отечественного программного обеспечения и элементной базы.

С начала 1970-х годов, по мере усложнения технологии интегральных схем, самостоятельные научные разработки заменяются копированием готовых технических решений. Всё это обеспечивает кризис советских вычислительных технологий.

Современная Россия сохранила тенденцию к переходу на массовое внедрение ПЭВМ, что, в сочетании с прекращением производства на территории страны гражданской вычислительной техники, предопределило современное аппаратное оснащение государственной власти РФ вычислительной техникой.

Так, деятельность государственных служащих на рабочих местах, как правило, производится с применением ПЭВМ, созданной на базе импортной элементной базы с использованием IBM-PC совместимой архитектуры. Ряд мер по импортозамещению, в том числе формирование списка отечественного программного обеспечения, поддержка развития российской элементной базы и ограничения на закупку зарубежных программных решений потенциально способен обеспечить некоторое различие в программно-аппаратном обеспечении российских государственных служащих и сотрудников коммерческих организаций, однако сходной сохраняется сама концепция взаимодействия человека и информационной среды организации.

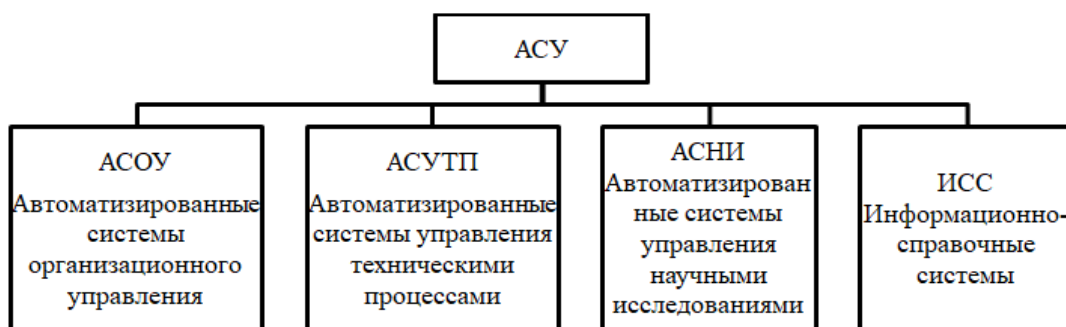
Таким образом, программно-аппаратное обеспечение российской государственной службы обеспечивает предпосылки к учёту опыта коммерческих организаций в вопросах построения внутренних и внешних информационных взаимодействий.

3.2. Развитие информационных систем государственного управления в СССР

Основой для появления информационных систем государственного управления в отечественной практике информатизации стало бурное развитие технологий автоматизированных систем управления (АСУ) в 60-х гг. XX века. Высокая значимость АСУ для развития экономики страны являлась

общепризнанной, и нашла своё отражение в официальных документах КПСС. Рассмотрение АСУ как фактора развития электронного государственного управления связано, прежде всего, с фактором наличия в СССР государственной собственности на средства производства. Развитие комплексных информационных систем государственного управления, которые будут рассмотрены далее, в качестве конечной цели предусматривало интеграцию всех вычислительных систем СССР в единую сеть, в связи с чем, специфику процессов информатизации на уровне государственных производственных и непроизводственных организаций определяет сам процесс информатизации государственного и муниципального управления [5; 6].

В связи с широкими возможностями применения АСУ в различных сферах деятельности человека, необходимо определить различные категории систем в целях уточнения объекта исследования. Основные направления по созданию АСУ в СССР представлены на рисунке 3.2.1.



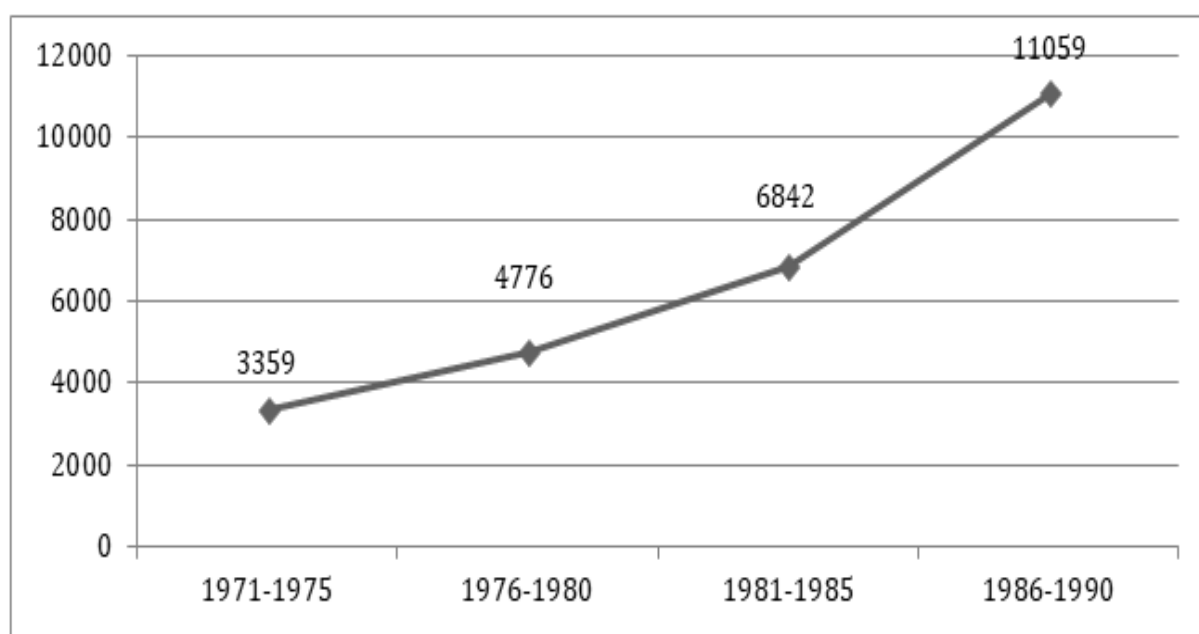
Источник: составлено авторами по материалам статьи Стрюковой Е.П. «Основополагающие работы А. И. Китова в области АСУ»

Рисунок 3.2.1 – Классификация направлений создания АСУ в СССР

Как следует из рисунка 3.2.1, АСУ применялись в различных областях деятельности, что обеспечивало появление различных концептуальных схем их проектирования в зависимости от сферы внедрения [33]. В контексте настоящего исследования, особый интерес представляют АСОУ и ИСС, однако кратко будут рассмотрены и иные типы АСУ.

Наибольшей популярностью в Советском Союзе пользовались АСУТП, функционал которых заключался в автоматизации определённого технического процесса (или группы процессов) в сфере промышленного производства. Прогресс в данной сфере отражался в появлении станков с ЧПУ, автоматических производственных линий и иных средств, обеспечивавших сокращение использования ручного труда [7].

Подобные системы обусловили значительное повышение эффективности труда, что предоставляло возможности для прямой оценки экономической эффективности внедрения технологических инноваций. Помимо экономической эффективности, снижение уровня ручного труда повышало условия труда рабочих, и обеспечивало положительный социальный эффект, особенно значимый в условия государственной собственности на средства производства. В связи с этими факторами, обеспечивающими популярность развития АСУТП, финансирование данного направления продолжало ежегодно увеличиваться. Динамика финансирования автоматизации производства представлена на рисунке 3.2.2.



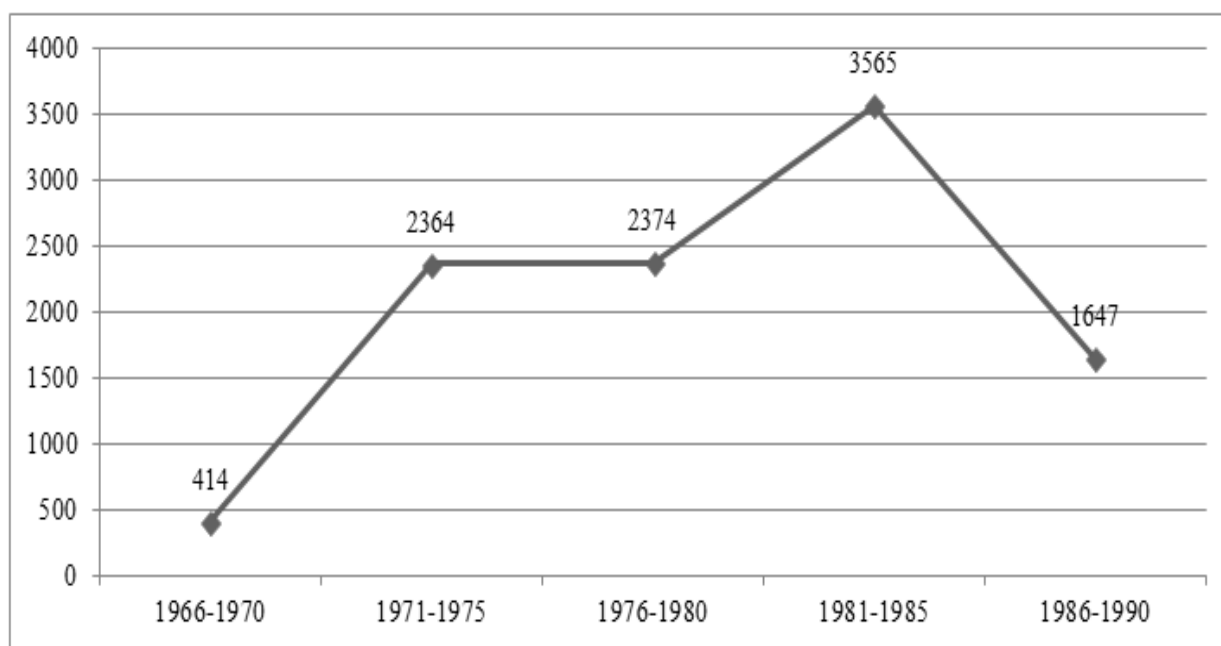
Источник: составлено авторами по материалам статистического сборника «Научно-технический прогресс в СССР, 1990г.» [17].

Рисунок 3.2.2 – Динамика финансирования автоматизации производства в СССР (тыс. руб.)

Таким образом, можно сделать вывод о том, что автоматизация производства посредством внедрения в деятельность промышленных предприятий АСУТП в СССР широко поощрялась и финансировалась.

Вместе с тем, стоит учитывать, что отсутствие механизмов рыночной конкуренции, ставших катализатором процессов автоматизации в странах с капиталистической экономикой повлияло на формирование пониженного интереса к автоматизированным системам на уровне предприятий. Так, по ряду сведений, к 1975 году было выведено из эксплуатации 469 АСУ, в т.ч. 225 АСУТП и 244 АСОУ [7].

С началом Перестройки процесс ввода в эксплуатацию новых автоматизированных систем стал значительно замедляться. Общее количество созданных АСУ в динамике за 1966 – 1990 гг. представлено на рисунке 3.2.3.



Источник: составлено авторами по материалам статистического сборника «Научно-технический прогресс в СССР, 1990г.» [17].

Рисунок 3.2.3 – Динамика создания АСУ в СССР (ед.)

Исходя из данных, представленных на рисунке 3.2.3, можно сделать вывод о том, что процессы перехода к рыночной экономике отрицательно сказались на отрасли разработки отечественных АСУ. Следует предположить также значительное воздействие на данную динамику наличествовавшей

неопределённости в дальнейших тенденциях развития хозяйственных отношений, значительно повышавшей риски, связанные с изменениями производственных процессов и утратой АСУ, обладающей, как правило, долгим сроком окупаемости, актуальности в краткосрочной перспективе.

С учётом данных о росте финансирования на АСУ, представленных на рисунке 3.2.2, а также общедоступных сведений об упрощении торговых отношений между СССР и странами Запада, и сопоставлением их с динамикой создания АСУ, представленной на рисунке 3.2.3, имеется возможность также сделать вывод о росте импорта зарубежных автоматизированных систем.

Автоматизированные системы организационного управления (АСОУ), предусматривающие комплексную информатизацию как производственных процессов, так и управления ими, получили значительно меньшее распространение в СССР. Во многом, это связано со значительными финансовыми затратами на их внедрение и сложностью оценки эффективности итогового результата. Помимо этого, данные системы, несмотря на их значительный экономический потенциал, не оказывали непосредственного воздействия на рядовых сотрудников организаций, в связи с чем, обеспечивали значительно меньший социальный эффект, чем АСУТП.

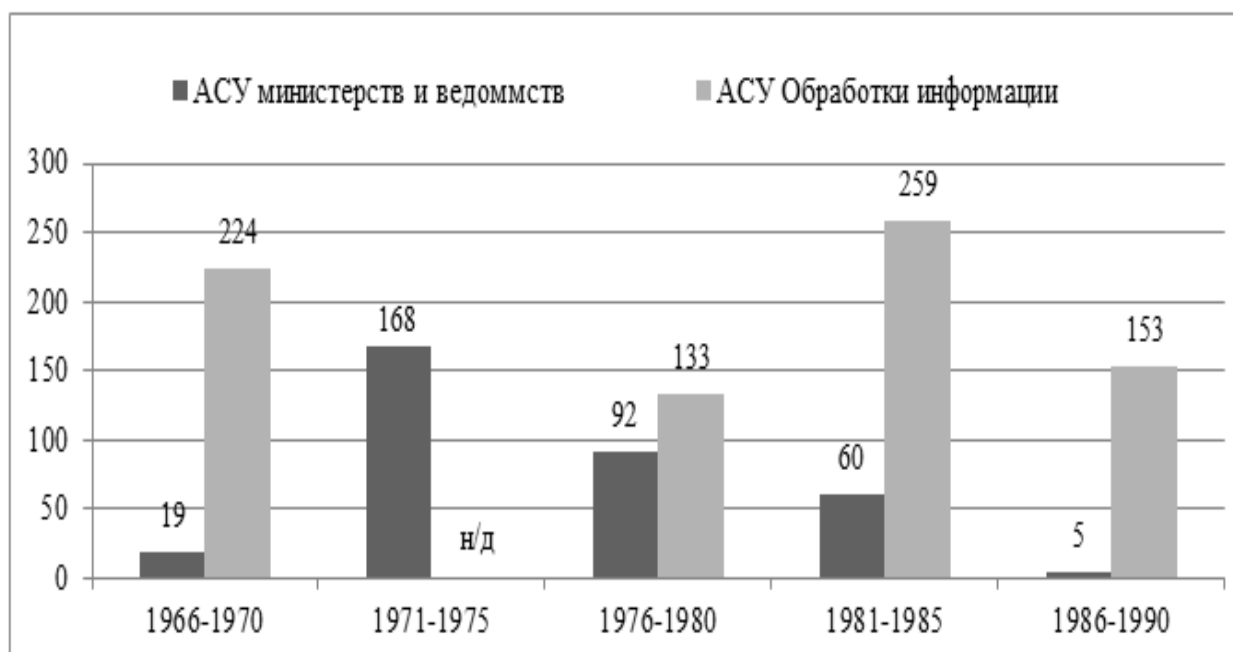
При этом именно на расширении внедрения в деятельность организаций АСОУ базировался ряд проектов всеобъемлющей информатизации советского общества, более подробно рассмотренных далее. Так, оснащённые АСОУ предприятия должны были стать низовыми организационными звеньями единой государственной сети, функционирующей в режиме реального времени.

Наиболее распространены в учреждениях государственного управления были информационно-справочные системы, обеспечивавшие представление, в том числе в режиме реального времени, актуальной справочной информации, формируемой в специальных центрах обработки информации организации.

Ряд информационных систем создавался исключительно для обработки информации – к таковым можно отнести различные АСУ, обеспечивавшие

работу органов государственного управления, библиотек, научных учреждений, архивов и т.д. Существование подобных информационных систем имеет принципиальное значение для цифровизации государственного управления, т.к. данный процесс не является осуществимым без эффективной обработки информационных потоков.

На рисунке 3.2.4 представлена динамика ввода АСУ вышеуказанных типов.



Источник: составлено авторами по материалам статистического сборника «Научно-технический прогресс в СССР, 1990г.» [17].

Рисунок 3.2.4 – Динамика создания АСУ государственного управления в СССР (ед.)

Как следует из рисунка 3.2.4, органы государственного управления были оснащены собственными ведомственными информационными системами в приоритетном порядке в первой половине 1970-х гг. В дальнейшем количество введённых в эксплуатацию систем снижалась, притом, что в целом именно вторая половина 1970-х и первая половина 1980-х стали золотыми годами советской информатизации. Подобные результаты, с учётом отсутствия данных о выводе и комплексной модернизации АСУ в органах государственной власти,

позволяют предположить о насыщении министерств и ведомств СССР собственными информационными системами.

Подобные системы, получившие название отраслевых автоматизированных структур управления (ОАСУ) являлись фактическими прообразами современных информационных систем государственного управления. Их задачей стало обеспечение принятия решений на уровне министерства или отрасли, посредством выполнения сбора, обработки и предоставления информации. Также зачастую обеспечивалась возможность информационного взаимодействия в реальном времени между территориальными подразделениями организации и подведомственными производственными организациями.

Ещё в конце 50-х годов XX века, при разработке первых действующих АСУ, появились предложения по использованию ИКТ в сфере государственного управления [12]. Основной предпосылкой информатизации государственного управления СССР являлось необходимость оперативного обмена данными между хозяйственными субъектами государственной экономики и органами государственной власти, обусловленная влиянием качества поступающей информации на качество государственного планирования.

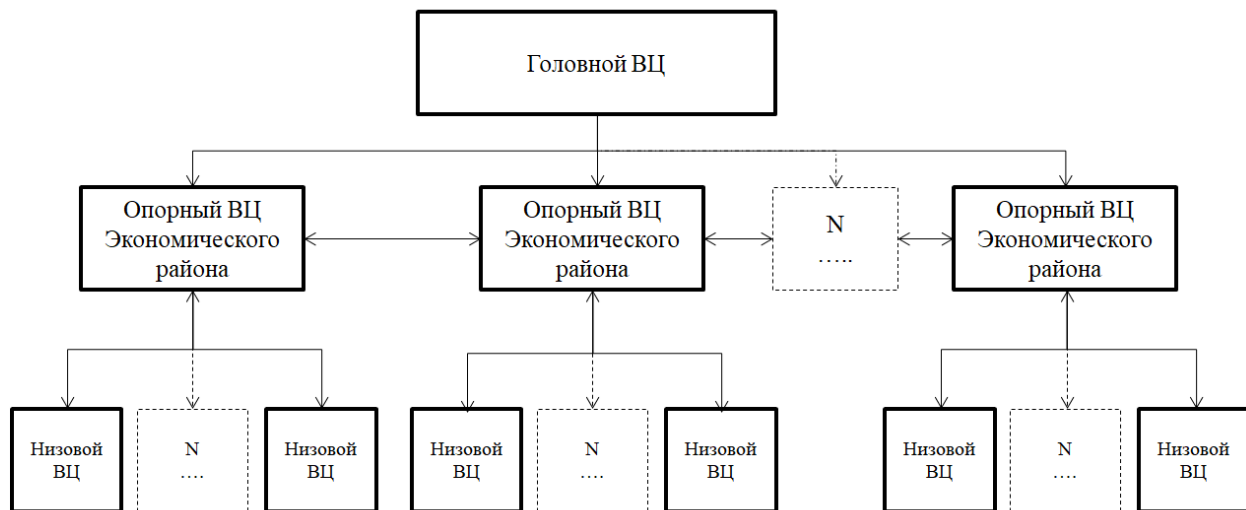
Так, в 1959 году руководитель головного вычислительного центра Министерства обороны СССР А.И. Китов направил на имя Н.С. Хрущёва докладную записку посвящённую информатизации страны, а позже – и подробный план создания единой информационной инфраструктуры СССР на базе создания Единой государственной сети вычислительных центров (ЕГСВЦ), обслуживаемых силами министерства обороны СССР. Помимо гражданских функций, планируемая к внедрению информационная система предполагала возможность использования её в целях национальной обороны при появлении военной угрозы [11].

Несмотря на первоначальное одобрение проекта со стороны государства, его реализация требовала полной перестройки системы государственного

управления в СССР, в связи с чем, проект был отвергнут, а сам его разработчик был исключён из КПСС и снят с занимаемой должности. Дальнейшее развитие концепции единой государственной системы управления непосредственно связано с директором Института кибернетики АН УССР академиком Виктором Михайловичем Глушковым.

В 1962 году Госкомитетом СССР по науке и технике был рассмотрен проект «Общегосударственной системы автоматизированного сбора и обработки экономической информации», предполагавшей обеспечение актуальной информацией отраслевых министерств и ведомств. Принципиальными отличиями нового проекта ЕГСВЦ, от изначальной концепции являлось обособление силовых структур, не участвовавших в проекте, от гражданских управленческих структур. Также планировалось внедрение системы электронных денег.

В рамках проекта ЕГСВЦ планировалось формирование взаимосвязанной иерархической системы вычислительных центров, схема которой наглядно представлена на рисунке 3.2.5.



Источник: составлено авторами по материалам анализа трудов В.М. Глушкова

Рисунок 3.2.5 – Первоначальная концепция создания ЕГСВЦ

Как следует из рисунка 3.2.5, комплекс вычислительных центров раскидывался на все уровни экономического управления. Во многом, при

создании данной схемы был учтён зарубежный опыт проектирования компьютерных сетей, например созданной в США ARPA-net, однако характерно его предназначение для нужд гражданского управления и оптимизации экономических процессов.

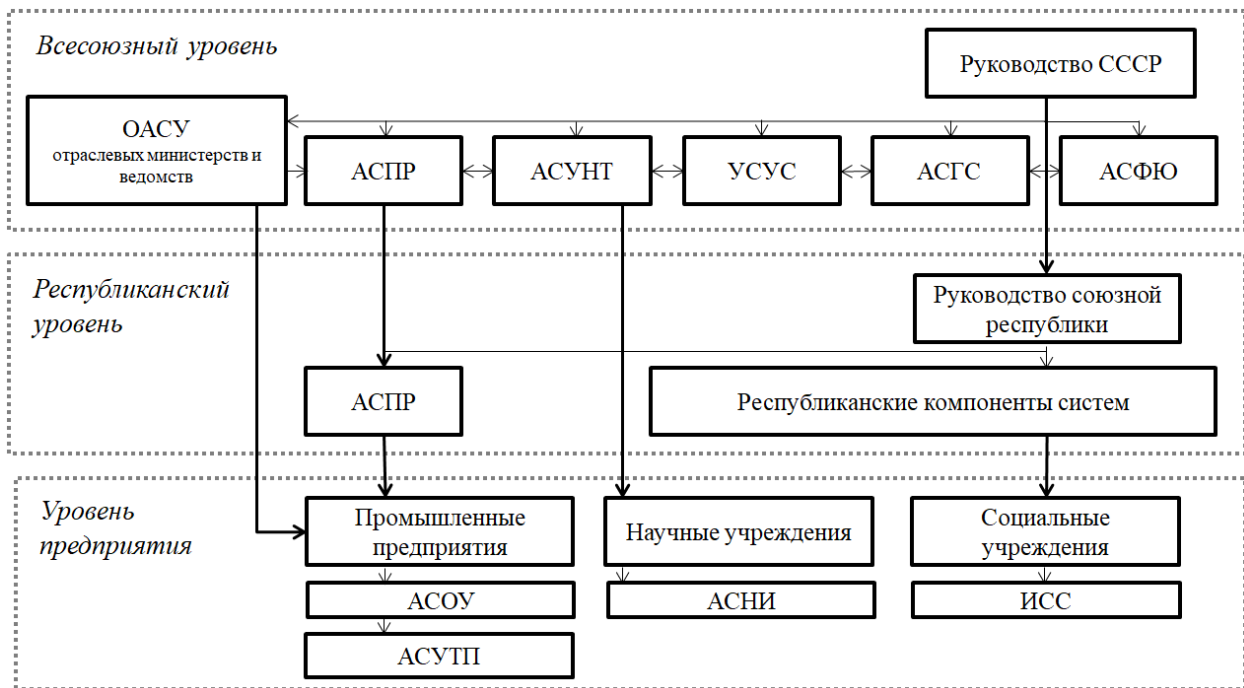
Головной вычислительный центр предназначался для обеспечения нужд центральных органов управления, прежде всего – Госплана СССР.

Опорные вычислительные центры должны были обеспечивать информацией местные органы государственного управления, являться хранилищами баз данных, а также использоваться для коллективных вычислений и управления низовых вычислительных центров. На базе около 200 опорных вычислительных центров предполагалось осуществлять вычисления в целях создания региональных экономических планов [10].

Данный проект, несмотря на значительное внимание со стороны руководства СССР, был отвергнут в связи с неочевидной ролью существующих органов государственной власти, в частности Центрального статистического управления, разрабатывавшего концепцию своей собственной всесоюзной информационной системы.

В итоге был разработан новый проект, основанный на создании всесоюзной сети на базе существующей системы министерств и ведомств Советского Союза. Предусматривалось и создание ряда межведомственных систем, таких, как например АУНТП – автоматизированная система управления научно-техническим процессом [16].

Реализация данного проекта началась в 1970-е годы [10]. Наглядно схема данного проекта, получившего название Общегосударственной автоматизированной системы учёта и обработки информации (ОГАС) представлена на рисунке 3.2.6.



Источник: составлено авторами по материалам анализа трудов В.М. Глушкова.

Рисунок 3.2.6 – Итоговая концепция развития ОГАС

Как следует из рисунка 3.2.6, ОГАС на всесоюзном и региональных уровнях предполагалось создание ряда автоматизированных систем – Автоматизированную систему плановых расчетов (АСПР) Госплана, АСУ Госстата (АСГС), АСУ Госснаба (АСУГ), АСУ Госстроя (АСУС), автоматизированную систему Госкомтруда (АСТЗ), АСФЮ – система финансово-юридической деятельности. Обеспечивалась взаимосвязь информационных систем между собой [20].

Несмотря на существенный потенциал системы, исследователи отмечали значительное ведомственное противодействие, связанное с нежеланием обеспечения открытости информации об их деятельности, а также стремлением обеспечить самостоятельность в принятии решений [12].

По результатам работ над созданием системы, были реализованы отдельные её компоненты, в частности Автоматизированная система плановых расчетов и ряд ОАСУ министерств и ведомств, однако ключевой аспект плана – интеграция всех систем в единое информационное пространство так и не был реализован, что обусловило то, что система так и не обеспечила

запланированный результат в формировании всеобщего электронного государственного управления.

3.3. Становление цифрового государства в современной России

В Российской Федерации, несмотря на сложную социально-экономическую обстановку, продолжились работы по созданию собственных информационных систем [27]. Продолжилась и модернизация ряда информационных систем, оставшихся от нереализованного ОГАС.

Следующим шагом на пути к цифровому государственному управлению, стало принятие Федеральной Целевой Программы «Электронная Россия» (2002- 2010 гг.)» [19]. В рамках программы планировалось решение следующих вопросов:

- обеспечение электронного межведомственного документооборота;
- достижение открытости деятельности органов государственной власти;
- развитие механизма государственного управления посредством применения инновационных технологий;
- принятие управленческих решений и их контроль в электронном виде;
- создание условий для электронного взаимодействия государства и гражданского общества.

Продолжением развития данного направления является принятие программы «Информационное общество» (2011–2020) [29]. Положительными результатами её реализации стали: доступные Интернет-соединение, получение государственных услуг в электронном виде, многофункциональные центры (МФЦ) [30].

В 2007 году в России появились первые многофункциональные центры. Главным их преимуществом, по сравнению с классическим порядком получения государственных услуг, стало использование концепции «одного окна», позволяющей заявителю получить необходимые услуги при единичном посещении МФЦ. Реализуется активное внедрение подобной модели оказания

услуг, что обусловило доступ к услугам МФЦ 96,6% жителей РФ в 2017 году [32].

Осуществляется комплексная деятельность по совершенствованию системы межведомственного электронного взаимодействия (далее – СМЭВ), предоставлению доступа к системе для новых органов государственной власти. По состоянию на 2020 год процессы цифровизации в сфере государственного управления состоят, в первую очередь, в интенсификации межведомственного информационного обмена посредством использования узкоспециализированных информационных систем [26].

Собственные информационные системы имеются у подавляющего большинства федеральных министерств и ведомств [28]. Данные системы предназначены, прежде всего, для автоматизации внутренних трудовых процессов и сбора отчётности с подведомственных организаций, если таковые имеются. Фактически, они являются продолжением советской концепции ведомственных АСУ. Ряд информационных систем, таких как ГАС «Управление», ГАС «Выборы» и ЕИС в сфере закупок выполняют функции, аналогичные отраслевым АСУ, т.к. их функционирование обеспечивает не управление деятельностью ведомства, но работу под контролем государства определённой функциональной сферы деятельности.

Программно-аппаратная база государственных информационных систем регламентируются, прежде всего, в аспектах обеспечения информационной безопасности. Требования к унификации технологических решений и включению системы при её создании в единое информационное пространство государственного управления отсутствуют. Создание систем осуществляется по мере возникновения в них потребности [1].

Информационные системы субъектов РФ создаются самостоятельно силами субъектов на основе рыночных взаимоотношений. Отдельные информационные системы, например Федерального казначейства,

функционируют на всех уровнях власти, создавая цельную иерархическую структуру.

На основе анализа государственных информационных систем, возможно выделить ряд следующих проблемных моментов:

- сложность планирования внедрения информационных систем;
- длительный период опытной эксплуатации;
- отсутствие прямого информационного взаимодействия между отдельными системами;
- отсутствие унификации пользовательского интерфейса;
- отсутствие единой базы пользователей.

Указанные проблемы в различной степени оказывают воздействие на эффективность процесса цифровизации государственного управления в РФ.

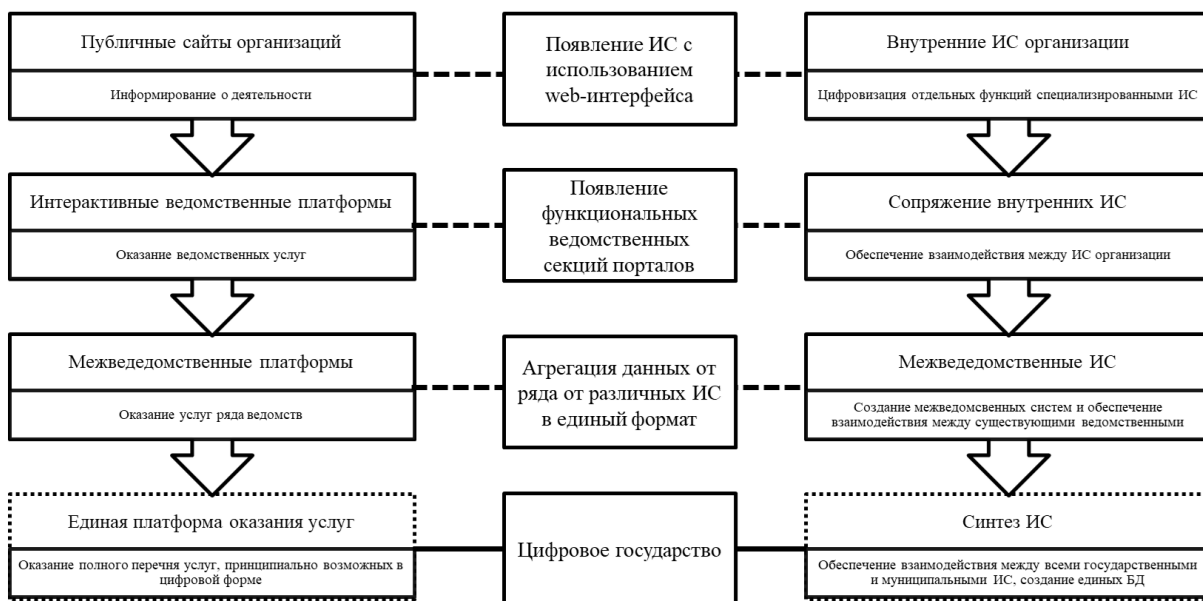
Первой по уровню значимости, и во многом являющейся причиной возникновения следующих проблем является сложность долгосрочного планирования потребности в создании новых информационных систем. Подобная тенденция, прежде всего, связана с необходимостью повышения уровня координации в данной сфере – несмотря на то, что Министерство цифрового развития, связи и массовых коммуникаций РФ осуществляет общий контроль, обеспечивает планирование и задаёт вектор новых информационных систем федерального уровня, фактически решение об их создании принимается непосредственно отдельными органами власти, после чего обособленно внедряется [3].

В связи со значительным количеством федеральных государственных информационных систем, и закрытостью части сведений о них, целесообразным является рассмотрение информационных систем отдельного субъекта РФ. Узкая специализация внедряемых информационных систем находит отражение, например, в региональной программе Московской области «Цифровое Подмосковье». Так, среди широкого перечня внедряемых систем и в их описании фактически отсутствуют проектные процедуры по их интеграции [4].

В целом, несмотря на ряд моментов, связанных с интеграцией информационных систем, видна тенденция по развитию в Российской Федерации концепции цифрового государства, что отражается в повышении доступности услуг в электронном виде для населения, развитии электронного документооборота, постепенной интеграции информационных систем на региональном уровне.

3.4. Перспективы цифровизации государственного управления в России и мире

Мировой тенденцией информатизации органов государственного управления является создание общего информационного пространства – цифрового государства. Эволюция полноценного электронного правительства включает в себя несколько этапов, представленных на рисунке 3.4.1.



Источник: составлено авторами на основе анализа мировых тенденций развития цифрового государства как явления объективной реальности

Рисунок 3.4.1 – Этапы построения цифрового государства

Как следует из схемы, представленной на рисунке 3.4.1, и выполненного ранее анализа информатизации государственного управления, в настоящий момент Российская Федерация находится на 3-й стадии цифровизации.

Четвертый этап, напрямую сопряжённый с появлением цифрового правительства, включает в себя создание портала, предоставляющего весь комплекс услуг всех государственных и муниципальных органов власти и свободный обмен данными между всеми информационными системами. Таким образом, для перехода к цифровому государству необходимо:

- применение единого стандарта технической реализации информационных систем;
- унификация пользовательских интерфейсов;
- создание единой архитектуры государственных данных;
- реализация возможности эффективного использования государственных данных в информационных системах всеми государственными и муниципальными органами, эффективность деятельности которых, зависит от их применения.

В настоящий момент, в Российской Федерации проводятся работы по координации деятельности в сфере информатизации органов власти федерального и регионального уровня. Данные функции осуществляются Департаментом координации и реализации проектов по цифровой экономике Министерства цифрового развития, связи и массовых коммуникаций РФ. В рамках Постановления Правительства РФ от 14 ноября 2015 г. N 1235 «О федеральной государственной информационной системе координации информатизации» создана информационная система, в которой обеспечивается осуществление координации информационных систем [2].

По состоянию на 2020 год, осуществляется интеграция пяти информационных систем, являющихся ключевыми для развития цифрового государства:

- ЕСИА;

- ГАС «Управление»;
- ЕИС в сфере закупок;
- ГИС управления общественными финансами «Электронный бюджет»;
- ГИС «Федеральный реестр государственных и муниципальных услуг».

Комплекс вышеуказанных систем позволяет сформировать единую платформу для оказания государственных услуг и управления финансовой деятельностью. Данные информационные системы тесно связаны друг с другом и основаны на схожей технологической базе, что обеспечивает:

- снижение затрат рабочего времени сотрудников на ознакомление с принципами действия новых информационных систем;
- снижение затрат рабочего времени технических специалистов на поиск и решение неполадок в работе информационной системы;
- обеспечение единой базы данных пользователей государственных информационных систем.

Расширение действия мероприятий по координации развития информационных систем может обеспечить существенное ускорение процесса построения цифровой экономики за счёт высвобождения вычислительных мощностей и технических специалистов и применения их в приоритетных направлениях развития цифровой инфраструктуры.

Невозможно не учитывать и последние достижения в сфере информационных технологий, способные значительно изменить отдельные аспекты государственных информационных систем. Так, широкий потенциал внедрения имеют нейросетевые технологии и блокчейн.

Нейронные сети – программное обеспечение, созданное по принципу организации и функционирования биологических нейронных сетей, стали привычным элементом повседневной жизни в конце второго десятилетия XXI века. Данная технология широко применяется в аналитических целях в связи с тем, что она позволяет производить новую информацию на основе исходно

заложенных вводных, благодаря механизмам обучения на больших массивах данных [22].

Информационные системы с внедрёнными в них механизмами нейронных сетей могут позволить значительно ускорить процессы поиска и обработки массивов данных, обеспечить помощь в определении неочевидных связей каких-либо процессов и явлений, создавать проекты готовых решений по заданным критериям. Несомненно, что работа нейронных сетей в сфере государственного управления должна тщательно регулироваться, однако широкий потенциал данной технологии в сфере аналитики и сортировки данных, с учётом непрерывно увеличивающегося их объёма, в т.ч. и в государственной информационной инфраструктуре, невозможно недооценивать.

Рассмотрение технологии блокчейн (выстроенная по определённым правилам непрерывная последовательная цепочка блоков, содержащих информацию) в значительной степени относится к сфере обеспечения информационной безопасности, однако данная сфера имеет большое значение в контексте рассмотрения государственных информационных систем [8]. Так, использование данной технологии позволит обеспечивать безопасную передачу данных, что снижает угрозы от проникновения злоумышленников в перспективную единую государственную инфраструктуру.

По состоянию на 2020 год технология блокчейн используется в сфере государственного управления Эстонии в целях идентификации личности, в т.ч. для целей обеспечения безопасности проведения процедуры выборов в электронной форме. В России рассматривалось применение технологии для обеспечения работы информационных систем Росреестра.

Таким образом, перспектива развития информационных систем государственного управления, в связи с развитием сетевых технологий, заключается в повышении уровня их взаимной интеграции, что предполагает своим итогом построение единого информационного пространства государственного управления. Значительное место в формировании

государственного управления будущего принадлежит концепции оказания государственных услуг в электронном виде, что связано с изменением структуры информационного межведомственного взаимодействия при расширении перечня оказываемых услуг. Катализатором развития информационных систем государственного управления могут стать нейросетевые технологии, способные обеспечить рост эффективности аналитической работы, зависящий от объёма данных в информационной среде и уровня интеграции её компонентов.

При этом не стоит забывать, что эффективность системы цифрового государственного управления тесно связана с развитием не только вычислительных технологий, но и институтов гражданского общества. Таким образом, именно повышение гражданской сознательности каждого отдельного человека позволит добиться открытой и эффективной системы цифрового государственного управления, действующего в интересах всеобщего развития, и обеспечивающего защиту общественных интересов.

Список использованной литературы

1. Постановление Правительства Российской Федерации от 10 сентября 2009 года № 723 «О порядке ввода в эксплуатацию отдельных государственных информационных систем».
2. Постановление Правительства РФ от 14 ноября 2015 г. N 1235 «О федеральной государственной информационной системе координации информатизации».
3. Письмо Аппарата Правительства РФ №П10-5473 от 6 февраля 2014 г.
4. Постановление Правительства Московской области «Об утверждении государственной программы Московской области «Цифровое Подмосковье» на 2018-2021 годы».
5. Постановление ЦК КПСС и Совета Министров СССР от 21.05.1963 г. «Об улучшении руководства внедрением вычислительной техники и автоматизированных систем управления в народное хозяйство».

6. Постановление ЦК КПСС и Совета Министров СССР от 08.10.1970 г. «О мерах по совершенствованию управления в народном хозяйстве на основе широкого использования средств вычислительной техники».
7. Бокарев Ю.П. СССР и становление постиндустриального общества на Западе, 1970-1980-е годы [Текст] / Ю.П. Бокарев. – М.: Наука, 2007. – 381 с.
8. Борисов, А.Б. Большой экономический словарь. Издание 2-е переработанное и дополненное. – М.: Книжный мир, 2007. – 860с.
9. Н. Винер Кибернетика: Или Контроль и Коммуникация у Животных и Машин. [Текст] / Пер. с англ. И.В. Соловьева и Г.Н. Поварова. – М.: Наука; Главная редакция изданий для зарубежных стран, 1983. – 344 с.
10. Глушков В.М. Основы безбумажной информатики [Текст] / В.М. Глушков. – М.: Наука, – 1987. – 211 с.
11. Кутейников А. В. На заре компьютерной эры: предыстория разработки проекта Общегосударственной автоматизированной системы управления народным хозяйством СССР (ОГЛС) [Текст] / А.В. Кутейников // История науки и техники. 2010. № 2. с. 46-47
12. Кутейников А.В. Общегосударственная автоматизированная система управления советской экономикой (ОГАС): история создания и уроки. [Текст] / А.В. Кутейников // Научные труды Международной молодежной научной конференции XXXVII Гагаринские чтения, – 2011. Т. 4. С. 80-82.
13. Ларионов А.М., Левин В.К. и др. Основные принципы построения и технико-экономические характеристики Единой системы ЭВМ [Текст]/ А.М. Ларионов, В.К. Левин // УСиМ. 1973. № 2. с. 1-12.
14. Ленин В.И. Система Тейлора — порабощение человека машиной [Текст] / В.И. Ленин. – М.: Госполитиздат, 1984. Полн. собр. соч., 5 изд., т. 23. 416 с.
15. Малиновский Б.Н. История вычислительной техники в лицах [Текст] / Б.Н. Малиновский // Киев: «КИТ», ПТОО «А. С. К.». – 1995. — 384 с.

16. Маталин-Слущкий Л.А., Колпаков И.Ф. Автоматизированные системы научных исследований и аппаратура КАМАК [Текст] / Л.А. Маталин-Слущкий, И.Ф. Колпаков // М.: Природа. 1984. № 2. – с. 85.
17. Научно-технический прогресс в СССР. Статистический сборник [Текст] // М.: Финансы и статистика. – 1990. – 680с.
18. Никитов В.А., Орлов Е.И., Старовойтов А.В., Савин Г.И. Информационное обеспечение государственного управления [Текст] / под ред. Академика Гуляева Ю.В. – М.: Славянский диалог. – 2000. – 278с.
19. Петрова Е.А. Зарубежный опыт информатизации и особенности его реализации в России [Текст] / Е.А. Петрова // М.: Фундаментальные исследования. – 2007. – № 11. – с. 31-35
20. Сафронов А.В. Автоматизированная система плановых расчетов Госплана СССР как необходимый шаг на пути к общегосударственной автоматизированной системе учета и обработки информации (ОГАС) [Текст] / А.В. Сафронов. – М.: Экономическая история. – 2019.– №4. с.47-48
21. Соловьева О. Водяные вычислительные машины [Текст] / О. Соловьева // М.: «Наука и Жизнь». —2000. — № 4.
22. Хайкин С. Нейронные сети: полный курс. [Текст] / С. Хайкин – М.: Издательский дом «Вильямс», 2006. – 1104 с.
23. Шилов В.В. Логические машины и их создатели [Текст] / В.В. Шилов // М.: Информационные технологии. – 2008. № 8. – 40 с.
24. В.Г. Электронная машина Голлерита для подсчёта статистических данных // Вестник опытной физики и математики. Электронный ресурс. Режим доступа: <https://vofem.ru/ru/articles/22501>.
25. Материалы XXII съезда КПСС. Электронный ресурс. Режим доступа <https://search.rsl.ru/ru/record/01006226073>.
26. Официальный сайт национального проекта Российской Федерации «Цифровая экономика». Электронный ресурс. Режим доступа: <https://digital.ac.gov.ru>.

27. Портал Министерства цифрового развития, связи и массовых коммуникаций Российской Федерации. Государственная автоматизированная система Российской Федерации «Выборы» (ГАС «Выборы»). Электронный ресурс. Режим доступа: <https://digital.gov.ru/ru/activity/govservices/infosystems/2/>.

28. Портал Министерства цифрового развития, связи и массовых коммуникаций Российской Федерации. Годовой отчет о ходе реализации и оценке эффективности государственной программы Российской Федерации «Информационное общество 2011–2020 годы». Электронный ресурс. Режим доступа: <http://minsvyaz.ru/uploaded/files/otchet2016.pdf>.

29. Портал Министерства цифрового развития, связи и массовых коммуникаций Российской Федерации. ФЦП «Информационное общество». Электронный ресурс. Режим доступа: <http://minsvyaz.ru/ru/activity/programs/1>.

30. Рудычева Н. ИКТ в госсекторе: основные тренды. Электронный ресурс. Режим доступа: http://www.cnews.ru/reviews/gov2015/articles/ikt_v_gossektore_osnovnye_trendy.

31. Сафронов А.А. Из истории подготовки первой всеобщей переписи населения Российской империи 1897 г. Электронный ресурс. Режим доступа: <https://elar.urfu.ru/bitstream/10995/5037/1/1-2001-12.pdf>.

32. Совершенствование государственного управления. МФЦ охватили 96,6% россиян. Электронный ресурс. Режим доступа: <http://ar.gov.ru/ru/news/42956/1/0/0/index.html>.

33. Стрюкова Е.П. Основополагающие работы А. И. Китова в области АСУ // Научные труды Вольного экономического общества России. 2012. №4. Электронный ресурс. Режим доступа: <https://cyberleninka.ru/article/n/osnovopolagayuschie-raboty-a-i-kitova-v-oblasti-asu>.

34. D. Swade. The difference engine: Charles Babbage and the quest to build the first computer / Swade D. Электронный ресурс. Режим доступа: <https://www.researchgate.net/publication/268242772>.

Глава 4. Проблемы формирования устойчивого развития промышленных отраслей в условиях цифровой экономики

4.1. Факторы и тенденции устойчивого развития промышленных предприятий

Современное турбулентное развитие экономики и постоянно возникающие новые экономические и политические риски подтверждают необходимость совершенствования системы обеспечения устойчивого развития промышленных предприятий России. Для этого необходимо выявить все факторы, которые влияют на снижение устойчивого промышленного производства, а также усилить поиск новых инструментов повышения финансовой устойчивости предприятий, так как они занимают ведущее место не только в обеспечении национальной безопасности, но и в решении социально-экономических задач страны.

Актуальность исследования факторов и тенденций устойчивого развития промышленных предприятий обусловлена необходимостью развития теории управления устойчивостью промышленных предприятий путем совершенствования управления их цифровой трансформацией в условиях развития цифровой экономики в Российской Федерации.

Научная новизна исследования заключается в разработке методических подходов к формированию механизмов устойчивого развития промышленных предприятий на основе развития цифровой трансформации в управлении предприятием и технологическими процессами. Для обоснования предложенных результатов применялись методы системного, статистического, факторного анализа, а также методы экспертных оценок.

Необходимость использования системного подхода в управлении устойчивым развитием промышленного предприятия обусловлено тем, что промышленное предприятие является системой, состоящей из подсистем и частей, обладающих собственными свойствами и характеристиками, а также

имеющих свои цели и задачи. Системный подход в исследовании устойчивого развития промышленного предприятия предполагает использование комплексного подхода к исследованию проблемы, то есть учет внутренних и внешних факторов, влияющих на производственную систему [1].

Система количественных и качественных показателей оценки финансовой устойчивости предприятий ОПК должна включать следующие основные индикаторы, которые могут быть конкретизированы с учетом специфики деятельности ее предприятий (рисунок 4.1.1).



Рисунок 4.1.1 - Основные показатели финансовой устойчивости промышленных предприятий с коэффициентами значимости

В рамках проведенного исследования определена задача обеспечения максимального уровня устойчивости при минимальных затратах. Устойчивость промышленного предприятия должна быть достаточно хорошей при условии

минимума совокупных издержек по обеспечению устойчивости промышленного предприятия (рисунок 4.1.2).

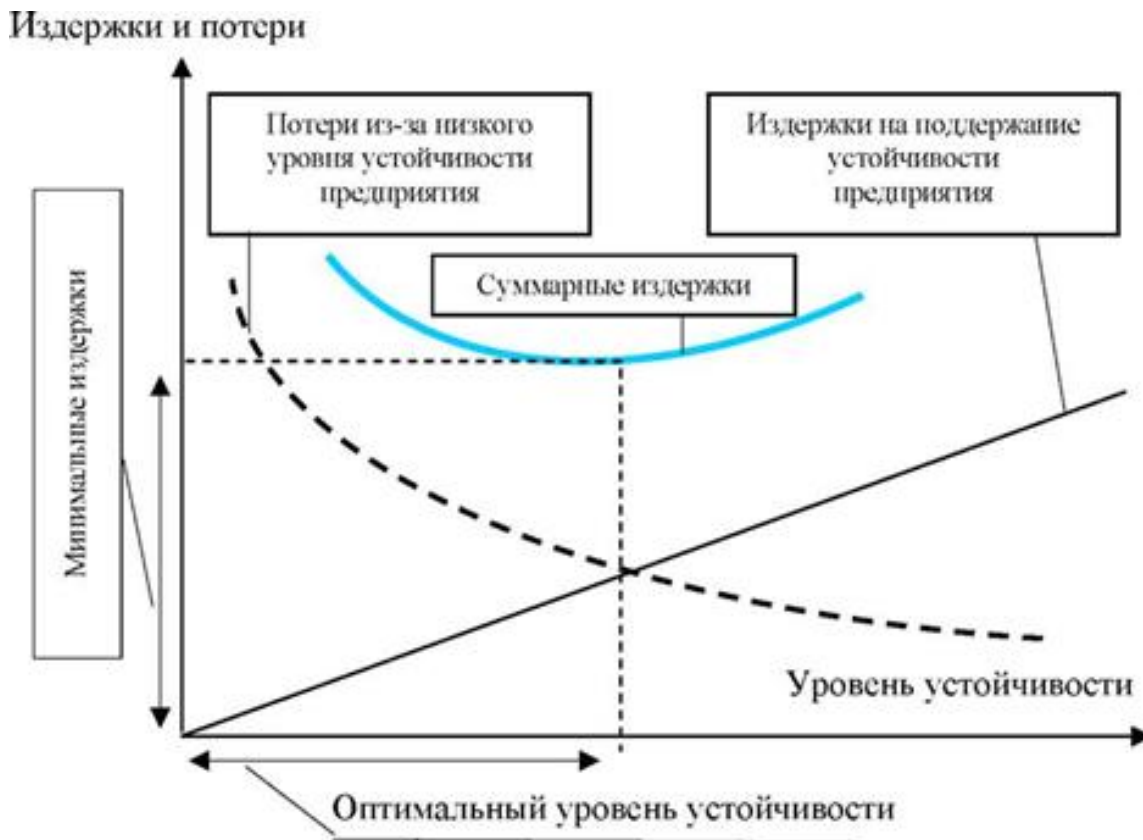


Рисунок 4.1.2 - Взаимосвязь устойчивости промышленного предприятия и издержек на её обеспечение [2].

Основными методами обеспечения устойчивости предприятия являются резервирование, страхование, хеджирование, устранение и игнорирование угроз, адаптация и изменение среды, а также внедрение современных цифровых технологий, повышающих эффективность управления предприятием и его технологическими процессами.

Отрасль информационных технологий представляет собой совокупность секторов (индустрий), связанных с созданием, хранением, интеграцией, обработкой и передачей информации. Совокупность данных операций можно объединить понятием управления жизненным циклом информации. Информационные технологии входят в четвертичный сектор мировой экономики – экономику знаний по модели Фишера-Кларка [3] и расположены в

5-ом технологическом укладе [4]. Развитие информационных технологий в последней трети XX века обусловило появление постиндустриального (информационного) общества и понятия «новой экономики» [5]. Отрасль информационных технологий (ИТ) в ее современном виде сопровождается в течение последних 100 лет развитием логических алгоритмов, специализированных математических методов и аппаратного обеспечения для вычислительных процессов.

Обстоятельство необходимости технологий передачи информации, связанной с телекоммуникационными услугами, привело к объединению данной отрасли с телекоммуникацией и связью в информационно-телекоммуникационный комплекс (ИТК). Это подразумевает включение в ИТК предприятий, оказывающие услуги массовой коммуникаций и связи и производителей соответствующего аппаратного обеспечения. Схожесть отраслей обеспечения услуг телекоммуникаций, связи и информационных технологий подчеркивается в названиях министерств и департаментов в региональных и федеральных органах власти РФ.

Рассмотрим результаты исследований и разработок в организациях сектора информационно-коммуникационных технологий (ИКТ), которые могут повлиять на формирование устойчивого развития промышленных отраслей в условиях цифровой экономики [6]. Исследования и разработки в организациях сектора ИКТ представлены на рисунке 4.1.3.



Рисунок 4.1.3 - Исследования и разработки в организациях сектора ИКТ, [7]

В последнее время отмечается падение удельного веса сектора ИКТ в общем объеме внутренних затрат на исследование и разработки, а также внутренних затрат на исследования и разработки в организациях сектора ИКТ.

В связи с этим для проектов в рамках программы «Цифровизация промышленности» предусмотрены специальные условия финансового обеспечения. Условия финансового обеспечения проектов: общие требования и критерии отбора проектов, порядок экспертизы регламентируются Стандартом Фонда Развития Промышленности (ФРП) «Условия и порядок отбора проектов для финансирования по программе «Цифровизация промышленности» (далее – Стандарт «Цифровизация промышленности»). Стандарт «Цифровизация промышленности» согласован с Минпромторгом России (письмо от 08.08.2018 № ОВ-50477/05), Минэкономразвития России (письмо от 29.08.2018 № 24631- МР/Д18и).

Сумма потенциального займа, в соответствии со Стандартом «Цифровизация промышленности», на срок не более 5 лет составляет от 20,0 млн руб. до 500,0 млн руб. Процентная ставка на период предоставления займа – 1%. Максимально возможный размер займа может определяться решением Наблюдательного Совета ФРП.

Организация может направить полученные для финансирования проекта средства на приобретение компьютерного, серверного и сетевого оборудования, а также инжиниринг и финансирование договоров с системными интеграторами цифровых и технологических решений.

«Цифровизация промышленности» является новой программой займов ФРП, одной из самых перспективных и максимально приближенных к современному курсу на Индустрию 4.0.

4.2. Системный подход к построению общей модели цифровой трансформации промышленных предприятий

Для повышения экономической эффективности применения инструментария цифровых технологий необходима методология системы управления этой деятельностью. Прогрессивным и опробованным методом является системный подход. В условиях цифровой экономики системный подход реализуется в виде синергии научно обоснованных методов внедрения цифровых технологий в управление предприятием и технологические процессы, а также разработки стратегических программ цифровизации промышленных предприятий [8].

Наиболее эффективный подход к реализации цифровой трансформации заключается в использовании перехода от бизнес-задач к новым цифровым технологиям, т.е. компания определяет, какой результат необходимо достичь, источники финансирования, а затем выбирает нужную технологию для внедрения.

Необходимо применять комплексный межфункциональный подход к реализации программ цифровой трансформации, рассматривая их не по отдельности, а в функциональной взаимосвязи между собой.

Тенденции современной «цифровой трансформации» на промышленных предприятиях связаны с интеграцией используемых ИТ-систем. Развиваются гибкие производственные системы. Осуществляется переход от описательной аналитики к формированию прогнозов научно-технологического развития промышленных отраслей. Результаты такой аналитической работы в условиях цифровизации экономики все больше используются при формировании и реализации государственных программ.

Для ведущих промышленных предприятий за последние 20 лет информационные технологии из сервисной функции превратились в драйвер роста бизнеса. Стремительно удешевляющиеся системные и прикладные информационные технологии создают саму суть и границы возможных изменений в промышленности в рамках цифровизации и обеспечивают абсолютно новый качественный уровень добавленной стоимости в их продукции [9]. Более того, предиктивная аналитика, как расширение SCADA- систем – еще одна информационная технология в рамках цифровизации промышленности – позволяет делать довольно точные прогнозы будущего: затрат, отказов, необходимых ремонтов и т.п.

Успешное развитие российской отрасли информационных технологий и отдельных успешных российских IT-компаний сопряжено с необходимостью конкурентной борьбы на мировом уровне, где сосредоточены основные инвестиции в данные технологии. Более того, эта конкурентная борьба является альтернативным для экспорта сырья внешнеэкономическим драйвером развития [10].

В настоящее время еще не сформировалась практика, когда за реализацию цифровых технологий на предприятии отвечает конкретный топ-менеджер. Только 8% российских компаний ввели должность руководителя программ

цифровизации. Опыт по цифровизации сегодня концентрируется в центрах компетенций компаний по цифровизации предприятия. Можно выделить следующие модели центров компетенций, которые сформировались в российских компаниях: методологическое подразделение, общекорпоративный центр, гибридный вариант.

Методологическое подразделение обеспечивает выработку единых стандартов и методологии, контроль за формированием ИТ-архитектуры и управление данными. Формирование технических решений по внедрению цифровых технологий производится в бизнес-подразделениях, которые будут их использовать. Общекорпоративный центр компетенции обеспечивает полный цикл работ по формированию методологического подхода и процесса технологического внедрения цифровых технологий. Бизнес-подразделения при этом формируют только заявки на проекты. Гибридный вариант центра компетенций выполняет как методологические функции, так и отвечает за внедрение цифровых технологий. При этом часть проектов могут быть переданы другим подразделениям компании.

4.3. Оценка уровня цифровизации предприятий ОПК

Анализ уровня автоматизации рабочих мест (АРМ) показывает, что уровень оснащенности управленческого и инженерно-технического персонала предприятий ОПК качественно меняется в сторону увеличения использования специализированных автоматизированных рабочих мест. На 100 служащих из числа инженерно-технического и управленческого персонала в среднем приходится свыше 80 персональных компьютеров и автоматизированных рабочих мест.

Больше всего автоматизированных рабочих мест использовалось в авиационной промышленности. В настоящее время в этой отрасли действует около 200 тысяч специализированных АРМ. На предприятиях судостроения действуют свыше 64 тысяч АРМ, из которых более 26 тысяч (40%) в

ОАО «Адмиралтейские верфи». На этом предприятии используется интегрированная информационная система «Адмирал» собственной разработки, объединяющая свыше 1300 компьютеров, на каждом из которых функционирует несколько различных АРМ. В отраслях электроники, радиоэлектроники и связи число АРМ превышает 68 тыс. (рисунок 4.3.1) [11].

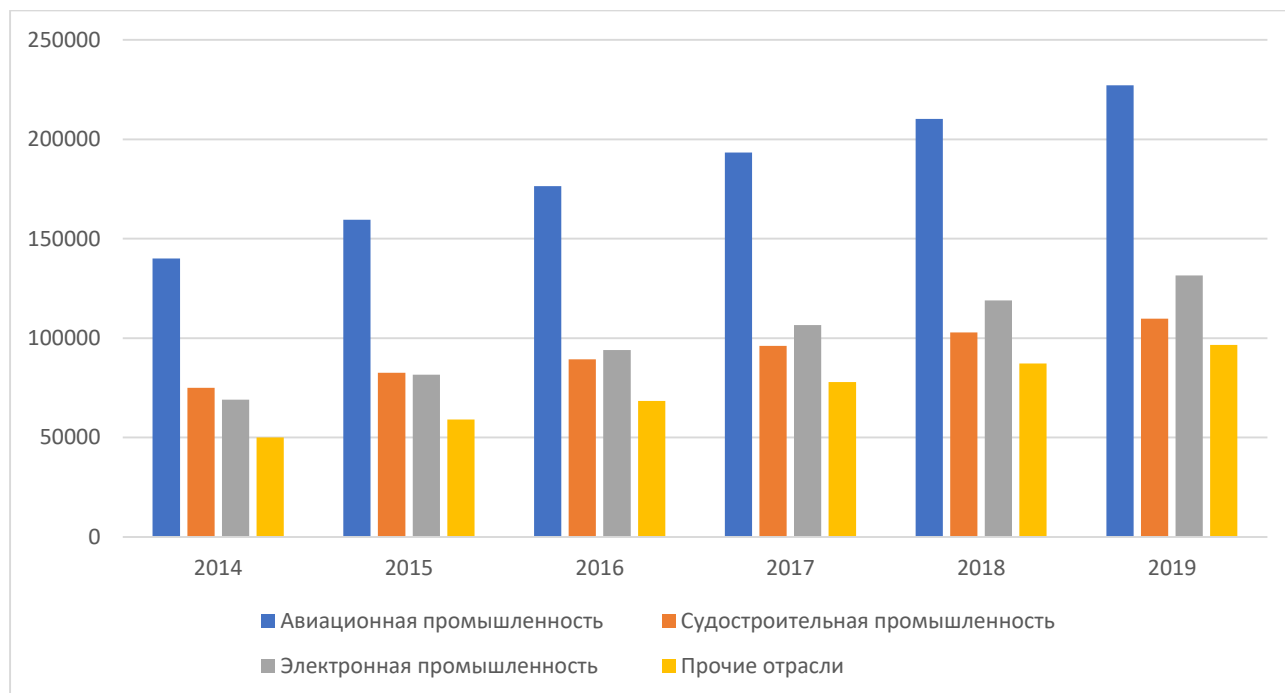


Рисунок 4.3.1 - Количество автоматизированных рабочих мест в отраслях

В 2017-2019 годах передовые российские компании успешно реализовывали пилотные проекты по внедрению цифровых технологий, разрабатывали программы цифровизации предприятий. Вместе с тем остаются не решенными такие вопросы управления программой цифровой трансформации, как выбор цифровых решений для инвестирования в условиях ограниченных финансовых ресурсов на эти цели, оценке влияния новых технологий на операционную эффективность и расчета сроков их окупаемости, определение плана перехода от точечных пилотных проектов по цифровизации предприятия к масштабной программе цифровизации.

Таким образом, в настоящее время крупные российские промышленные предприятия осуществляют цифровую трансформацию, но большинство из них не имеют комплексных программ цифровизации. Они реализуют фактически

пакеты пилотных проектов по внедрению цифровых технологий и не имеют долгосрочного плана действий по цифровой трансформации предприятия. Такой подход приводит к ориентации действий на второстепенные задачи, не связанные с решением бизнес-задач предприятия, и соответственно к распылению ресурсов, что формирует проблемы для устойчивого развития промышленных отраслей в условиях цифровой экономики.

4.4. Цифровые технологии инструменты промышленных предприятий

В настоящее время существует достаточно широкий ряд инструментов цифровизации высокотехнологичных промышленных предприятий ОПК, решающих задачи управления предприятием и управления технологическими процессами. Ключевые инструменты цифровой трансформации промышленных предприятий представлены на рисунке 4.4.1. Они включают в себя инструменты планирования процессов производства, инструменты проектирования производства, инструменты управления производством, а также средства мониторинга, моделирования материальных потоков и логистики и маркетинга.

Влияние использования инструментов и технологий цифровой трансформации предприятия на финансовые показатели промышленного предприятия подробно рассмотрены в работе [12].

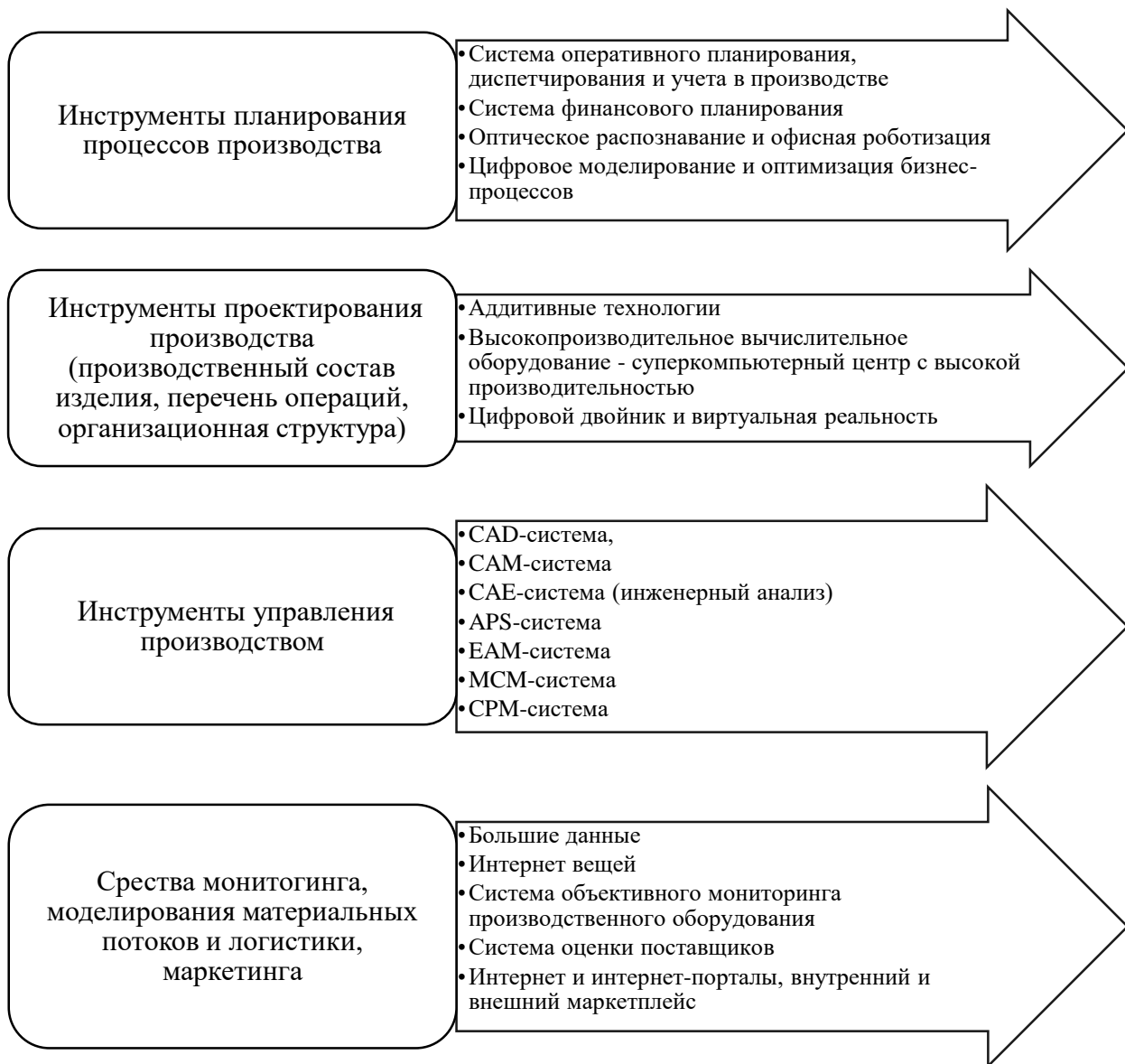


Рисунок 4.4.1 - Цифровые инструменты промышленных предприятий

Так, например, технология оптического распознавания и цифровизации документооборота компании способна заменить человека при приеме, анализе и проверке документов. Она имеет наибольший потенциал использования на предприятиях, где имеется большое количество разнообразных бумажных документов, которые необходимо оцифровать и направить в электронном виде лицам, принимающим решения на основании этих документов, а также для автоматизации учетных операций. Цифровизация документооборота промышленного предприятия позволяет уменьшить срок выполнения однообразных и многочисленных операций, что способствует повышению

операционной эффективности благодаря снижению расходов на заработную плату персонала промышленного предприятия, а также благодаря снижению операционных рисков деятельности на предприятии.

Скорость и качество обработки данных с применением цифровых технологий безусловно повышает эффективность работы промышленных предприятий. Осуществляется разработка долгосрочных прогнозов развития, на основании которых планируется деятельность промышленных предприятий. При этом могут использоваться методы статистического моделирования и интеллектуальной обработки массивов больших данных.

4.5. Исследование факторов цифровой трансформации предприятия, влияющих на себестоимость продукции промышленных предприятий

Эффективность внедрения цифровых технологий заключается в сокращении затраты рабочего времени персонала предприятия и недопущению возникновения различного вида ошибок, свойственных человеку.

Результатом деятельности промышленного предприятия является выпуск продукции. Прирост или уменьшение объемов производства приводит к соответствующему изменению условно-постоянных и условно-переменных затрат предприятия. При этом условно-переменные затраты предприятия должны сильнее изменяться, чем условно-постоянные.

Тенденция роста выпуска сохраняется во всех отраслях промышленности (рисунок 4.5.1), причем наибольший темп роста наблюдается в промышленности боеприпасов и спецхимии, который составил 133,9% в целом по предприятиям и 133,02% по военной (оборонной) продукции. Наименьший рост выпуска в целом по предприятиям наблюдается у авиационной промышленности, а по военной (оборонной) продукции у судостроительной промышленности – 101,08%. Стоит также отметить рост в выпуске по военной (оборонной) продукции у предприятий радиоэлектронной промышленности – 129,27% и предприятий промышленности обычных вооружений – 112,97%.

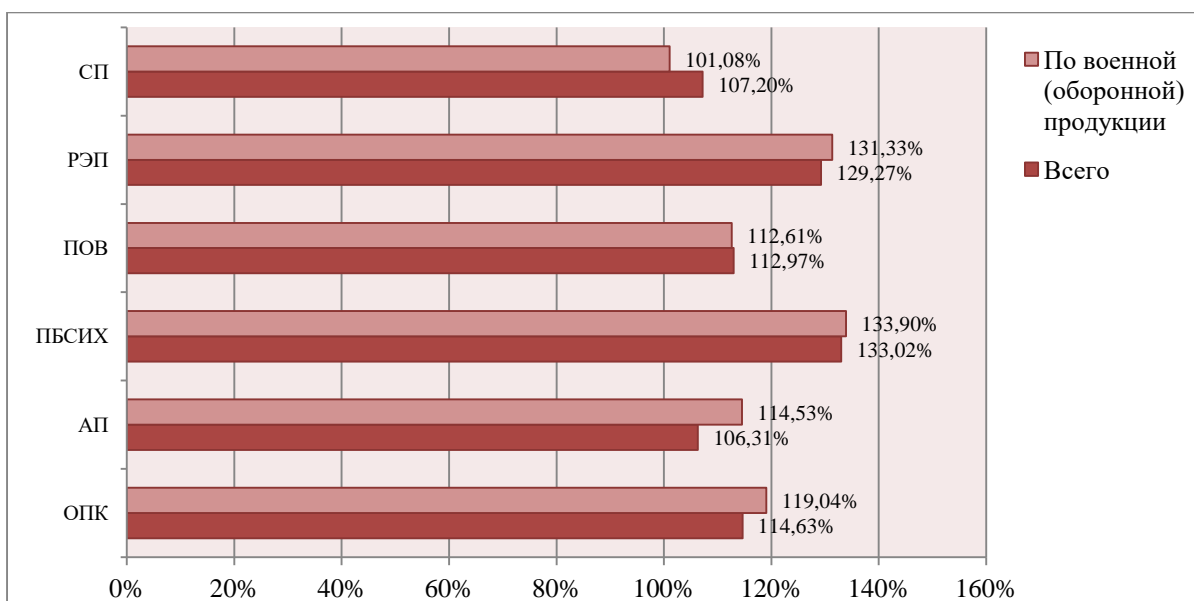


Рисунок 4.5.1 - Темпы роста выпуска продукции по организациям ОПК за 2015 – 2020 гг.

Для эффективного управления затратами по всем стадиям жизненного цикла продукции используются цифровые аналитические системы, формируемые для этих целей. Важно учитывать, как изменяются затраты при изменении объемов производства, привлекая на помощь цифровые технологии.

4.6. Использование цифровых технологий при формировании кооперационных связей промышленных предприятий

Необходимо отметить, что совершенствование механизма государственного регулирования себестоимости по договорам между головными исполнителями (исполнителями) и соисполнителями различных уровней кооперации работ должно быть направлено на стимулирование развития таких отношений.

Существуют ряд проблем, не способствующих развитию кооперационных связей. В частности:

- анализ предложений поставщиков, обоснование их выбора и согласование необходимых документов занимает длительное время;
- период от объявления конкурса до заключения контракта имеет достаточно большую протяженность во времени (от 3 до 10 месяцев);

- финансирование (авансы и конечная оплата) по госконтракту идет с существенным опозданием по сравнению с производственным процессом поставщика;

- проблема несвоевременного финансирования вызывает следующую проблему – привлечение заемных средств поставщиками (проценты по которым не компенсируются), если с их стороны принимается решение работать в рамках государственного контракта, что в свою очередь снижает экономическую эффективность контракта для поставщика, либо вообще возможен отказ от его заключения;

- сложное документальное и учетно-аналитическое сопровождение контракта (подготовка пакета документов для участия в конкурсных процедурах, ведение отдельного учета финансовых результатов, необходимость обоснования затрат и подтверждения их целесообразности для включения в себестоимость продукции и др.;

- обязательное наличие (получение) уведомления об исполнении государственного контракта от государственного заказчика уполномоченным банком и только после этой процедуры возможность распоряжаться полученными денежными средствами по окончании выполнения контракта;

- другие.

В условиях неопределенности, характерных для рыночной экономики, мало определить исполнителя, исходя исключительно из соотношения стоимости, качества и условий поставки продукции, необходимо также, как отмечалось, своевременно учесть возможные риски невыполнения исполнителем своих обязательств [13].

Задача разработки методики оценки рисков кооперации промышленных предприятий заключается в разработке процедуры, которая полностью обеспечивала бы регулярный последовательный процесс идентификации всевозможных рисков кооперации, оценку общих и частных показателей, а также определяла порядок их регулярного мониторинга. Риски могут быть определены

экспертами аналитическим путем при наличии соответствующей статистической базы по рискам и их последствиям [14].

В качестве примера использования цифровых технологий для формирования производственной кооперации представим интегрированную систему управления предприятием «Галактика» (рисунок 4.6.1).

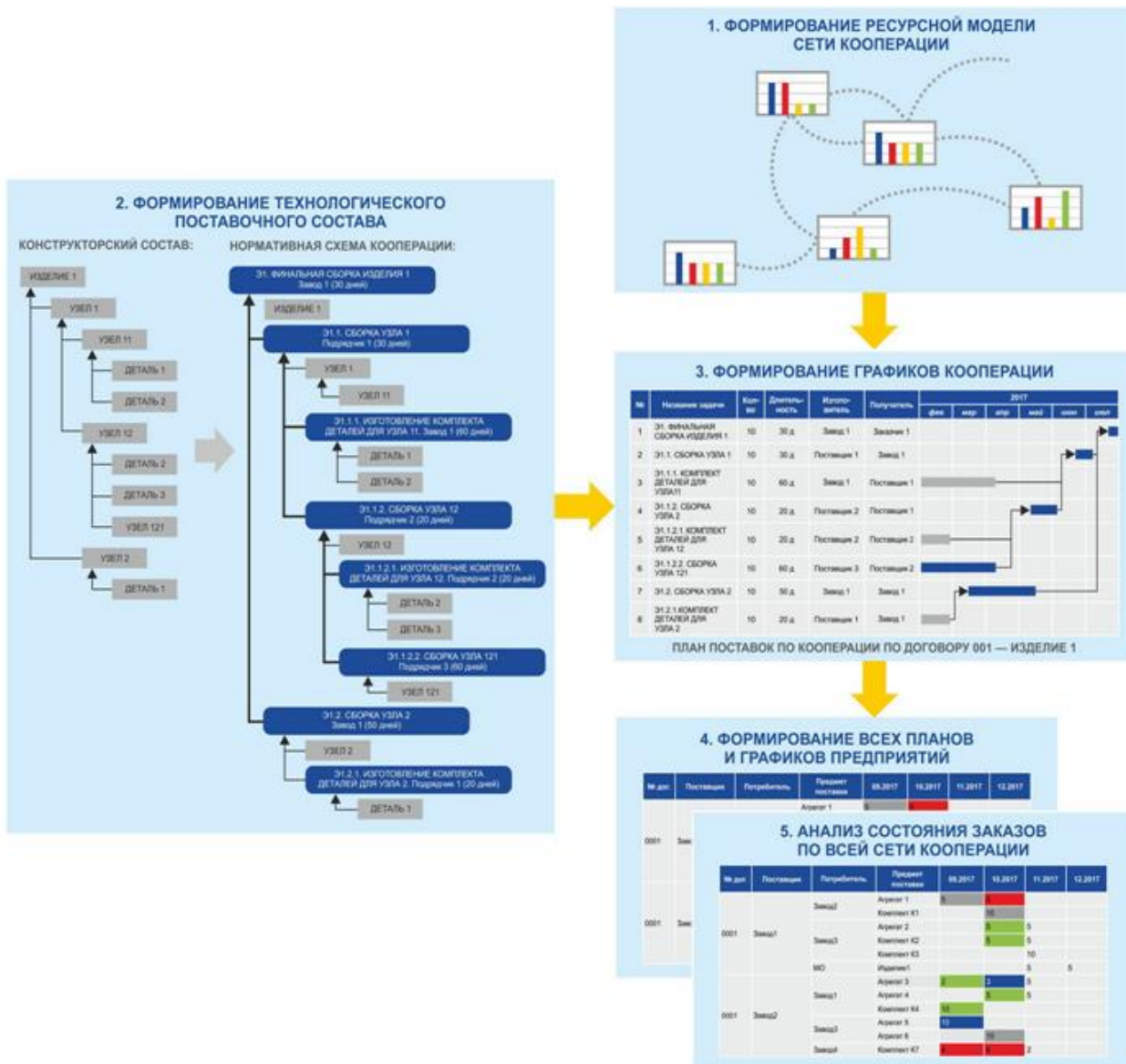


Рисунок 4.6.1 – Формирование кооперации в системе «Галактика», [15]

Предложенная автоматизированная система формирования производственной кооперации позволяет принимать качественные управленческие решения по выбору контрагентов промышленного предприятия, сократить число ошибок, вызванных «человеческим фактором», а также

высвободить время специалистов на решение других производственных задач, которые не поддаются цифровизации.

4.7. Цифровизация промышленных предприятий и диверсификация производства

В связи со снижением объемов государственного оборонного заказа Президентом Российской Федерации поставлена задача диверсификации предприятий ОПК, заключающаяся в увеличении доли гражданской продукции и продукции двойного назначения высокотехнологичных предприятий ОПК к 2025 году до 30 % и к 2030 году до 50 %. Одновременно создаются правовые механизмы защиты продукции российских предприятий ОПК на внутреннем рынке, а также создающие преференции на внешних рынках. Однако только создание механизмов государственной поддержки гражданской продукции, выпускаемой предприятиями ОПК, не позволит им обеспечить конкурентоспособность этой продукции. Для достижения поставленных целей необходимым условием является активное научно-технологическое развитие и, в частности, внедрение цифровых технологий на предприятиях ОПК.

В настоящее время растет инновационная составляющая продукции высокотехнологичных предприятий ОПК, на долю которых сегодня приходится более 70% наукоемкой продукции страны, в ОПК работают более 50% научных работников нашего государства. Качество продукции и высокие эксплуатационные характеристики вооружения, военной и специальной техники свидетельствуют о высоком уровне управления предприятиями. Предприятия ОПК фактически являются двигателем научно-технологического прогресса, поскольку на них сегодня активнее чем на других используются высокие технологии [16].

Функциональная структура автоматизированных рабочих мест (АРМ) в информационных системах ОПК представлена на рисунке 4.7.1.

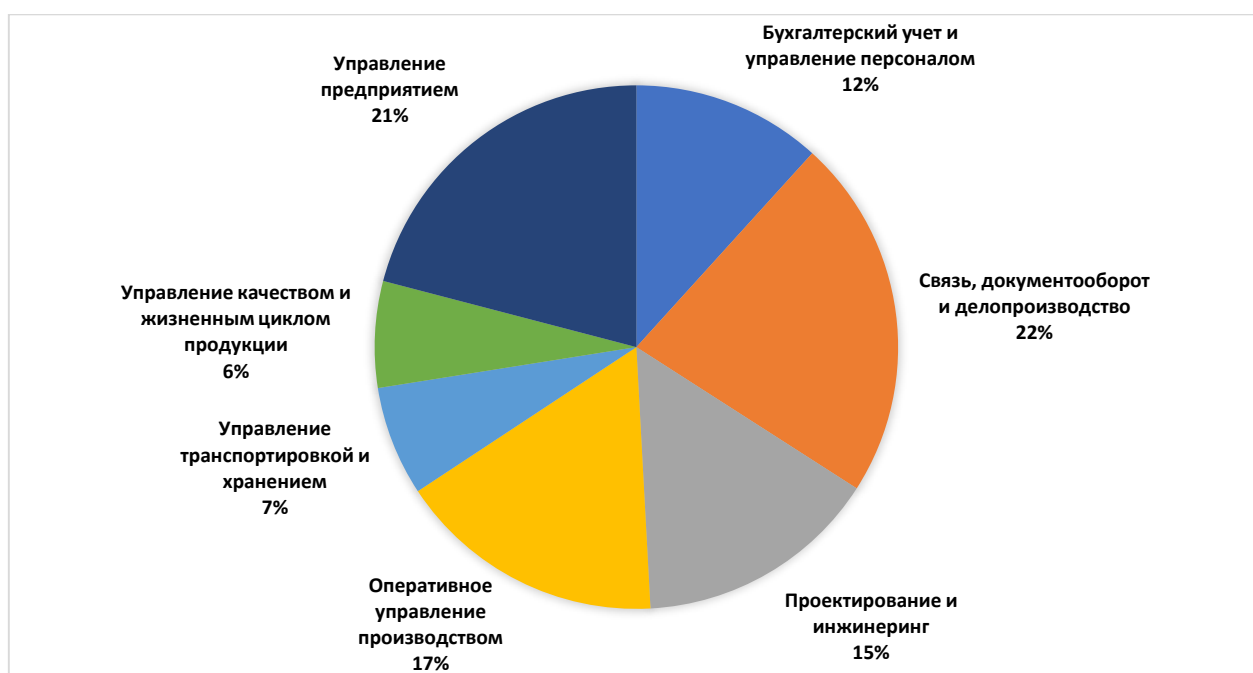


Рисунок 4.7.1 – Функциональная структура автоматизированных рабочих мест в информационных системах ОПК, [17]

В программе «Цифровая экономика» большинство из пяти её разделов связаны с формированием компетенций и научно-технологических заделов для выпуска конкурентоспособной продукции, а также с формированием информационной инфраструктуры, являющейся ключевым фактором производства.

В настоящее время необходимо постоянно развивать механизмы, стимулирующие предприятия ОПК создавать новые продукты на основе новых и перспективных технологий. Опытно-конструкторские работы «финансируются лишь на 3-4 года вперёд, что заставляет производителя или конструктора перестраховываться и создавать технику на основе существующих технологий» [18].

Цифровая экономика связана прежде всего с долгосрочным научно-технологическим прогнозированием, осуществляемым на 10-15 лет вперед. В связи с этим необходимо разделение источников финансирования создания конкретных образцов продукции и создания научно-технологического задела перспективных и прорывных технологий. Поэтому в условиях цифровой

трансформации экономики сегодня необходимо сфокусироваться на создании цифровых платформ, которые обеспечивают взаимодействие предприятия с его партнерами, поставщиками, подрядчиками и способствуют разработке новых перспективных технологий для выпуска конкурентоспособной продукции гражданского и двойного назначения.

Одной из таких платформ, выступающей местом сбора гражданских проектов предприятий ОПК, является ГИС Промышленности (ГИСП), которая является одним из ключевых элементов формирующейся сегодня цифровой экосистемы российской промышленности. Эта система позволяет в реальном режиме времени отслеживать технологические цепочки между предприятиями, облегчает поиск потребителей и производителей, содержит интерактивные каталоги высокотехнологичной продукции (в каталог вошли 9,5 тысяч наименований высокотехнологичной продукции гражданского и двойного назначения), а также включает в себя электронные торговые площадки (с объемом электронных сделок более 1,2 трлн. рублей в год). Единая национальная цифровая платформа безусловно содействует реализации программы диверсификации в ОПК [19].

В настоящее время в соответствии с поручениями Минпромторга России ФГУП «ВНИИ «Центр» решает задачи выявления оборонных производств, которые можно использовать для выпуска высокотехнологичной продукции гражданского и двойного назначения с использованием цифровых технологий. Создание такой цифровой сервис-платформы будет способствовать масштабной диверсификации производства, сокращению недозагрузки оборудования и сохранению производственного и кадрового потенциала предприятий ОПК [20].

При цифровой трансформации экономики существенным образом меняется бизнес компании, особенно в плане его интеграции с гражданской сферой экономики. В качестве примера успешной диверсификации можно привести новую технологию компании Роскосмоса – АО «Терра Тех» (входит в состав АО «Российские космические системы»), касающуюся дистанционного

зондирования земли. Космические снимки размещаются в цифровом облачном хранилище и образуют фактически новый сервис – «цифровой двойник» Земли для регистрирующих, надзорных и контролирующих служб государства, которые благодаря новым возможностям смогут оптимизировать свою работу, а АО «Терра Тех» получить дополнительные доходы. По этим снимкам в гражданских целях, например, можно выявлять неучтённые объекты капитального строительства, факты незаконной вырубке леса и др. При развитии таких технологий будут задействованы оптические производства предприятий ОПК, закупаться электронная компонентная база, создаваться новые изделия для этого рынка, что повысит диверсификацию предприятий оборонно-промышленного комплекса.

Цифровизация промышленных предприятий меняет стиль управления производством и сбытом продукции. Покупатель гражданской продукции, используя цифровые технологии, может оставить свои предпочтения и потребности в цифровой среде, что не так просто осуществить для потребителей военной продукции. В результате этого производитель гражданской продукции может изменить свойства и параметры выпускаемых продуктов гражданского назначения, обеспечивая тем самым их конкурентоспособность и увеличение объёма выпуска.

Таким образом, можно констатировать, что процессы развития цифровизации и диверсификации оборонных предприятий, которые неразрывно связаны между собой, требуют последовательного решения основных проблем в сфере нормативно-правового регулирования, концентрации ресурсов государственной поддержки технологического обеспечения внедрения инновационных разработок, подготовки и развития кадрового потенциала организаций ОПК. О конкретных механизмах решения этих проблем речь пойдет в следующих выпусках издания.

4.8. Проблемы кадрового обеспечения цифровой трансформации промышленных предприятий

Для полномасштабной цифровой трансформации на промышленных предприятиях не хватает компетентных специалистов, обладающих необходимыми навыками и компетенциями в IT-технологиях. Отмечается дефицит кадров по всем основным направлениям цифровизации предприятий. Предприятиям необходимо использовать гибкие формы занятости, а также заниматься подготовкой и переподготовкой своих кадров [20].

В условиях формирования цифровой экономики изменение структуры рабочего процесса по скорости опережает происходящие изменения в содержании и методологии освоения профессий и обучении. Поэтому образовательному сообществу необходимо понимать это и искать оперативные и адекватные способы решения возникающих проблем и задач.

Среди барьеров во внедрении цифровой экономики несоответствие стратегии развития человеческого капитала стратегии инновационного развития занимает третье место (рисунок 4.8.1).

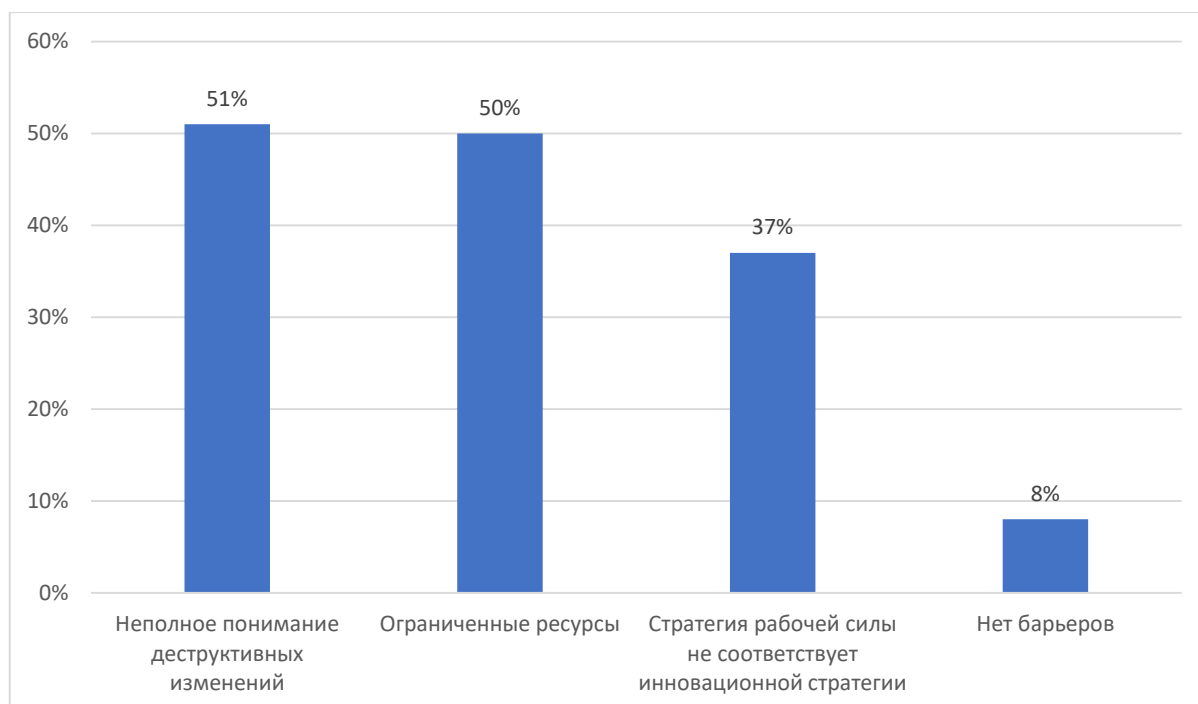


Рисунок 4.8.1 – Барьеры в цифровой экономике

Цифровые технологии меняют рынок труда. Так искусственный интеллект приводит к высвобождению неквалифицированной рабочей силы, но при этом позволяет расширить фронт работ и сформировать потребность в новых кадрах более квалифицированных, умеющих работать в цифровой среде. При этом специалисты должны будут обладать знаниями на стыке этих областей.

Дефицит квалифицированных специалистов с навыками и знаниями в цифровой сфере является серьезной проблемой, которая тормозит реализацию проектов цифровой трансформации компаний. Так для более 60% респондентов в мире и 56% в России отсутствие специалистов необходимой квалификации является серьезным барьером (рисунок 4.8.2).



Источник: PwC — «Всемирное исследование Digital IQ за 2017 г.»

Рисунок 4.8.2 – Барьеры реализации программ цифровой трансформации

Проблема заключается также и в том, что руководители надеются найти работников с навыками и квалификацией, которые нужны им не только сегодня, но и будут востребованы в будущем. Это фактически идеальный сотрудник и их надо не искать на стороне, а создавать и развивать на предприятии с помощью специальных тренингов и программ развития, творческой среды и корпоративной культуры в организации, а также управления результативностью

сотрудников. В связи с этим возрастает роль и важность для предприятий корпоративной культуры.

Исследования показали, что помимо требований к цифровым навыкам работников руководители предъявляют высокие требования к таким личностным качествам сотрудников, как творческий подход к решению задач, способность адаптироваться, а также решать сложные проблемы, и, конечно, лидерские качества. Т.е. ценится симбиоз технологической подготовки специалистов с организаторскими и личностными их способностями.

В условиях цифровой экономики особую ценность приобретают навыки сотрудников, которые не могут быть повторены машинами. Это как правило навыки, связанные с продвижением инновации.

Главное направление развития требований к специалистам в условиях цифровой экономики заключается в уходе от общепринятых в настоящее время стандартов. Уже становятся менее значимыми навыки, связанные с четким выполнением однотипных операций, строгое исполнение правил и инструкций.

Увеличение объемов работы с большими данными в условиях цифровой трансформации стимулируют спрос на специалистов с цифровыми навыками и аналитическим мышлением.

Требуемые цифровой экономикой компетенции будущего представлены на рисунке 4.8.3.



Рисунок 4.8.3 – Требуемые цифровой экономикой компетенции будущего

Компании, которые вкладывали существенные средства в человеческий капитал, в навыки и компетенции своих сотрудников, будут конкурентоспособными на российском и мировом рынках выпускаемой продукции.

Выполнение указанных требований к трудовым ресурсам позволит промышленному предприятию повысить производительности труда, обеспечить эффективную занятость и кадровую поддержку инновационных процессов, что безусловно будет способствовать повышению экономической эффективности предприятия.

Список использованной литературы

1. Авдонин Б.Н. и др. Экономические стратегии развития предприятий радиоэлектронной промышленности в посткризисный период – М.: Креативная экономика, 2011 – 511 с.
2. Пухальский А.Н. и др. Формирование механизма устойчивого развития предприятия // Мир экономики и управления - 2012.-№2.-С. 35-47.
3. Clark С. The Conditions of Economic Progress. — London : Macmillan, 1940.
4. Глазьев С.Ю., Львов Д.С., Фетисов Г.Г. Эволюция технико-экономических систем: возможности и границы централизованного регулирования. — М.: Наука, 1992. — 207 с.
5. Авдокушин Е. Ф. «Новая экономика»: сущность и структура // Экон. Теория на пороге XXI века — 5. Неэкономика / Под ред. Ю. М. Осипова и др., — М., Юристь,- 2001. — 624 с.
6. Агеев А.И., Смирнова В.А. Адаптивность высокотехнологичного комплекса к цифровым вызовам // Экономические стратегии.- 2018. -Т. 20.- № 1 (154). – С. 164-166.
7. Цифровая экономика: 2020: краткий статистический сборник / Г.И. Абдрахманова, К.О. Вишневский, Л.М. Гохберг и др.; Нац. исслед. ун-т «Высшая школа экономики». – М.: НИУ ВШЭ, 2020. – 112 с.
8. Голубев С.С., Чеботарев С.С. Информационные технологии как ключевой механизм устойчивого развития оборонных промышленных предприятий в современных условиях // Экономические стратегии - 2018.- Т. 20.- № 3 (153) - С. 68-81.
9. Портер Майкл, Хаппельманн Джеймс Революция в производстве // Цифровизация производства. Сборник статей. - Harvard Business Review – Россия, 2017.[Электронный ресурс].URL:<https://www.hbr-r.ru/original-17n2/pdf> (дата обращения: 06.08.2020).

10. Бачило И.Л. Цифровизация управления и экономики - задача общегосударственная // Государство и право. - 2018. - № 2. - С.59-69.

11. Тарабрин К.А. От точечных ИТ-решений к прорыву – созданию «умных фабрик» в ОПК // Connect – 2017 - №4, – с.3-15.

12. Голубев С.С., Щербаков А.Г. Влияние информационных технологий на деятельность оборонных промышленных предприятий России // Вестник Московского государственного областного университета. Серия: Экономика.- 2018.- № 3. - С. 55-68.

13. Доронин С.Н. Госзакупки: законодательная основа, механизмы реализации, риск-ориентированная технология управления / Доронин С.Н., Рыхтикова Н.А., Васильев А.О. – М.: Форум, 2012. – 231 с.

14. Военно-промышленный комплекс США: управление, организация конкуренции, научно-исследовательская деятельность. Монография. Коллектив авторов. Под общей редакцией д.т.н. Д.О. Рогозина. – ЦНИИ ВВКО, Москва, 2018. – 74 с.

15. Лямшев Д. Цифровые модели управления кооперационным производством. Истоки возникновения и возможности развития // Деловой портал «Управление производством». – 2020 - URL: http://www.up-pro.ru/print/library/information_systems/management/cyfrovye-modeli-proizvodstvo.html. Дата обращения 12.01.2021.

16. Волков В.И., Голубев С.С., Щербаков А.Г. Цифровая трансформация как новый формат инновационно-технологической политики, реализуемой на предприятиях ОПК // Научный вестник оборонно-промышленного комплекса России. -2018. -№ 3.- С. 22-31.

17. Киселев В.Д., Рязанцев О.Н., Данилкин Ф.А., Губинский А.М. Информационные технологии в оборонно-промышленных комплексах России и стран НАТО – М.: Знание, 2017.-256 с.

18. Довгучиц С.И., Мушков А.Ю. Единое информационное пространство оборонно-промышленного комплекса. результаты работ по его формированию // Научный вестник ОПК России.- 2018.- № 2. – С. 5-9.

19. Волков В.И. Диверсификация и цифровизация в их взаимосвязи – важнейшие факторы в становлении инновационного облика российской экономики // Научный вестник ОПК России, 2020 -, №2.- С.27-37.

20. Golubev S.S., Volkov V.I., Shcherbakov A.G., Sekerin V.D., Gorokhova A.E. Manpower support for digital technology implementation processes in industrial enterprises // International Journal of Engineering and Advanced Technology .- 2019.- Т. 8. -№ 3.- С. 414-420.

Глава 5. Управление рисками цифровой трансформации промышленного предприятия

5.1. Введение и постановка проблемы

Внедрение масштабных изменений, сопровождающих цифровую трансформацию, связано с необходимостью управления разнообразными рисками, в том числе специфическими и отраслевыми. По мнению целого ряда исследователей, значительная часть потенциальных издержек связана с организационным сопротивлением, обуславливающим возможное снижение продуктивности сотрудников, задержки по срокам исполнения задач и даже саботаж внедряемых изменений [1, 2]. Не менее значимым оказывается изменчивость внешней среды: технологий, ожиданий потребителей, действий регуляторов, также влияющих на ход трансформации промышленного предприятия. При этом риск-менеджмент затрагивает операционно-тактический и стратегический уровни управления, а значит, понимание его роли в цифровой трансформации должно быть достигнуто еще на ранних этапах планирования преобразований.

Кроме уже отмеченных внутренних и внешних факторов противодействия изменениям ключевой сложностью риск-менеджмента в цифровой трансформации промышленности является возрастающая неопределенность конкурентной среды. Речь идет об ускорении и десинхронизации циклов изменений влияния конкурентных сил – возможностей поставщиков, спроса и власти потребителей, уровня конкуренции на каждом рынке сбыта, изменений в доступности и возможностях инновационных методологий преобразований.

Следует принять, что риск-менеджмент является частью активного бизнес-планирования на стратегическом уровне, а значит, постановка процесса регулярного мониторинга и управления рисками должна происходить параллельно с началом цикла бизнес-планирования и стратегического целеполагания. При применении процессного подхода в качестве объектов риска

выделяются «процессы разработки и реализации стратегических планов, от качества которых, в первую очередь, зависят сбалансированность и реалистичность стратегического плана, а также уровень риска скрытых ошибок» [3]. Частью актуальной модели риск-менеджмента является предотвращение подмены в целеполагании и последовательное сохранение акцента в стратегическом планировании цифровой трансформации на экономических параметрах – росте стоимости компании, увеличении прибыли и оборота и т.п. Рассматриваемая модель управления стратегическими рисками направлена на «минимизацию вероятности недостижения поставленных целей и задач, а также минимизацию потери части доходов и капитала, клиентской базы, рыночной ниши, снижения темпов развития или ухудшение репутации промышленного предприятия» [3].

Эффективное управление своевременными рисками изменений – это конкурентное преимущество и новая конкурентная сила в значительной части отраслей «новой экономики» [4]. Это справедливо и для наукоемких промышленных производств, создающих продукцию с высокой добавленной стоимостью и низкой зависимостью от ресурсного обеспечения (например, органического сырья, металлов, энергии).

Следует отметить, что постановка процесса риск-менеджмента при планировании цифровизации на промышленном предприятии тесно связана с оценкой бюджета всей трансформации. С одной стороны, такое бюджетирование – это элемент инвестирования, реализующего ключевую функцию внедрения инноваций [5]. С другой стороны, создание стратегии развития опирается на оценку текущих возможностей предприятия – финансовых, ресурсных, интеллектуальных. Сравнение возможностей компании с бюджетом трансформации позволяет провести разумное планирование, деление на итерации, ранний поиск средств для заимствования и, возможно, указывает на необходимость экономических интеграций для реализации новых конкурентных возможностей, получаемых в цифровой трансформации [5].

Практики риск-менеджмента подразумевают создание сложной системы финансовых резервов – достаточных для уменьшения негативного влияния реализовавшихся рисков и ликвидных для согласования таких резервов с финансовой политикой предприятия. Следует отметить еще одну ключевую особенность – границы цифровой трансформации подвижны, а эффективность применяемых технологий недерминирована, что означает необходимость поддержания «гибкости» в управлении рисками и соответствующими финансовыми резервами.

Основной проблемой, решение которой рассматривается в данной главе, является уменьшение степени неопределенности в бизнес-планировании цифровой трансформации промышленного предприятия и подбор адекватных методов управления разнообразными рисками – как внутренними (прежде всего, организационным сопротивлением), так и внешней среды (прежде всего, связанные с экономической целесообразностью трансформации). Предлагаемые подходы к комплексному управлению соответствующими рисками цифровой трансформации охватывают как этап планирования трансформации, так и ее непосредственную реализацию в виде набора связанных проектов (программ проектов). Типичный алгоритм проведения цифровой трансформации промышленного предприятия, представленный в данной главе, подразумевает управление рисками на всех этапах – от оценки готовности предприятия к цифровизации к операционным моделям риск-менеджмента отдельных программ проектов.

5.2. Роль активного риск-менеджмента в цифровой трансформации

Анализ проблемы снижения факторов неопределенности при цифровой трансформации промышленного предприятия охватывает несколько связанных областей. Стратегическое планирование в этом контексте подразумевает в своем составе две группы работ:

– формализацию и оценку рисков, разработку планов управления и выделение резервов для риск-менеджмента;

– определение влияния резервов по рискам на бюджетирование цифровой трансформации (как на этапе планирования, так и в будущем – при исполнении бюджета).

Начальная формализация и оценка рисков осуществляется с помощью метода изложенного в [3] и включает в себя:

1) выявление факторов, которые затрудняют определение стратегических целей организации в рамках цифровой трансформации;

2) ранжирование факторов по двум параметрам: уровень разрушительных последствий и вероятность реализации риска;

3) разработка планов управления: мер и организационных мероприятий для ограничения влияния и уменьшения вероятности реализации выявленных факторов;

4) проведение взвешенного анализа разработанного бизнес-плана цифровой трансформации и представление по его результатов топ-менеджменту компании.

Следует отметить, что данная группа работ подразумевает целенаправленное ограничение рисков в самом процессе стратегического планирования цифровой трансформации, а именно: разделение функций разработки стратегии и функции проведения ее финального анализа (экспертизы) на наличие ошибок между разными, независимыми друг от друга группами специалистов в компании.

Не менее важно использование финансовых резервов в управлении рисками. С одной стороны, трата финансовых резервов – это естественная реакция при реализации рисков, позволяющая не снижать темпов проведения преобразований, не менять целей, не соглашаться на дополнительные итерации. С другой стороны – резервирование влияет на общие процессы бюджетирования – это не просто введение дополнительных коэффициентов на

статьи расходов. Прежде всего, это построение сложной системы ликвидности резервов, вводимых «в бой» по формализованному процессу.

Обобщающим элементом в управлении исполнением риск-менеджмента, бюджетирования и, в целом, процесса цифровой трансформации, как масштабного изменения, является метод потоков денежных средств [6]. Для рисков – это универсальный способ использования резервов при реализации негативных последствий. Для осуществления трансформации – метод корректировки бюджетов и смещения тактических акцентов в какой-либо итерации цифровой трансформации. Метод потоков денежных средств позволяет представить процесс цифровой трансформации, как еще одну совокупность подсистем: управляющей и управляемой (рисунок 5.2.1). Промышленное предприятие (ПП) управляется его менеджментом с помощью бюджетирования и постоянного мониторинга эффективности затрачиваемых средств. В рамках итераций цифровой трансформации это позволяет построить «гибкое» управление процессом на базе анализа достигаемых промежуточных результатов. У данного метода есть определенные ограничения, присущие компаниям из «новой» экономики, однако, для промышленных предприятий метод корректен.

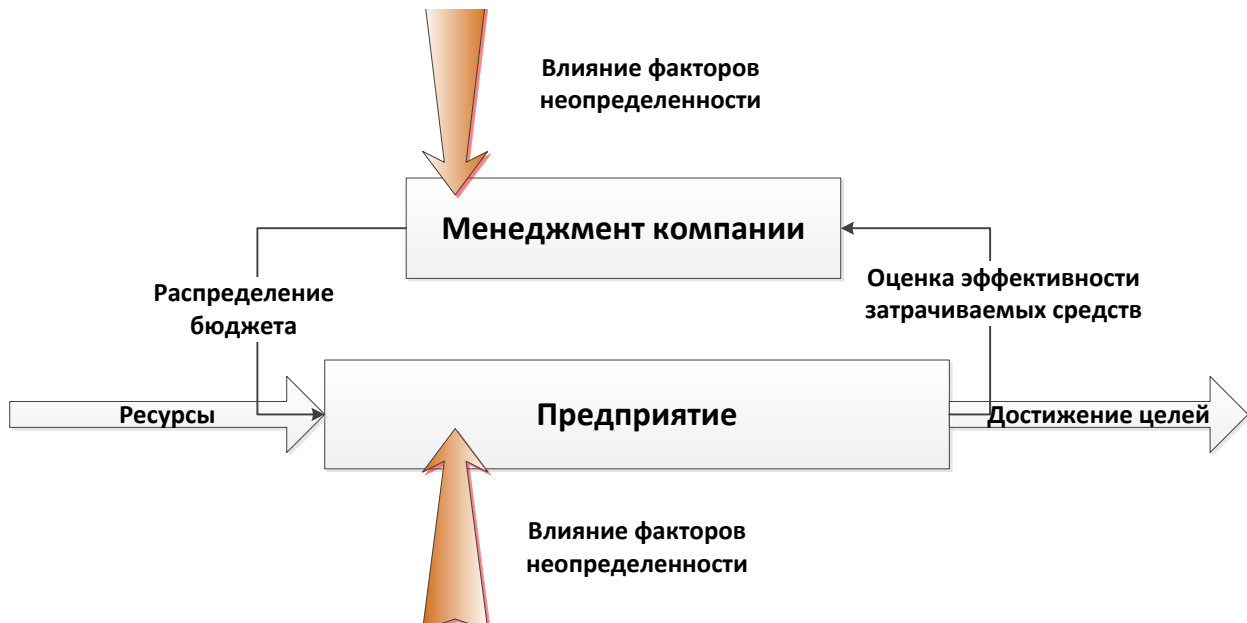


Рисунок 5.2.1 – Управление изменениями на предприятии, как системой управления денежными потоками с обратной связью

Более того, управление корректировками бюджета цифровой трансформации, финансовыми резервами по рискам и общей инвестиционной стратегией может быть также реализовано с помощью данного метода.

Рассмотрим практические подходы к верхнеуровневому риск-менеджменту и управлению соответствующими финансовыми резервами при проведении цифровой трансформации на ПП. При этом полученные статьи бюджета и финансовые резервы должны стать составной частью модели управления денежными потоками при осуществлении программ проектов цифровизации.

Управление рисками в течение создания бизнес-плана продолжается их детальной идентификацией, классификацией и оценкой приоритетов. В качестве результирующего документа следует предложить реестр рисков, содержащий, как правило:

1. Группу и название риска.
2. Приоритет.
3. Оценку ущерба при реализации риска (как правило, цифру или функцию от времени).

Группирование рисков возможно выполнить по различным объединяющим признакам: объект ущерба, характер риска и даже этап проекта, когда он станет наиболее актуальным. В случае программ проектов цифровой трансформации могут быть предложены следующие группы:

1. Возможность выполнения бизнес-стратегии.
2. Финансовые и экономические риски.
3. Технологические риски.
4. Риски команд управления изменениями.
5. Риски организационного сопротивления.

В зависимости от отрасли и деталей цифровой трансформации также возможно выделение регуляторных, экологических, социальных рисков.

Следующий шаг – это определение приоритетов и ранжирование рисков внутри группы. Очевидно, что чем выше вероятность реализации риска и сопутствующий потенциальный ущерб, тем выше данный риск в ранжировании. Определение потенциального ущерба возможно выполнить в виде простого произведения вероятности реализации риска (в процентах) на размер ущерба бизнесу (максимального, ожидаемого, минимального при управлении риском). В более сложных моделях риск-менеджмента ущерб может быть определен в виде функции от времени, такой подход показывает ежедневные потери при игнорировании наступившего риска.

Далее реестр рисков должен быть дополнен соответствующими элементами управления:

- планом реагирования (смягчения);
- аварийным планом;
- резервами.

Для каждого риска необходимо формализовать план реагирования на риск – набор организационных мер по уменьшению потенциального ущерба и \ или вероятности реализации риска.

Для рисков с высоким приоритетом также необходимо разработать и подготовить к выполнению аварийные планы – управляющие воздействия, направленные на минимизацию реального ущерба бизнесу после реализации риска. В случае цифровой трансформации с ее значительными инвестициями для таких рисков должны быть предусмотрены резервы – денежные средства в ликвидной форме, которые будут тратиться в течение реализации аварийного плана на поддержку заданного темпа (график, команды, усилия) цифровизации предприятия.

Особенное место в данном реестре рисков занимают риски, чья реализация напрямую затрудняет или вовсе останавливает цифровую трансформацию, не позволяя реализовать сам стратегический бизнес-план развития ПП. Данный раздел следует создавать первым, не уклоняясь от подбора адекватных планов реагирования и смягчения негативных последствий в случае реализации риска. Характер таких рисков напрямую зависит от выбранного метода стратегического планирования и типа планирования [7]:

– метод RDS (Resource Driving Strategy) – стратегия, основанная на ресурсах, в которой цели, задачи и финансовые ограничения напрямую связаны с собственными ресурсами и известными (плановыми) источниками финансирования. Чаще всего в такой стратегии предполагается концентрация усилий на росте суммы активов предприятия;

– метод CDS (Condition Driving Strategy) – стратегия, базирующаяся на рыночных инструментах и предполагающая детальный анализ и учет внешних условий для бизнеса. Достижение роста суммы активов предприятия сочетается с необходимостью роста рентабельности бизнеса и развитием современных источников дохода – комиссий с разнообразных услуг;

– метод ADS (Ambition Driving Strategy) – стратегия, движимая амбициями, которые реализуются крупными проектами без ограничений ресурсов и с использованием динамического и оптимистичного планирования источников финансирования. Сильной стороной метода является непрерывно

проходящий процесс управления изменениями, оперативно реагирующий на изменения внешних и внутренних условий.

В таблице 5.2.1 приведены типы стратегий и рисков, соответствующие им.

Таблица 5.2.1 – Типичные риски, мешающие реализации стратегии по типам

| № | Тип стратегии | Типичные риски, мешающие реализации стратегии |
|---|---------------|--|
| 1 | Метод RDS | Негибкость в управлении трансформацией Низкий темп проведения трансформации Динамическое отставание от конкурентов |
| 2 | Метод CDS | Размытость фокуса цифровой трансформации Ошибки в определении порядка итераций (и приоритетов) цифровой трансформации |
| 3 | Метод ADS | Истощение финансирования без завершения трансформации Низкий уровень компетенций менеджмента в управлении изменениями и проектами |

Вне зависимости от метода при планировании цифровой трансформации «сверху-вниз» также следует указать на типичные риски:

- низкий уровень экспертизы в определении сроков и объема задач по подразделениям;
- неоправданная экономия затрат на ключевых участках цифровой трансформации;
- создание формальных контрольных показателей, не раскрывающих суть успешной трансформации производственных и технологических процессов.

Следующий шаг в риск-менеджменте при цифровой трансформации – это осуществление мониторинга и контроллинга. Наиболее удобной формой для этого является синхронизация управления актуальными рисками по программам проектов, позволяющая одновременно управлять наиболее принципиальными рисками цифровой трансформации. В данном подходе сохраняется баланс между централизованным управлением резервами и распределенными сценариями

реализации планов реагирования (смягчения) и аварийных планов по группам и даже отдельным рискам.

Следует отметить, что переход от бизнес-планирования и целеполагания к практическому внедрению изменений в виде программ проектов необходима повторная идентификация и приоритизация рисков по технологическим направлениям (элементам технологического контура, реализующего перспективную бизнес-модель ПП). Каждая программа проектов получает собственный реестр рисков (частично наследованный из общего реестра, созданного на этапе планирования).

Такой риск-менеджмент в цифровой трансформации удобно построить на базе иерархической модели связанных списков различного уровня операционной актуальности. Общие черты данной модели представлены на рисунке 5.2.2.

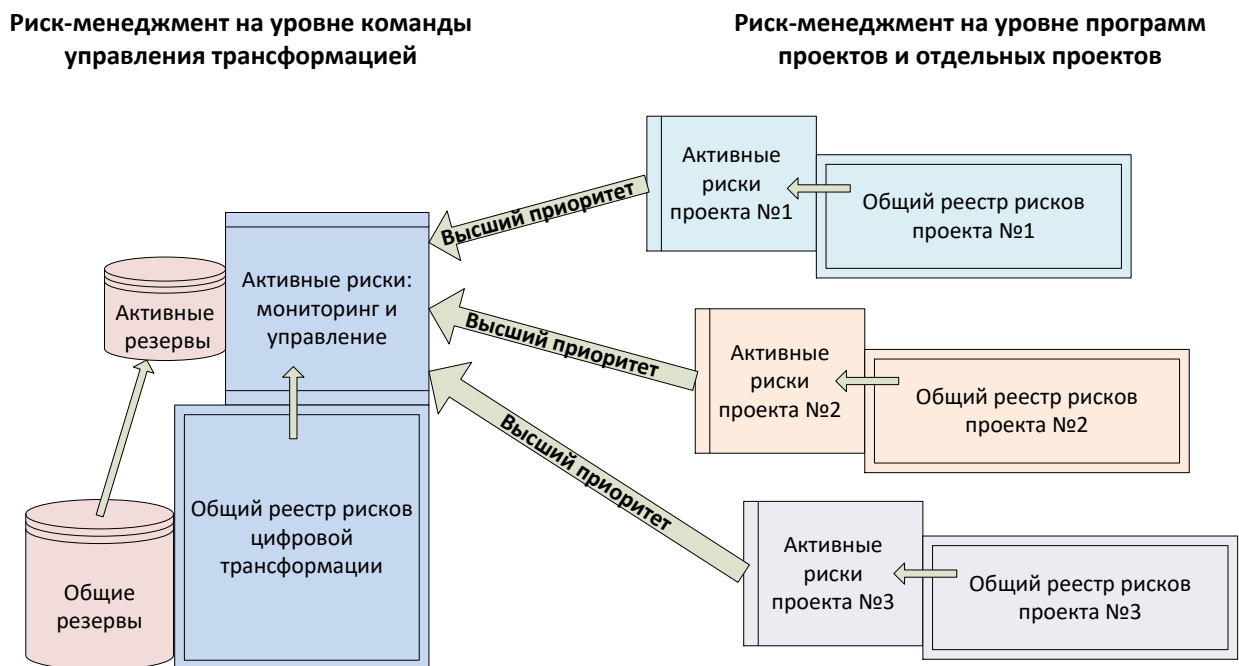


Рисунок 5.2.2 – Модель операционно-тактического риск-менеджмента

Наиболее разрушительные и актуальные риски для итерации трансформации находятся в смешанном управлении: реализация планов смягчения и аварийных планов лежит в совместной зоне ответственности для команды управления цифровой трансформацией и руководителей отдельных

проектов (программ проектов). Распределение финансовых резервов по таким рискам проводится централизованно.

Актуальные риски с меньшим приоритетом находятся в отдельном управлении: общими корпоративными рисками занимается специализированное подразделение, отвечающее на ПП за цифровую трансформацию, а частными проектными рисками занимаются соответствующие руководители проектов.

На стратегическом уровне риски еще больше превращаются в новые конкурентные возможности для ПП. Модель стратегического риск-менеджмента в цифровой трансформации – это управление достигаемостью горизонта технологического развития. Есть несколько ключевых трендов, очевидных из примеров программ проектов в России и в Мире:

- удешевление программно-аппаратного обеспечения цифровых технологий;
- появление специализации рынка «интеллектуальных» услуг в цифровой трансформации: по отраслям, масштабах объектов трансформации, особенностям трансформации (например, приоритетное использование отечественных технологий);
- давление окружающей бизнес-среды – новые технологические стандарты у конкурентов и партнеров, рост ожиданий потребителей.

Безусловно, отраслевые тенденции и расширение технологических возможностей должно на стратегическом уровне оказывать влияние не только на планирование, но и на активное проведение цифровизации. Итерационность проведения цифровой трансформации позволяет учитывать это влияние более плавно и взвешено, сочетать с анализом достигаемых промежуточных результатов. Ключевым моментом является взаимосвязь влияния данных тенденций и соответствующих изменений в планах цифровой трансформации (возможно уже на следующие итерации) с финансовым обеспечением процесса и созданием необходимых финансовых резервов.

Модель влияния факторов внешней среды на цифровую трансформацию с точки зрения стратегического риск-менеджмента представлена на рисунке 5.2.3

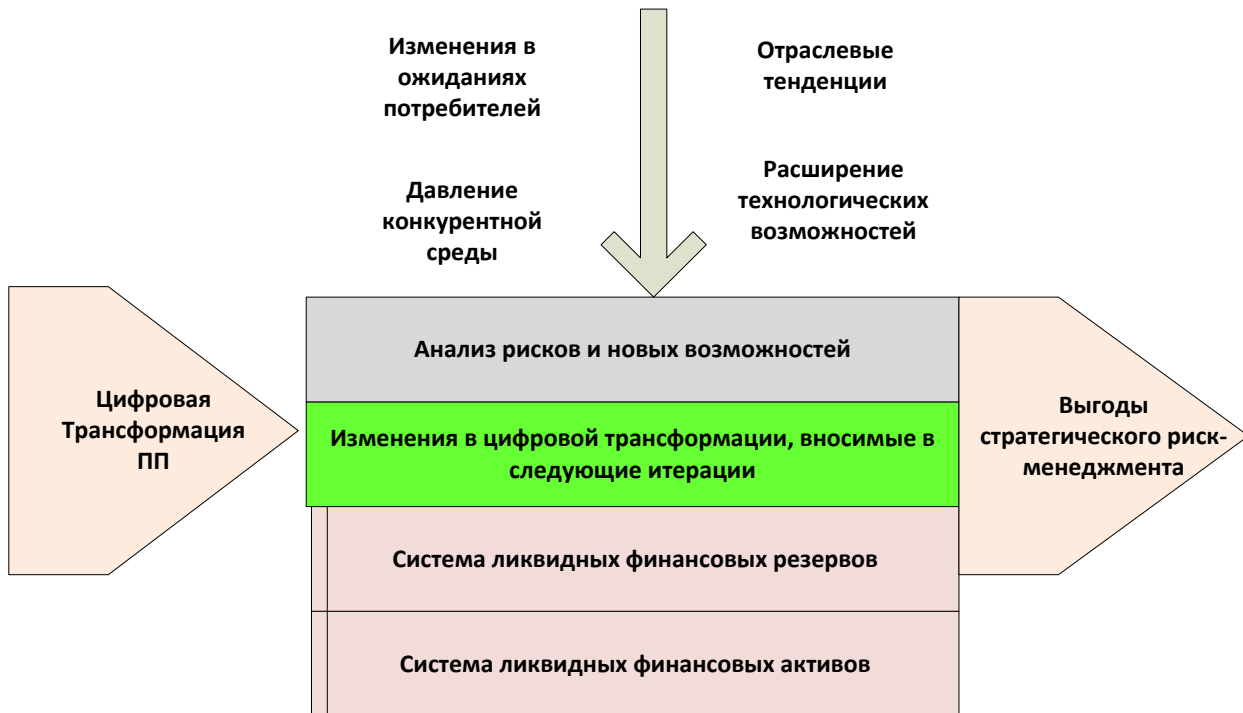


Рисунок 5.2.3 – Влияние стратегического риск-менеджмента на цифровую трансформацию ПП

Не менее важно принять во внимание роль внутренних факторов в проведении цифровой трансформации. Значительная часть специфических рисков масштабных изменений связана с организационным сопротивлением, игнорирование которого приводит к снижению мотивации сотрудников, саботажу изменений, падению продуктивности и даже оттоку самых талантливых сотрудников. Безусловно, для отраслей промышленности данные риски выражены менее ярко, чем для многих отраслей «новой» экономики [8], однако, следует дать несколько общих рекомендаций по учету внутренних факторов при цифровизации.

Наиболее точной практикой риск-менеджмента является выделение групп сотрудников, чьи интересы могут быть ущемлены изменениями, сопровождающими цифровизацию. Идентификация таких групп идет одновременно «снизу-вверх» и «сверху-вниз»:

– в рамках бизнес-планирования определяются такие группы, чье экономическое или политическое положение на предприятии значительно меняется в ходе цифровой трансформации;

– в рамках информирования сотрудников о предстоящих изменениях собираются мнения линейных руководителей.

На том же этапе бизнес-планирования выявленные группы сотрудников, готовые к организационному сопротивлению изменениям, попадают в отдельную группу рисков с индивидуализированными планами по их смягчению.

В течение каждой итерации осуществляется мониторинг данных рисков по группам возможного сопротивления, пересматриваются резервы и оцениваются возможные негативные последствия. Риски, связанные с организационным сопротивлением и шире – «человеческим фактором» – наиболее управляемы с помощью финансовых резервов, которые, как было показано ранее, играют значительную роль в риск-менеджменте. Построение гибкой системы резервирования предполагает:

– регулярную актуализации оценки размера необходимых резервов по группам рисков;

– создание формализованного процесса вывода резервов из операционного бизнеса и \ или системы ликвидных финансовых активов;

– накопление \ пополнение резервов по результатам операционной деятельности ПП, проходящего цифровую трансформацию.

В данном случае управление резервами находится на стыке управления рисками в отдельных программах проектов и в финансовом управлении всей компанией. Предложенный подход (рисунок 5.2.2) предполагает консервативную иерархическую модель управления, свойственную промышленным предприятиям.

5.3. Ключевые элементы организации цифровой трансформации на промышленном предприятии

Следует рассмотреть место управления рисками в типичном алгоритме цифровой трансформации на промышленном предприятии. Очевидно, что в оценке перспектив бизнес-развития всегда стоит соотнесение целей и перспективных выгод с соответствующими затратами и рисками. Данное соотнесение разумно выполнять в виде полноценного планирования изменений на тактическом и стратегических уровнях. Такое планирование, как часть соответственно стратегического и тактического менеджмента, имеет набор ключевых аспектов, нуждающихся в осмыслении при подготовке и принятии управленческих решений.

Стратегия – это, по сути, расширенный бизнес-план компании, опирающийся на разнообразные модели ее текущей и перспективной работы. Тем не менее, он не является самой начальной точкой в управлении развитием, а скорее документирует необходимые шаги и ресурсы для воплощения миссии и видения компании. На рисунке 5.3.1 представлена типичная 4-х уровневая структура корпоративного управления: от миссии компании к реализации операционного управления. На рисунке 5.3.1 дано также видение места стратегии и долгосрочного бизнес-планирования в такой структуре. С одной стороны это уровень каскадирования с уровня миссии и ценностей компании, с другой стороны – практическая реализация стратегии лежит на тактическом и операционных уровнях и подкрепляется различными моделями: финансовой, рискованной, долгосрочной оценкой стоимости компании и т.п.



Рисунок 5.3.1 – Структура современного корпоративного управления

Таким образом, модель управления рисками на уровне всей компании является существенным элементом корпоративного управления. Риск-менеджмент в цифровизации промышленного предприятия является составной частью такой модели.

Если рассматривать такую цифровую трансформацию как наиболее эффективный (при этом высокочрезвычайно затратный) метод реализации долгосрочных планов и получения уникальных конкурентных преимуществ, то следует выделить ее ключевые элементы:

- 1) метод \ алгоритм организации трансформации;
- 1) экономические параметры и модель возврата инвестиций;
- 2) рискованная модель.

Методы организации трансформации подразумевают выбор формы проведения основных изменений, итерационность, подбор методов анализа промежуточных и конечных результатов. Типичный алгоритм проведения цифровой трансформации представлен на рисунке 5.3.2.

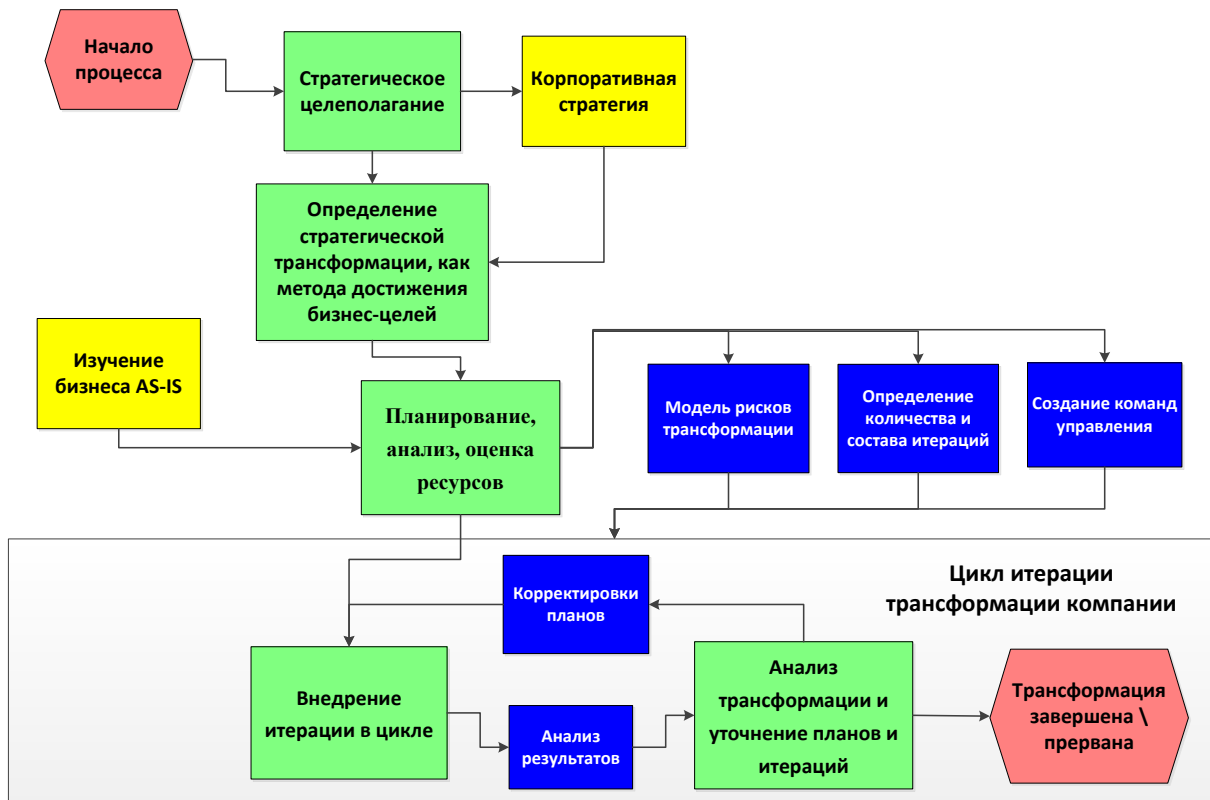


Рисунок 5.3.2 – Типичный алгоритм проведения цифровой трансформации промышленного предприятия

Безусловно принимая необходимость стратегического бизнес-планирования, как первоначальной фазы формулирования целей и критериев успешности, следует кратко рассмотреть следующие практические этапы трансформации промышленного предприятия. Проведение масштабных изменений на промышленном предприятии в рамках цифровой трансформации упрощенно можно разделить на четыре этапа:

1. Оценка готовности предприятия к трансформации по категориям: финансы, технологии, человеческий капитал, компетенции менеджмента.
2. Моделирование перспективного развития, связанного с обновлением цепочки генерирования добавленной стоимости в условиях клиентоцентричности, расширенного жизненного цикла продукции и принятия решений на базе достоверных данных.
3. Создание технологического контура, команд специалистов и баз применяемых знаний, реализующих перспективную модель развития.

4. Итерационный запуск элементов перспективной модели развития: по продуктам, по географическим локациям, по элементам цепочек формирования добавленной стоимости.

Расчеты параметров и модели возврата инвестиций позволяют корректно судить об экономической целесообразности как самой трансформации, так и стратегического бизнес-плана который она реализует. Критически важным представляется определение и управление бюджетом, оценка влияния бизнес-изменений на прибыль и стоимость компании, корректировка методов проведения трансформации на основе анализа получаемых результатов. И наоборот, отказ от расчетов и прогнозов приводит к явному набору неэффективностей: от рванного ритма трансформации, связанного с «кусочностью» финансирования, и выполнению неоптимального деления трансформации на итерации к снижению успешности промежуточных стадий, потери мотивации к завершению трансформации, запаздыванию в развитии бизнеса и адаптации к меняющимся внешним условиям. В основе такого экономического анализа лежат следующие параметры (таблица 5.3.1):

Таблица 5.3.1 – Параметры экономического анализа трансформации

| № | Параметр | Определение и комментарии |
|-----|--|--|
| 1 | Количество итераций при проведении стратегической трансформации | Целое число от 2 до 5. Планирование более 5 итераций кажется слишком неточным - факторы неопределенности вносят слишком много искажений |
| 2 | Бюджет и продолжительность итерации | Продолжительность каждой итерации - 2-6 месяцев в зависимости от величины ПП. Бюджет каждой итерации включает в себя набор составляющих в следующих строках таблицы с п.2.1 и 2.4 |
| 2.1 | Прямые издержки (Капитальные инвестиции в трансформацию) | Издержки на организацию трансформации, включающие в себя: фонд оплаты труда специалистов, косвенные затраты, вложения в основные средства и другие капитальные затраты |
| 2.2 | Недополученная прибыль | Прибыль предприятия, которая была не получена вследствие планирования, организации и проведения трансформации. Обычно она связана со снижением продуктивности определенных бизнес-функций в течение трансформации и отказа компании от части центров получения прибыли (рынков сбыта, офисов, продуктов) |
| 2.3 | Колебание стоимости компании в первые итерации начинающейся трансформации | В высокой степени данный параметр зависит от метода определения стоимости компании: 1) рыночная стоимость акций, 2) оценка внешним оценщиком в том числе путем сравнения с конкурентами 3) оценка по финансовым показателям с использованием дисконтирования |
| 2.4 | Повышение (снижение) прибыли компании (дохода, затрат) после каждой итерации трансформации | Данный показатель в начале планирования носит прогнозный характер, однако. По завершению каждой итерации он может быть вычислен практически и сравнен с прогнозом. |

Модель возврата инвестиций строится на основе данных показателей путем сравнения долгосрочного тренда изменения стоимости компании (в том числе, с учетом дисконтирования) с совокупностью значений параметров трансформации, описанных в таблице 5.3.1. Именно подтверждаемая модель возврата инвестиций позволяет судить об экономической целесообразности продолжения трансформации, отказа от нее или наоборот – необходимости увеличения инвестиций в нее.

Практическая реализация стратегической трансформации (а не только ее планирование, анализ и оценка затрат и рисков) – это самый сложный вопрос современного стратегического менеджмента [9]. Она требует глубокого анализа

на всех уровнях деятельности, сочетания процессных и проектных подходов, существенных инвестиций, знаний и готовности топ-менеджеров и собственников предприятия. Наиболее логичным вариантом является разработка дорожной карты стратегической трансформации, которая включает в себя не только процессы целеполагания, но и выбора методов внедрения изменений, мониторинга прогресса и оценки их экономической эффективности. По умолчанию такая дорожная карта состоит из набора этапов, представленных на рисунке 5.3.2. Следует отметить, что масштаб бизнеса и отрасль накладывают существенные условия на подготовку и реализацию такой дорожной карты.

Рисковая модель также является ключевым элементом в организации цифровой трансформации. Данный элемент подразумевает, как значительную подготовительную работу (идентификацию и ранжирование рисков), так и постоянный мониторинг вероятностей реализации рисков и применение соответствующих планов управления (смягчающего, аварийного). Не менее важно отметить, что даже при создании максимально гибкой системы управления финансовыми резервами для управления рисками часть средств ПП вследствие их привлечения в риск-менеджмент находятся не в самом эффективном типе управления. Как было описано ранее, управление рисками в цифровой трансформации должно стать частью общекорпоративной рискованной модели.

5.4. Типичный алгоритм проведения цифровизации промышленного предприятия

Не смотря на запоздалое начало цифровой трансформации в российской промышленности и возможности бенчмаркинга этого процесса, в том числе с использованием внешнего консалтинга и опыта уже завершенных проектов мировых корпораций, динамика внедрения отдельных технологий в российской промышленности противоречива. Рынок российских поставщиков IT-решений из концепции «Индустрии 4.0» для промышленности довольно скуден, и

подавляющее большинство российских решений зависимо от аппаратного обеспечения, производимого за рубежом.

Развитие отечественных решений в области Интернета вещей и робототехники находится на начальном уровне, хотя в 2019 году в России был зафиксирован существенный рост производителей промышленных и сервисных роботов. Вместе с этим доля импортных составляющих и текущие технические ограничения не позволяют российским промышленным предприятиям перейти к целевой задаче цифровой трансформации: адаптации эталонных моделей цифровых объектов под свои условия. К таким эталонным моделям относятся модели производств «Индустрии 4.0»: цифровой сталелитейный цех, цифровая шахта, цифровой карьер, цифровая буровая вышка и т.д. Осмысление этих моделей и практические проекты по их построению с учетом текущих условий (финансовых, методологических, коммерческих) требуют существенного изменения части привычных представлений о модернизации промышленности из XX века.

На рисунке 5.3.2 представлен типичный алгоритм цифровой трансформации, условно включающий в себя после бизнес-планирования и целеполагания четыре значимых этапа:

- 1) оценка готовности предприятия к трансформации;
- 2) моделирование перспективного развития ПП;
- 3) создание технологического контура, реализующего модель перспективного развития;
- 4) итерационный запуск элементов перспективной модели развития на практике.

Оценка готовности предприятия к цифровой трансформации имеет как минимум четыре категории: финансы, технологии, человеческий капитал, компетенции менеджмента.

Определение финансовой готовности промышленного предприятия к трансформации неотрывно связано с бюджетированием цифровой

трансформации. Рассмотрим несколько подходов к данному процессу, среди которых:

- постатейное бюджетирование на базе стратегии развития предприятия с разделением на итерации и привязкой к достижению целей в формате SMART;
- бюджетирование по уровням функционирования и даже отдельным функциям предприятия, модернизируемым в процессе цифровой трансформации [5];
- бюджетирование по элементам цепочки создания добавленной стоимости с расчетом возврата инвестиций в каждом элементе.

Какой бы алгоритм не применялся при оценке финансовой готовности промышленного предприятия к трансформации, ключевое правило – следующее: недопустим разрыв в инвестировании внутри этапов или итераций трансформации. Таким образом, инициаторы цифровой трансформации должны быть уверены, что необходимые финансовые потоки будут скоординированы и не остановят соответствующие проекты.

Технологическая готовность предприятия к трансформации имеет несколько аспектов – готовность самой компании к применению технологий, возможность адаптации инновационных технологий к применению в конкретных условиях предприятия, место программного и аппаратного обеспечения трансформации в общем IT-ландшафте.

Традиционной, но мало востребованной в России концепцией оценки готовности предприятия к цифровой трансформации является MRL-метод (Manufacturing Readiness Levels, MRL) [10]. Данная методика позволяет в простой градации классифицировать предприятия по уровням готовности производства и его процессов к внедрению и использованию новых технологий. Впервые широкой публике она была представлена министерством обороны США в 2005 году.

Всего выделяются десять уровней готовности производства от MRL1 до MRL10, подробнее о данных уровнях:

- MRL1 – определение базовой производственной концепции и контура технологических инноваций;
- MRL2 – проектирование производственных линий;
- MRL3 – верификация производственной концепции;
- MRL4 – запуск производственного процесса в лабораторных условиях;
- MRL5 – воспроизводство некоторых элементов производственного процесса в естественных условиях;
- MRL6 – создание прототипов систем и подсистем;
- MRL7 – подготовка к опытной эксплуатации – производство систем, подсистем или их компонентов в условиях, приближенных к реальным;
- MRL8 – испытание пилотной производственной линии;
- MRL9 – запуск опытного мелкосерийного производства;
- MRL10 – создание отлаженной системы производства.

Данный метод позволяет структурировать внедрение технологий в рамках цифровой трансформации на промышленном предприятии и создать план, имеющий набор четких и последовательных этапов с прозрачными условиями завершения каждого из них. В предлагаемом алгоритме цифровой трансформации ПП метод MRL позволяет выбрать последовательность практического внедрения технологического контура.

Следующей категорией в оценке готовности промышленного предприятия к цифровой трансформации является потенциал развития человеческого капитала. Понимая необходимость повышения квалификации рабочих и линейных руководителей, а также интеллектуальные и даже культурные вызовы, связанные с организацией высокотехнологичных производств, существенным индикатором в такой оценке является исследование возможностей массового обучения сотрудников. Центром новых компетенций, распространяемых среди

сотрудников, должна стать организационная единица внутри предприятия. Не менее важно сохранить сотрудников предприятия после обучения и практического освоения новых паттернов в производстве, инвестируя в их высокий уровень лояльности. Программы аттестации и поощрения, долгосрочные социальные программы, корпоративная культура меритократии, одновременные внутренняя конкуренция и горизонтальные связи сотрудничества – элементы этих ценностей высокотехнологичных отраслей, в некоторой степени, должны быть экстраполированы на промышленные предприятия.

Наконец, еще один фактор, необходимый для оценки готовности промышленного предприятия к началу цифровой трансформации – это уровень компетенций среднего и старшего менеджмента. Безнадёжно даже планировать технологические и бизнес-контуры будущего, не имея единого понимания среди руководства в вопросах: «что принесет цифровая трансформация?» и «как осуществить ее в заданные сроки и бюджеты?».

Мировые лидеры промышленности выделили простой набор шагов для повышения профильных компетенций менеджмента и получения единого и глубокого понимания ценностей и рисков цифровизации:

- 1) проведение консалтингового проекта или обучения внешними экспертами;
- 2) создание ответственных структур – центров, комиссий, офисов – отвечающих как за инновации в компании, так и конкретно за цифровую трансформацию;
- 3) рассмотрение цифровой трансформации, как части стратегического развития, которое на операционном и тактическом уровне через соответствующие цели должно быть поддержано каждым старшим менеджером на предприятии.

Совокупность полученных статусов готовности \ неготовности промышленного предприятия к цифровой трансформации формирует значимую

часть модели его текущей деятельности – «AS-IS». Далее следует начинать моделирование перспективного развития, связанного с обновлением цепочки генерирования добавленной стоимости. Такая целевая модель «TO-BE» является следующим шагом в проведении цифровой трансформации и содержит в себе:

- 1) перспективные экономические показатели, к которым стремится промышленное предприятие;
- 2) модель бизнес- и производственных процессов, которые должны быть запущены и закреплены в практике;
- 3) методы, задачи, частные цели и план трансформации с учетом специфических и общих отраслевых рисков и факторов влияния.

Среди факторов влияния следует отметить необходимость помещения клиента в центр усилий промышленного предприятия и поддержку расширенного жизненного цикла продукции (а в идеале – как для единицы каждого товара, так и для продукта в целом).

В создании перспективных моделей очень полезна опора на методологии цифровой экономики. Именно так проходили цифровую трансформацию банки и финансовые организации: известные концепции «Банк 2.0 \ 3.0 \ 4.0», «Банк, как IT-компания», «Омни-канальное самообслуживание клиентов» и другие позволяли каждой организации видеть конечные ориентиры в цифровизации. В промышленности схожие концепции находятся в самом начале развития, например, «автономные роботизированные заводы Индустрии 4.0». Наиболее завершенная концепция в 2020 году (в технологической части) – это создание эталонных моделей объектов по отраслям промышленности: «цифровой завод», «цифровая буровая вышка», «цифровая логистическая цепочка». В настоящее время концепты таких моделей активно продвигаются, но развитие (а точнее стоимость) соответствующих технологий пока не позволяет считать такие концепты полностью оптимальными. Пример уже реализованной трансформации в соответствии с эталонной моделью – это завод Mercedes-Benz Factory 56 в Зиндельфингене [11], пожалуй, на сегодняшний день – это одно из

самых автономных и роботизированных производств, реализующее значительные конкурентные преимущества цифровизации.

Следующим этапом в подготовке цифровой трансформации промышленного предприятия является создание технологического контура, команд специалистов и баз применяемых знаний, реализующих утвержденную перспективную модель развития.

Технологический или производственный контур – это совокупность различных технологий, обеспечивающих производственную функцию – от планирования до запуска и анализа эффективности его эксплуатации. В контуре необходимо учесть информационные, производственные и управленческие технологии, позволяющие реализовать исследование, проектирование, выпуск, сбыт, сервисное обслуживание, утилизацию промышленной продукции. Безусловно, выбор интегрируемых технологий зависит от модели перспективного развития и тех целей, которые были выбраны на предыдущем этапе. Кроме того, в настоящее время уже накоплен первый опыт эффективности тех или иных технологий по отраслям и конкретным функциям производства. С другой стороны, такой контур является неотъемлемой частью модели «ТО-ВЕ», а его проектирование существенно осложнено фактами готовности \ неготовности производства предприятий и технологий друг к другу. Такое осложнение должно найти отражение в планировании итераций трансформации.

Следует привести неполный список наиболее успешно зарекомендовавших себя технологий и областей применения в промышленности (таблица 5.4.1). Данные технологии, как правило, объединены в логические группы (кластеры) и формируют контур в цифровой трансформации. Как следует из таблицы, довольно часто использование определенной технологии означает необходимость освоения «соседних» инноваций. Это обусловлено уже существующим опытом внедрения технологий в промышленности и акцентом на экономическую выгоду от внедрения инноваций.

Таблица 5.4.1 – Использование прикладных кластеров технологий

| № | Технология | Применение и примеры проектов |
|---|--|---|
| 1 | Интернет вещей, включая цифровую логистику и IT-решения типа SCADA | Взаимодействие машин и механизмов между собой – системы учета электроэнергии в корпорации «Россети» Сбор данных о процессах и объектах - «Интер РАО – Электрогенерация» - сбор и обработка данных с объектов электростанций |
| 2 | Специализированные мобильные программно-аппаратные комплексы | Сбор данных на объектах – мониторинг ремонтов и обслуживания на Смоленской АЭС; |
| 3 | Искусственный интеллект, включая нейронные сети, предиктивные и экспертные модели, компьютерное зрение и обучение ИИ | Анализ и обобщение данных - система анализа образцов авиатоплива в «Газпромнефть-Аэро»; Экспертные и рекомендательные решения - сервис для ускорения работы стана горячей прокатки в НЛМК; |
| 4 | Промышленные роботы | Производственные функции – производство сельхоз техники в компании «Промзапчасть»; Вспомогательные функции – подача заготовок в производстве изделий из латуни в компании Браско (Оренбург); Транспортные функции – транспортировка грузов внутри склада на Московском НПЗ; |
| 5 | Виртуализация процессов и объектов, включая «цифровые двойники» | Процессы проектирования и производства – симуляция геологических работ в добыче трудной нефти - Кибер ГРП 2.0 в Газпромнефти, симуляция краш-тестов автомобилей в «АвтоВАЗ»; Прочие бизнес-процессы – «цифровой двойник» процессов оптимизации закупочной деятельности, управления внешней логистикой автотранспорта и управления мастер-данными в Северстали; |
| 6 | Обработка больших данных | Рекомендательные и экспертные решения - сервис рекомендаций по оптимальному расходу ферросплавов при производстве стали в НЛМК; |

Приводимые примеры использования технологий в пилотных проектах цифровизации и регулярной эксплуатации относятся к технологическим лидерам отечественной промышленности – это Россети, Новолипецкий металлургический комбинат (НЛМК), Московский Нефтеперерабатывающий завод (МНПЗ), Северсталь и другие.

Формирование технологического контура цифровой трансформации на конкретном промышленном предприятии имеет набор ограничивающих факторов:

– готовность технологий на уровне устройств и программно-аппаратного обеспечения без серьезной модификации реализовывать цели трансформации;

– готовность сотрудников предприятия реализовывать цели трансформации с помощью данного технологического контура.

Безусловно, в ходе трансформации в виду высокой скорости изменений технологий и ожиданий от их внедрения могут вноситься значительные изменения и в состав производственного контура, однако, разделение на итерации в цифровизации позволяет сделать такие изменения более плавными и сопряженными с частными задачами и целями.

Не менее значимо на данном этапе сформировать команды специалистов, чьи усилия будут направлены на детализированное планирование и внедрение изменений. Компетенции и полномочия формального бизнес-юнита, отвечающего за всю трансформацию предприятия, могут оказаться недостаточны в сложных узловых моментах: интеграциях, технологической экспертизе и внедрении изменений непосредственно в цехах, географически распределенных производствах, удаленных объектах. Не менее важно управлять организационным сопротивлением на производстве: автоматизация, роботизация да и любые другие инновации всегда окружены страхами потери рабочих мест, зон ответственности в производстве и власти линейных менеджеров [12].

Не следует пренебрегать формированием баз применяемых знаний, уже начиная с данного этапа. Практика показывает, что цифровая трансформация растянута на годы и в больших компаниях неравномерно распределена по производствам и по времени. Накопление лучших практик и опыта взаимодействия с новыми технологиями, учет совершенных ошибок и анализ результатов должны фиксироваться в базах знаний [13]. Распределение опыта позволяет избегать повторной реализации типичных рисков, снижает

трудозатраты по внедрению изменений, позволяет быстрее масштабировать уже внедрённые инновации на другие рынки сбыта, продукты и т.п.

И наконец, последняя часть реализации данного процесса – это итерационный запуск элементов перспективной модели развития. Как было показано выше, практически каждое предприятие создает свой уникальный контур, связанный с особенностями географии и технологий производства, ожиданиями потребителей, конкурентным давлением и объемом запланированных трат по ключевым ресурсам.

Наиболее важную роль риск-менеджмент при цифровой трансформации играет именно на данном последнем этапе – непосредственном итерационном внедрении изменений. К типичным рискам относятся уже описанные ранее – финансовые (финансирование трансформации), изменения рынков (влияющие на стратегическое целеполагание), организационное сопротивление. Следует также выделить специфические риски, связанные с данным последним этапом:

- 1) верное нахождение порядка внедрения инноваций в расширенном жизненном цикле продукции;
- 2) сложная координация модернизированных элементов цепочек добавленной стоимости продукции в течение цифровой трансформации для избегания «бутылочного горлышка инноваций».

Оба риска тесно связаны со средой, в которой оперирует предприятие – почти каждый элемент в какой-то степени связан с внешними контрагентами, регуляторами, текущими клиентами. Наиболее правильным кажется следующий алгоритм планирования необходимого порядка внедрения:

- 1) в первую очередь внедрять инновации в области, где влияние внешних участников мало, а экономическая выгода максимальна в краткосрочной перспективе;
- 2) во вторую очередь внедрять элементы модели перспективного развития и соответствующие части технологического контура, которые

предсказывают наиболее высокую экономическую выгоду в среднесрочной перспективе;

3) в третью очередь изменять работу элементов, потенциально затрудняющих гармонию цифровой трансформации, т.е. избавляться от «бутылочных горлышек в инновациях».

Представленные этапы модернизации предприятия в рамках цифровой трансформации в виду масштабности изменений могут получить дополнительные элементы управления, заимствованные из практики высокотехнологичных компаний отраслей «новой» экономики, например из практики IT-компаний.

Таким образом, совокупность общих и специфических рисков сопровождает весь долгосрочный процесс цифровой трансформации. Управление такими рисками должно быть частью общекорпоративной модели риск-менеджмента. Финансовые резервы, как один из методов реагирования на риски, остаются актуальными для управления рисками от этапа бизнес-планирования и соответствующего планирования бюджета трансформации до окончания внедрения и закрепления в практике масштабных изменений. Игнорирование управления рисками наносит значительный урон предприятию: от стремительного снижения эффективности уже потраченных инвестиций до полной остановки трансформации.

Список использованной литературы

1. Занковский А., Организационная психология, М.- Флинта, 2002.
2. Пащенко Д.С. Как инженеры софтверных компаний воспринимают производственные изменения // Мир новой экономики, 2015. № 1. С. 74–82.
3. Бухтин М.А. Методы управления стратегическими рисками // Управление финансовыми рисками. — 2005. — №3. — С.12–26.

4. Комаров, Н.М., Пащенко, Д.С. Современная высокотехнологичная компания в IT-отрасли: краткий обзор // Вестник Евразийской науки, 2019 №4, <https://esj.today/PDF/58SAVN419.pdf>
5. Ускорение процессов цифровизации российской промышленности на основе развития и эффективного использования инновационного человеческого капитала. // Коллективная монография / Под ред. Веселовского М.Я., Измайловой М.А. – М.: Издательство «Научный консультант», 2020 – 225с.
6. Солдатов В.В., Левиков Д.А., Пащенко Д.С. Управление проектами автоматизации предприятий // Приборы и системы. Управление, контроль, диагностика, 2008. № 4.
7. Идрисов А. Стратегия, основанная на ключевых компетенциях и динамических способностях компании // Доступ: https://www.lobanov-logist.ru/library/all_articles/54831/
8. Управление производственными изменениями в высокотехнологичной компании : монография / Д.С. Пащенко. — Казань : Бук, 2019. — 100 с.
9. Маврина, И. Н. М12 Стратегический менеджмент : учебное пособие / И. Н. Маврина. – Екатеринбург : УрФУ, 2014. – 132 с.
10. D. Wheeler and M. Ulsh (2010). "Manufacturing Readiness Assessment for Fuel Cell Stacks and Systems for the Back-up Power and Material Handling Equipment Emerging Markets - Technical Report NREL/TP-560-45406". United States Department of Energy, National Renewable Energy Laboratory.
11. Official opening of Factory 56. Official Report. URL: <https://www.mercedes-benz.com/en/innovation/connected/official-opening-of-factory-56/>
12. Пискунов А.И. Вызовы, угрозы и ожидания цифровизации для промышленных предприятий // Организатор производства. 2019. №2.

13. Акаткин Ю.М., Ясиновская Е.Д. Цифровая трансформация государственного управления. Датацентричность и семантическая интероперабельность /Препринт/ – М.: ДПК Пресс, 2018. – 48 с.

Глава 6. Факторы роста и эффективности деятельности предприятий отечественного сельхозмашиностроения в условиях развития цифровых систем

6.1. Оценка состояния рынка сельскохозяйственной техники

Рынок сельскохозяйственной техники занимает важное место в общероссийском рынке и от его состояния во многом зависит успешное развитие сельского хозяйства и других отраслей агропромышленного комплекса. В этой связи представляет значительный интерес исследование изменений, происходящих на данном рынке.

Вопросы технического оснащения сельскохозяйственного производства и эффективности деятельности предприятий отечественного сельхозмашиностроения при переходе к рыночной экономике, активно освещались с начала девяностых годов XX века в работах Алферьева В.П., Дорофеевой Н.А., Драгайцева В.И., Ежевского А.А., Черноиванова В.И. и Федоренко В.Ф., и других авторов.

За последние годы особую актуальность приобрели вопросы развития рынка сельскохозяйственной техники, государственной поддержки агропромышленного комплекса, отраслей сельского хозяйства и сельхозмашиностроения, продовольственной безопасности России. Так, проблемам продовольственной безопасности и государственной поддержки агропромышленного комплекса посвящены работы Ушачева И.Г., Папцова А.Г., Кайшева В.Г. и Алексева К.И., Полухина А.А., Аварского Н.Д. с соавторами, Бабкина К.А. Также, современные исследователи в своих работах уделяют большое внимание вопросам экспортного потенциала российского сельскохозяйственного машиностроения, особенностям регионального развития, отечественным разработкам в условиях импортозамещения зарубежной продукции. Результаты исследования по данным вопросам

изложены в трудах Полухина А.А., Осипова А.Н. и Девина В.К., Алексева К.И., Алпатова А.В.

Несмотря на серьезные исследования, которые уделяются проблемам агропромышленного комплекса, развития рынка сельскохозяйственной техники и, в частности, роста и эффективности деятельности предприятий отечественного сельхозмашиностроения данные вопросы являются актуальными и требующими дальнейших исследований.

В условиях экономического давления и применения санкций со стороны западных стран рынок сельскохозяйственной техники стал испытывать некоторые трудности в своем развитии и потребовал определенных изменений. Данные изменения связаны с особенностями развития рынка в условиях внешнеэкономических ограничений, затруднений в движения капитала из одной отрасли материального производства в другую и другими ограничениями.

В этой связи, потребовались новые исследования, целью которых явилась необходимость разработки новых стимулирующих мер, направленных на дальнейшее развитие рынка сельскохозяйственной техники, а также придания нового импульса позитивным изменениям в данной отрасли.

Исследование проводилось теоретическими и эмпирическими методами. В частности, было изучено состояние отечественного рынка сельскохозяйственной техники, обеспеченность сельхозтоваропроизводителей основными техническими ресурсами.

Исследование включает в себя несколько взаимосвязанных частей, первая из которых посвящена вопросам развития рынка сельскохозяйственной техники и потребностям в технике сельскохозяйственных товаропроизводителей, вторая анализу направлений деятельности предприятий отечественного сельхозмашиностроения в сложившихся непростых условиях деятельности, третья перспективам роста и развития предприятий сельхозмашиностроения в условиях стратегии импортозамещения и наращивания экспортного потенциала отрасли.

В работе была проведена оценка состояния рынка сельскохозяйственной техники, которая показала все еще недостаточное развитие данного рынка. Причина недостаточного развития рынка в первую очередь заключается в низкой покупательной способности сельхозтоваропроизводителей и невозможности собственными силами осуществлять полноценное расширенное воспроизводство. В течение длительного периода времени имела место диспропорция, когда сельскохозяйственная продукция покупалась по низким ценам, а продукция промышленного производства предоставлялась по высоким ценам. Вследствие данного положения сельхозпроизводство было убыточным и отсутствовали возможности для расширенного воспроизводства в сельском хозяйстве.

Для того, чтобы изменить имеющееся положение и несколько повысить техническую обеспеченность сельскохозяйственного производства, государство вынуждено было оказывать финансовую помощь селу в сравнительно небольших масштабах, но и эта помощь оказала свое положительное воздействие.

Исследования показали, что за последние годы были внедрены меры и механизмы стимулирования приобретения новой техники на льготных условиях. В частности, была введена программа субсидирования при покупке отечественной сельхозтехники, применялись льготные кредитные ставки для приобретения технических средств и орудий производства, действовали льготные условия при поставке техники по лизингу. Однако, вышеперечисленные меры были недостаточными и полного эффекта достигнуто не было.

Дополнительные сложности в деятельность как сельскохозяйственных товаропроизводителей, так и производителей сельскохозяйственной техники в 2020 году внесла всемирная пандемия, вызванная распространением COVID-19. Создалась ситуация, которая значительно осложнила товарообмен производимой продукцией, особенно в международном масштабе, что было

связано с закрытием государственных границ и другими карантинными ограничениями.

Как показало проведенное исследование, в период с 2012-2017 гг. наблюдалось ежегодное удорожание промышленной продукции, хотя и разными темпами (от 0,5% в 2017г., до 15,5% в 2015 г.). Соответственно менялись и ценовые соотношения между 2 и 1 сферами АПК, которые в последние годы складывались, то в пользу сельского хозяйства, то в пользу 1 сферы АПК. В 2017-2018 гг. произошло существенное ухудшение ценовых соотношений – диспаритет сложился в пользу 1 сферы АПК, что осложнило положение сельскохозяйственных предприятий [11].

В 2018 году из-за роста цен на потери сельхозтоваропроизводителей составили почти 30 млрд рублей, при том что за счет средств федерального бюджета было компенсировано только 5 млрд рублей, подорожание горюче-смазочных материалов наблюдалось и в 2019 году, но уже не столь значительными темпами, как в 2018 году.

В 2020 году имеет место значительное подорожание металла и металлопроката. В ценовом выражении от 10 до 50 процентов в зависимости от наименования, что в свою очередь неизбежно приводит к росту стоимости сельскохозяйственной техники, а это, в свою очередь, удорожает технику и снижает покупательную способность сельхозтоваропроизводителей. Возникает ситуация, когда вырученные от продажи сельхозпродукции средства не позволяют в прежних объемах приобретать технику.

В 2019 году неритмичность финансирования и отсутствие своевременного решения отдельных стимулирующих программ, привело к негативным последствиям, которые выразились в сокращении производства и инвестиций в отрасли сельхозмашиностроения и сельхозпроизводства [3].

По-прежнему, Россия отстает от развитых стран по уровню технического обеспечения АПК. В России на 1000 га пашни приходится в среднем три трактора, в Германии – больше 60 тракторов, в США – 25, в Белоруссии – 9

тракторов. За пределами установленного амортизационного срока эксплуатируется: 73% тракторов, 59% зерноуборочных комбайнов, 56% кормоуборочных комбайнов. В результате ежегодно теряется 10-15% урожая [7].

В таблице 6.1.1 представлена динамика обеспеченности сельскохозяйственных организаций тракторами и комбайнами по Российской Федерации в 2017-2019 гг.

Таблица 6.1.1 – Обеспеченность сельскохозяйственных организаций тракторами и комбайнами по Российской Федерации в 2017-2019 гг.

| Показатели | 2017 г. | 2018 г. | 2019 г. |
|---|---------|---------|---------|
| Приходится тракторов на 1000 га пашни, шт. | 3 | 3 | 3 |
| Нагрузка пашни на один трактор, га | 328 | 337 | 345 |
| Приходится на 1000 га посевов (посадки) соответствующих культур, шт.: | | | |
| комбайнов | | | |
| зерноуборочных | 2 | 2 | 2 |
| кукурузоуборочных | 0,0 | 0,0 | 0,0 |
| картофелеуборочных | 17 | 15 | 15 |
| льноуборочных | 11 | 10 | 10 |
| Свеклоуборочных машин (без ботвоуборочных) | 2 | 2 | 2 |
| Приходится посевов (посадки) соответствующих культур, га: | | | |
| на один комбайн | | | |
| зерноуборочный | 427 | 424 | 437 |
| кукурузоуборочный | 2625 | 2366 | 2772 |
| картофелеуборочный | 60 | 68 | 68 |
| льноуборочный | 93 | 89 | 100 |
| Свеклоуборочную машину (без ботвоуборочных) | 465 | 456 | 478 |
| Энергообеспеченность (л.с.) сельскохозяйственных организаций на 100 га посевной площади | 198 | 200 | 199 |

Источники: данные Росстат РФ [4].

Анализ приведенных данных показывает, что в 2017-2019 годах в России на 1000 га пашни приходится только 3 трактора, нагрузка пашни на один трактор только увеличивается, не хватает зерноуборочных, картофелеуборочных, кормоуборочных, кукурузоуборочных и других комбайнов. Энергообеспеченность практически не растет. Такое положение приводит к

росту перегрузки на технические средства и преждевременному выходу техники из строя.

По-прежнему низкая покупательная способность сельхозпредприятий приводит к слабому спросу на новую технику. Так, анализ статистических данных, представленный в таблице 6.1.2, показывает наличие тенденции снижения парка тракторов и комбайнов в сельском хозяйстве Российской Федерации за период с 2017-2019 гг., что также приводит к негативным последствиям.

Таблица 6.1.2 – Парк основных видов техники в сельскохозяйственных организациях по Российской Федерации в 2017-2019 гг., тыс. шт.

| Показатели | 2017 г. | 2018 г. | 2019 г. |
|---------------------------------------|---------|---------|---------|
| Наличие на конец года всего, тыс. шт. | | | |
| тракторов | 216,8 | 211,9 | 206,7 |
| зерноуборочных комбайнов | 57,6 | 56,9 | 55,0 |
| кормоуборочных комбайнов | 12,7 | 12,3 | 11,8 |
| плуги | 59,7 | 58,5 | 56,9 |
| культиваторы | 87,6 | 84,7 | 82,6 |
| сеялки | 82,8 | 79,0 | 74,6 |
| косилки | 30,5 | 30,1 | 29,8 |
| пресс-подборщики | 19,9 | 19,6 | 19,5 |
| жатки | 19,1 | 18,8 | 19,1 |

Источники: данные Росстат РФ [4].

Данные, представленные в таблице 6.1.2, показывают, что количество тракторов в конце 2019 года по сравнению с 2017 годом уменьшилось на 10,1 тысяч единиц. Аналогичная картина наблюдается и по зерноуборочным и кормоуборочным комбайнам, плугам, культиваторам, сеялкам, косилкам, пресс-подборщикам. На уровне с 2017 годом остался лишь парк жаток.

Таким образом, по-прежнему выбытие сельскохозяйственной техники несколько превышает поставки новой техники, что и приводит к снижению общего парка техники. Имеющееся положение дел наглядно показывает необходимость дальнейшей поддержки со стороны государства процесса технического переоснащения сельскохозяйственного производства и увеличения, имеющегося парка сельскохозяйственной техники.

В период с 2018 по 2019 год поставки техники несколько увеличились. В 2020 году несмотря на всемирную пандемию выпуск отечественной сельскохозяйственной техники увеличился на треть, продажи – почти на 50%. Но сразу, следует отметить, что значительная часть произведенной сельскохозяйственной техники была поставлена на экспорт и не дошла до отечественных аграриев. Тем самым, как было отмечено ранее, парк имеющейся техники не вырос и по-прежнему техническое оснащение села отстает от научно-обоснованных норм и показателей технической оснащенности, достигнутой развитыми зарубежными странами.

В период пандемии сельхозтоваропроизводители продолжали свою работу. В 2020 году был собран хороший урожай, что позволило в определенных объемах приобретать новую технику. «Цены на сельхозпродукцию в 2020 году держались на уровне, который позволил приобрести больше сельхозмашин, а отечественные заводы в полном объеме удовлетворили растущий спрос» [14].

В настоящее время существуют три основных способа обновления парка сельскохозяйственной техники. Так, можно купить технику взяв льготный кредит под 4-5%. Также, можно приобрести технику по Программе 1432, по которой производители продают технику со значительной скидкой. Размер скидки меняется, например, в 2020 году скидка предоставляется в размере 10 - 15%. Еще один способ – купить технику в лизинг с постепенной оплатой ее стоимости.

Важное место в обеспечении техникой сельхозтоваропроизводителям принадлежит АО «Росагролизинг». Данная компания поставила отечественным аграриям в 2020 году свыше 9,6 тыс. единиц техники на сумму около 40 млрд рублей. Что является относительно высокой цифрой [16].

Спрос на услуги АО «Росагролизинга» остается неизменно высоким благодаря максимально низким ставкам, которые не имеют рыночных аналогов (3-3,5% по договорам лизинга сельхозтехники), специальным льготным программам и скидкам, а также благодаря постоянно расширяемому списку

поставщиков (с 2009 по 2016 гг. их число выросло с 28 до 85, а номенклатура техники – с 300 до 5 000 единиц) [8].

Глава Росагролизинга отметил, «что обоснованность и эффективность такого подхода демонстрируют результаты – за 2012-2020 гг. лишь только по программе «Обновления парка техники» (ОПТ) было поставлено около 6,5 тыс. единиц техники на 18,4 млрд рублей» [12].

По программе федерального лизинга АО «Росагролизинг» занимается только отечественной техникой. При этом АО «Росагролизинг» не только обеспечивает хозяйства техникой, но и поддерживали отечественных сельхозмашиностроителей. Так, в 2015 году с Петербургским тракторным заводом был реализован довольно интересный проект. Суть его заключается в следующем: АО «Росагролизинг», с одной стороны, искал клиентов, у которых были старые «Кировцы» и имелись ремонтная база и специалисты, а с другой – предлагал им уникальные условия по лизингу, в том числе приобретение техники без авансового платежа.

Подводя итоги анализа развития рынка сельскохозяйственной техники следует отметить, что, начиная с 2015 года рынок сельскохозяйственной техники стал развиваться преимущественно путем поставки отечественной техники, что в свою очередь обусловлено существенной девальвацией рубля и изменением государственной политики в отношении АПК. Импортная техника значительно подорожала и аграриям стало её не выгодно покупать, кроме этого, сказалась общая политика приоритетной поставки отечественной техники и система получаемых льгот при её приобретении.

В этот же период стали действовать государственные стимулирующие программы, которые дают определенные преимущества отечественным компаниям, тем самым обеспечивается приоритет отечественного товаропроизводителя.

6.2. Направления деятельности предприятий отечественного сельхозмашиностроения

Производителей сельскохозяйственной техники условно можно разделить на две части – крупные предприятия и средние и небольшие предприятия. К числу крупных предприятий следует отнести КЗ «Ростсельмаш», Кировский, Волгоградский, Алтайский тракторные заводы. На долю вышеперечисленных крупных предприятий приходится основная масса всего производства данного вида продукции. Доля продукции, производимой небольшими предприятиями, является незначительной и продолжает уменьшаться. Малые производственные предприятия по-прежнему не играют большой роли на соответствующем рынке, но тем не менее их значение велико и данные предприятия способны своей продукцией заполнять не занятые рыночные ниши.

Важнейшая задача, стоящая перед предприятиями отечественного сельхозмашиностроения, заключается в проведении модернизации и техническом перевооружении производства, так как значительная часть технологического оборудования изношено и нуждается в замене.

Существуют два направления модернизации предприятий отечественного сельхозмашиностроения. Замену старого оборудование на новое предполагает первый путь. Второй путь предполагает развитие совместных предприятий и на их основе используя высокотехнологическое оборудование производить новую продукцию.

«По первому пути относительно успешно развиваются такие предприятия как: КЗ «Ростсельмаш», ЗАО «Петербургский тракторный завод», ООО «Воронежсельмаш», ЗАО «Машзавод» и другие российские предприятия» [6].

Предприятия, развивающиеся по первому пути, нуждаются в значительных капитальных вложениях и поставках нового высокопроизводительного оборудования. Внедрение нового оборудования и технологий производства дает возможность производить более качественную и

современную продукцию, в которой нуждаются сельскохозяйственные производители.

В отрасли сельскохозяйственного машиностроения для производства сельхозтехники все больше применяется роботов. Российские производители наращивают компетенции по беспилотным сельхозмашинам. Так, 12 апреля в Санкт-Петербурге прошло заседание Правительственной комиссии по импортозамещению. Обсуждалась реализация планов по выпуску отечественной продукции в сфере машиностроения, и, в частности, создание беспилотной техники [14].

В 2020 году на «Агросалоне» были продемонстрированы машины, которые могут самостоятельно подруливать, то есть во время движения по полосе оператор может отпустить руль и по оптимальной траектории с точностью 2,5 см двигаться по валку либо по краю кромки, оптимизировать траекторию движения. Такая технология позволяет примерно на 15% лучше использовать машину, и такая система – востребованный продукт. Потому что оператор устает, под конец дня особенно, и жатку не полностью загружает работой или оставляет какие-то пробелы. Уже сотни таких машин сейчас заказаны и будут поставлены на рынок.

Еще более востребованная система, которую планируют начать продавать в следующем году – самонастройка комбайна. А его постоянно надо перенастраивать в зависимости от культуры, влажности поля, урожайности, многих факторов. Оператор не всегда может почувствовать оптимальную загрузку комбайна и оптимально его настроить. Если переложить эту задачу на электронику, можно повысить производительность комбайна на 30%. Много электронных систем, помогающих выгружать продукцию, наладить взаимодействие между различными машинами, чтобы водитель машины, которая должна принять зерно, знал, в какой точке он должен оказаться и когда, чтобы вовремя принять выгружаемый из бункера комбайна урожай. Стоимость таких систем составит примерно около 1 млн руб. на комбайн. Максимально возможная комплектация составит немногим менее 10% от стоимости комбайна,

но эффект от них будет гораздо больше – до 30% затрат на технику можно сэкономить при сельхозпроизводстве [18].

В связи с недостаточным финансированием отечественные предприятия не могут полноценно конкурировать с зарубежными компаниями, в этой связи, по-прежнему требуется система поддержки отечественного производства сельскохозяйственной техники.

Недостаток собственных финансовых средств приводит к тому, что обновление оборудования проводится неудовлетворительными темпами и не превышает 2%. Устаревшее оборудование не дает возможность производить современную и качественную технику, что приводит к техническому отставанию от ведущих мировых образцов.

Ставки кредитов российских банков превышают 8-10%, что значительно снижает возможность приобретения нового оборудования за счет привлечения заемных средств. В то время, как за рубежом эти ставки не превышают 2-6%, что дает возможность зарубежным производителям обновлять парк оборудования значительно более высокими темпами.

Одним из факторов, приводящих к техническому отставанию отечественного сельхозмашиностроения, является низкий уровень научных и конструкторских исследований в данной отрасли. Уровень финансирования НИОКР, как правило, не превышает 10-12%. «Основная масса данного финансирования осуществляется лишь двумя отечественными предприятиями – «Ростсельмаш» и КТЗ. В то время как в зарубежных странах более 50% инвестиций направляется на НИОКР» [9].

В 2017-2020 годах в этом направлении наметились некоторые улучшения. Правительственным постановлением 1312 от 30.12.2013 (последние изменения от 21.07.2017) предусматривается субсидирование от 50 до 70 размеров расходов на НИР. Под данную программу подпали отдельные предприятия сельхозмашиностроения и тракторостроения, в частности, Питерский тракторный завод, где планируется к середине 2019 года реализовать большой

проект по созданию российского центра компетенций в области производства современных трансмиссий.

Налаживается взаимовыгодная работа промышленности учебных и научных учреждений, так руководство Ассоциации «Росспецмаш» и Московского энергетического института договорились о сотрудничестве, которое будет направлено на кооперацию научных сотрудников вуза и промышленников в интересах инновационного развития отраслей специализированного машиностроения.

По словам заместителя директора Ассоциации «Росспецмаш» Вячеслава Пронина, для начала будут определены те узкие темы и направления работы, которые являются первостепенными для развития специализированного машиностроения [14].

16 августа 2018 года Российская академия наук и Ассоциация «Росспецмаш» подписали соглашение о сотрудничестве. Соглашение направлено на взаимодействие в интересах развития технического и технологического потенциала агропромышленного комплекса с использованием новых знаний. Документ подписали президент Ассоциации «Росспецмаш» Константин Бабкин и президент РАН Александр Сергеев.

Стороны будут совместно участвовать в подготовке методик и программ, направленных на развитие АПК, содействовать развитию наукоемких технологий, разработке научно-технических и инновационных проектов в сельхозмашиностроении, в том числе информационных и цифровых систем.

Кроме того, соглашение предусматривает взаимодействие Ассоциации «Росспецмаш» и РАН в рамках развития фундаментальных и прикладных исследований в сфере производства сельхозтехники и международного научно-технического сотрудничества. Стороны также планируют обмениваться методическими, информационно-справочными и аналитическими материалами, проводить консультации и совместные мероприятия [14].

Важное значение в развитии отечественного сельхозмашиностроения принадлежит Постановлению Правительства РФ от 17 июля 2015 г. N 719 «О подтверждении производства промышленной продукции на территории Российской Федерации». Данное постановление предусматривает локализацию зарубежного производства на территории РФ и показало свою эффективность.

Одним из драйверов роста отечественного сельхозмашиностроения следует рассматривать экспортный потенциал данной отрасли. По данным ассоциации «Росспецмаш» экспорт сельхозтехники растет. Произведенная техника экспортируется в страны СНГ, Китай, страны Европейского Союза, Иран и Канада. Осваиваются и новые рынки, к которым можно отнести страны Южной Америки, Ближнего Востока и Северной Африки. Так, аграрии Парагвая готовы приобретать технику для кормозаготовки и зерноуборочные комбайны, также данную технику готовы приобретать в Южно-Африканской Республике [9].

По словам директора Ассоциации «Росспецмаш» Аллы Елизаровой, основными направлениями экспорта являются страны СНГ, Европейского союза, Монголия, Канада. Всего же в прошлом году экспортные поставки охватили 35 стран.

Говоря о причинах роста зарубежных поставок, Алла Елизарова сообщила, что на сегодня отечественные производители значительно улучшили качество выпускаемой сельхозтехники, и работа в данном направлении продолжается. В сравнении с зарубежными аналогами сельхозмашины из России не уступают им, а иногда и превосходят по своим техническим характеристикам. Стоит также учитывать, что они экономически более эффективны [12].

«Экспортные поставки за 11 месяцев 2020 года, хотя растут медленнее – на 13,6%, до 13,8 млрд руб. – в денежном выражении уже превысили рекордный результат 2019 года в 12,1 млрд рублей» [23].

Рекордных показателей по объемам экспорта российским предприятиям удалось достичь благодаря эффективным мерам государственной поддержки,

среди которых субсидирование транспортировки продукции машиностроения, проведения НИОКР, участия в крупнейших отраслевых международных выставках, льготное кредитование, страховая поддержка.

Причинами такого роста явилась появление серии новых моделей техники. Улучшение качества выпускаемой продукции. Также, положительное влияние оказало девальвация рубля. Российская техника в долларовом эквиваленте стала значительно дешевле зарубежной, что увеличило её конкурентное преимущество.

Господдержка экспорта, в настоящее время, предусматривает целый комплекс мер, а именно: выделение компенсации части затрат предприятий на сертификацию продукции, субсидирование логистических затрат на транспортировку и хранение грузов, льготное кредитование расходов на модернизацию производства или приобретение нового оборудования, компенсации части затрат на патентование и защиту брендов российских производителей, помощь при размещении продукции на международных торговых онлайн-площадках, компенсация части расходов на маркетинги участие в международных выставках и другие меры [2; 3].

Таким образом, государство с помощью перечисленных инструментов поддерживает экспорт и способствует завоеванию новых ниш для реализации российской высокотехнологичной продукции. Экспортные поставки нарастают, не смотря на пандемию и ограничения со стороны развитых государств.

Среди российских производителей техники по уровню внешнеэкономической деятельности особенно выделяется компания «Ростсельмаш». Так за последние три года компания произвела и продала за рубеж более 57 тысяч агромашин. На долю иностранных покупателей приходится 15-20 процентов всей производимой техники данным предприятием. Руководство этой компании ставит задачу каждый год выходить на рынок не менее чем двух-трех новых стран. При этом сначала проводятся пробные поставки, а затем постоянные. Такая стратегия определяется маркетинговыми

принципами, которые заключаются в первоначальном проникновении отечественной продукции на новые рынки и последующем закреплении достигнутых результатов в форме освоения нового рынка.

Также наращивает экспортные поставки «Петербургский тракторный завод». В 2017 году машины, производимые на данном предприятии, были проданы в Канаду, Колумбию, Чехию, Венгрию, Польшу, Австралию, Узбекистан, Белоруссию, Казахстан. В последующие годы продукция данного предприятия заявила о себе и в других странах мира.

В качестве новаций продвижения отечественной продукции сельхозмашиностроения на зарубежных рынках выступает развитие сервисной инфраструктуры в странах, где продается российская техника. Российские компании создают, так называемые «логистические хабы» для создания запасов деталей и узлов техники и проведения фирменного обслуживания. Так, «Ростсельмаш» гарантирует доставку любой нужной запчасти в любую точку мира в течение 24 часов после запроса покупателя. Такая система обслуживания реализуемой техники соответствует практикуемой ведущими мировыми производителями системе логистического сервиса, что представляет значительную ценность для потребителей сложной сельскохозяйственной техники.

В 2020 году наблюдается рост объемов поставки сельскохозяйственной техники в страны ближнего и дальнего зарубежья. Существенная часть вырученных средства должна быть направлена на развитие отечественного сельхозмашиностроения, тем самым будет сделан значимый задел для наращивания объемов производства современной качественной техники отвечающей мировым стандартам.

Перед предприятиями отечественного сельскохозяйственного машиностроения ставится амбициозная цель, «уже к 2021 году нарастить долю российской сельхозтехники на внутреннем рынке до 80% при сохранении механизмов стимулирования спроса». Особое внимание будет уделено созданию

новых моделей агрегатов и комплектующих. При этом более 70% себестоимости выпускаемых машин приходится на отечественные комплектующие и материалы, что является показателем сохранения базовых компетенций в отрасли [10].

Таким образом, наблюдается тенденция улучшения состояния в отечественном сельхозмашиностроении, что открывает перспективы роста и развития в данном секторе экономики Российской Федерации.

6.3. Перспективы роста и развития предприятий отечественного сельхозмашиностроения

Проведенное исследование показывает, что следует закрепить тенденцию постепенного импортозамещения отечественной сельскохозяйственной техникой. Для этого потребуется нарастить производственные мощности на предприятиях, производящих сельскохозяйственную технику, расширить линейку предлагаемой техники, улучшить качество послепродажного обслуживания техники и принять другие действия, которые будут способствовать продвижению отечественной сельскохозяйственной техники.

Так, например, компания «Ростсельмаш» наметила программу на четыре года и готова вложить 20 млрд руб. в развитие: 5 млрд руб. на освоение новых моделей комбайнов и тракторов, еще 2,5 млрд на разработку и постановку на конвейер новых типов навесного и прицепного оборудования. Также в планах предприятия построить тракторный завод, завершить первый этап локализации коробок передач и дифференциалов для тракторов. Кроме того, в планах модернизация окрасочных решений, компьютеризация завода, создание нового склада запасных частей, инвестирование в интеллектуальные, компьютерные системы [18].

Важное значение для повышения уровня обеспеченности техникой сельскохозяйственных производителей имеет программа № 1432, которая дает возможность аграриям приобретать технику со значительными скидками. Но ее

перспективы остаются неопределенными: с одной стороны, на ее финансирование в 2019 году выделялось 14 млрд рублей, в 2020 году 10 млрд рублей, на 2021 год финансирование планируется в размере до 10 млрд рублей, что по мнению экспертов, явно недостаточно, требуется хотя бы финансирование на уровне 2019 года.

Развитие отечественного сельхозмашиностроения связано со стимулирующими программами, которые позволяли аграриям приобретать технику со значительными скидками. Предоставление подобных субсидий значительно удешевляет конечную стоимость отечественной техники и экономит деньги сельских товаропроизводителей.

Кроме данного фактора, отдельные государственные структуры осуществляют поддержку экспорта продукции сельхозмашиностроения. Например, агентство ЭКСАР осуществляет поддержку экспорта в Европу.

Также, имеются положительные примеры, когда государство помогает своим производителям. Так в 2018 году Кабмин РФ выделил 1,55 млрд рублей на субсидии для создания системы послепродажного обслуживания поставленной техники. Однако, имеет место ограничение размера субсидии, что может привести к потере достигнутых результатов.

Важное значение для эффективного экспорта продукции отечественного машиностроения особенно в дальние страны имеют логистические субсидии. «В 2020 году она не может превышать 11% от стоимости экспортируемого товара для производителей и 13% для иных юрлиц (ранее размер субсидии составлял 25–27,5%). Иными словами, при поставке машины стоимостью 1 млн руб. логистическая субсидия не может превышать 110 тыс. руб. Необходимо увеличение размера субсидии с 11% и 13% до 15% и 17%» [19].

Важное значение имеет долгосрочный характер государственной поддержки. Например, по программе 1432, в рамках которой сейчас субсидируется 10% стоимости техники, каждый год, особенно к концу бюджетного периода, возникало состояние неопределенности: будет она

продлена или нет. В 2020 году в проекте бюджета правительство заложило по 10 млрд руб. в год на эту программу на три ближайших года, на такой длительный период впервые. Сумма, конечно, не совсем достаточная, потребность оценивается в 12–14 млрд руб. в год. Тем не менее, данная программа носит среднесрочный характер и вселяет в участников рынка сельскохозяйственной техники определенный оптимизм.

Также важное значение имеет, то, что в 2021 году будет запущена программа гарантии обратного выкупа техники на внешних рынках. Сейчас экспорт составляет 12,5 млрд руб. в год, и за счет этого механизма он мог бы еще вырасти. Потому, что, когда компания выходит на рынки, технику еще не знают, и кредитные или лизинговые организации говорят: мы не знаем, сколько машина будет стоить через два года, гарантируйте нам, что вы выкупите ее за 90%, если фермер за машину не расплатится. Здесь могут возникнуть затраты, и государство готово взять часть рисков на себя. Выделяется не так много, 300 млн рублей, но тем не менее важен не размер этой субсидии, а сам факт ее существования [18].

В целом для стабильного роста производства продукции сельхозмашиностроения требуется государственная политика протекционизма развития отечественного производства.

Вместе с тем, следует учитывать, что политику протекционизма нужно применять с определенной долей осторожности, так как возникает опасность искусственного ограничения конкуренции отечественных и зарубежных товаропроизводителей, что может привести к застою и отставанию от мирового прогресса. В этой связи необходимо проводить **разумную** политику протекционизма, которая не будет полностью устранять рыночную конкуренцию.

Одной из важных мер политики протекционизма является субсидирование сбыта продукции отечественного машиностроения. Однако, имеет место недостаточный объем финансирования и намеченные программы по

субсидированию стоимости сельскохозяйственной техники отечественного производства не всегда подкрепляются выделенными бюджетными ресурсами [1].

Таким образом, имеется существенное основание отметить положительные тенденции, которые прослеживаются за последние годы.

Выводы и предложения:

В условиях экономической нестабильности, которая наблюдается в текущий период времени, рынок сельскохозяйственной техники подвержен значительным колебаниям и нуждается в государственной поддержке и мерах стабилизирующего характера.

В 2016-2020 годах наметились положительные тенденции в развитие отечественного сельхозмашиностроения, которые выражаются в росте производства отечественных машин и механизмов, разработке и внедрении в производство новых видов высокопроизводительной и менее энергозатратной техники, увеличение экспорта продукции сельхозмашиностроения.

Для проведения модернизации и импортозамещения необходимо создание современного экономического механизма. Данный механизм должна включать в себя прежде всего экономические инструменты. В частности, должен использоваться механизм субсидирования, льготного кредитования и налогообложения, мер протекционизмской политики, направленной на ограничение проникновения импортной продукции, мер поддержки экспорта продукции сельского хозяйства и продукции сельхозмашиностроения.

Отечественное сельскохозяйственное машиностроение не только способно обеспечить современной техникой агропромышленный комплекс страны, но и поставить значительное количество техники на экспорт, тем самым обеспечить переход России на экспортно-ориентированную экономику.

В основе государственной политики протекционизма развития отрасли сельхозмашиностроения должны лежать экономические меры, способствующие

росту производства в данной сфере. Необходима государственная поддержка, так как длительное время отрасль недофинансировалась в результате чего произошло устаревание средств производства и требуется их замена.

Господдержка отечественного машиностроения должна продолжиться и в дальнейшем, так как имеющиеся успехи нуждаются в подкреплении и достаточно длительном периоде действия.

Решение поставленных задач потребует, как корректировки государственной экономической политики, так и решения специфических отраслевых задач. Для дальнейшего развития отечественного сельхозмашиностроения в Российской Федерации требуется создать благоприятный экономический климат. Необходимо пересмотреть денежно-кредитную, налоговую и внешнеторговую политику.

Наряду с сельскохозяйственными предприятиями нужно стимулировать представителей сельскохозяйственного машиностроения реализовывать инновации в своем производстве. Направленные средства на НИОКР должны полностью освобождаться от налогов.

Наряду с экономическими мерами стимулирования развития отечественного сельхозмашиностроения необходимы меры направленные на ограничение проникновения импортной сельскохозяйственной продукции, готовой техники и других средств производства, которые могут быть произведены на территории Российской Федерации. Приоритет отечественного производителя должен обеспечиваться всеми возможными государственными мерами воздействия на текущие рыночные процессы.

Таким образом, необходим новый подход к стимулированию производства, который обеспечит устойчивый экономический рост и развитие отечественного сельхозмашиностроения.

Список использованной литературы

1. Государственная программа развития сельского хозяйства и регулирования рынков сельскохозяйственной продукции, сырья и

продовольствия на 2013-2020 годы. Утверждена постановлением Правительства Российской Федерации от 14 июля 2012 г. № 717.

2. Постановление Правительства РФ от 17 декабря 2016 г. № 1388 [Электронный ресурс]: Информационно-правовой портал «Гарант» – Режим доступа: <http://www.garant.ru/products/ipo/prime/doc/71469140>, (дата обращения 20.10.2018).

3. Постановление Правительства РФ от 13 декабря 2012 г. № 1302 [Электронный ресурс]: Информационно-правовой порта «Гарант» – Режим доступа: <http://base.garant.ru/70282388>. (дата обращения 20.10.2018).

4. Росстат РФ. – [Электронный ресурс]. – Режим доступа: <http://www.gks.ru/> (дата обращения: 25.12.2020).

5. Минсельхоз РФ. – [Электронный ресурс]. – Режим доступа: <http://www.mcx.ru/> (дата обращения: 09.09.2020).

6. Экспорт российской сельхозтехники бьет рекорды. Пресс-релиз Ассоциации "Росагромаш" - [Электронный ресурс]. – Режим доступа: <http://www.rosagromash.ru/ru/publications> (дата обращения: 09.09.2019).

7. К. Бабкин. Нужна предсказуемая поддержка – 25.09.2017 [Электронный ресурс]. – Режим доступа: <http://agro.ru/novosti/oborudovanie-i-agrotehnika/babkin-nuzhna-predskazuemaya-podderzhka/>(дата обращения: 02.09.2018).

8. Поставки техники через Росагролизинг выросли на 51% в 2016 году 28.09.2017 [Электронный ресурс]. – Режим доступа: <http://agro2b.ru/ru/news/38769-Postavki-tehniki-cherez-Rosagrolizing-vyrosli-2016.html> (дата обращения: 09.09.2018).

9. Успехи российских производителей сельхозтехники – [Электронный ресурс]. – Режим доступа: <http://rosspetsmash.ru/rosspetsmash-v-smi/1601-uspekhi-rossijskikh-proizvoditelej-selkhoztekhniki> (дата обращения: 09.09.2018).

10. Экспорт российской сельхозтехники вырос в полтора раза – [Электронный ресурс]. – Режим доступа: <https://iz.ru/626242/2017-07-31/eksport->

selkhoztekhniki-v-rf-vyros-v-15-raza-v-pervoi-polovine-goda(дата обращения: 09.09.2018).

11. Бабкин К. Почему в России сельхозтехника работает на износ - Газета «Коммерсант» 1 июня 2018 - [Электронный ресурс]. - <http://www.rosagromash.ru/rosspetsmash-v-smi/2522-pochemu-v-rossii-selkhoztekhnika-rabotaet-na-iznos> (дата обращения: 09.09.2018).

12. Без субсидий комбайны не продаются - Газета «Коммерсант» 06 июня 2018 - [Электронный ресурс]. <http://www.rosagromash.ru/rosspetsmash-v-smi/2523-bez-subsidij-kombajny-ne-prodayutsya> (дата обращения: 09.09.2018).

13. Производителей отечественной техники лишают господдержки – ТАСС 03 июня 2019 [Электронный ресурс]. <http://www.rosagromash.ru/novosti-kompanij-chlenov-assotsiatsii> (дата обращения: 19.09.2020).

14. Сайт Ассоциации «Росспецмаш», Новости компаний - [Электронный ресурс]. <https://rosspetsmash.ru/novosti-assotsiatsii-rosspetsmash> (дата обращения: 04.12.2020).

15. Выпуск сельхозтехники в РФ вырос на треть Сайт Ассоциации «Росспецмаш», Новости компаний - [Электронный ресурс]. <https://rosspetsmash.ru/novosti-assotsiatsii-rosspetsmash> (дата обращения: 04.11.2020).

16. Машиностроители жалуются на дороговизну продукции металлургов Сайт Ассоциации «Росспецмаш», Новости компаний - [Электронный ресурс]. <https://rosspetsmash.ru/novosti-assotsiatsii-rosspetsmash> (дата обращения: 04.11.2020).

17. Сайт АО «Росагролизинг», Новости компании - [Электронный ресурс]. <https://www.rosagroleasing.ru/smi/news/4093/>(дата обращения: 04.11.2020).

18. «Дивиденды подождут». Константин Бабкин о деньгах и счастье. - Газета «Коммерсант» 12 октября 2020 - [Электронный ресурс]. <https://rosspetsmash.ru/novosti-assotsiatsii-rosspetsmash> (дата обращения: 04.11.2020).

19. Машиностроители просят увеличить поддержку дальнего экспорта - Газета «Коммерсант» 16 июня 2020 - [Электронный ресурс]. <https://rosspetsmash.ru/novosti-assotsiatsii-rosspetsmash> (дата обращения: 04.11.2020).

Глава 7. Маркетинговые исследования в формировании сбытовой стратегии предприятия

7.1. Направления и программа маркетинговых исследований сбыта

Маркетинговые исследования – это исследования всех направлений деятельности предприятия, требующих маркетинговой активности. Они являются поставщиком информации менеджменту предприятия для разработки и принятия управленческих решений.

Результаты маркетинговых исследований служат основой разработки множества маркетинговых решений, тем более, когда речь идет о стратегических товарно-сбытовых решениях. Авторы учебников по маркетингу и маркетинговым исследованиям сходятся во мнении, что проводимые предприятиями маркетинговые исследования служат информационно-аналитическому обоснованию выбора стратегий маркетинга на рынках сбыта [10]. Полученная в ходе исследований информация берется в основу маркетинговых решений по преобразованиям товара, упаковки, рекламных планов и цен, программ формирования лояльности потребителей и их реализации, программ работы с партнёрами и поставщиками и др.

Необходимость и периодичность маркетинговых исследований зависят от масштаба бизнеса, его отраслевой принадлежности, реализуемого продукта, конкурентной среды, жизненного цикла товара, рынка, где предприятие осуществляет сбыт своей продукции и др.

Сбыт, являясь завершающей стадией на пути к достижению целей предприятия, служит выявлению вкусов и предпочтений клиентов (потребителей), выявлению и соотнесению интересов предприятия-производителя и требований рынка [2]. Цель производителя – наращивать объёмы производства, снижая при этом себестоимость производства и сужая номенклатуру производимой продукции. Потребителям же необходим широкий выбор товаров с различными потребительскими свойствами по приемлемой

цене. Уже одно это свидетельствует о необходимости и значимости маркетинговых исследований в обосновании решений по сбыту.

Маркетинговые решения по сбыту основаны на исследовании конъюнктуры рынка и возможностей предприятия предлагать востребованную рынком продукцию. Систему организации и контроля сбыта, способную обеспечить конкурентоспособность предприятия, можно построить только на хорошем понимании рынка, которое возможно с помощью маркетинговых исследований.

Исследования деятельности по сбыту в рейтингах направлений маркетинговых исследований стоят отнюдь не на первом месте. Из четырнадцати выделяемых основных направлений эти исследования занимают предпоследнюю строчку. Не сложно предположить, что методологические, методические и процедурно-технические приемы, принятые и зарекомендовавшие себя по другим направлениям, в исследовании сбыта все еще не завершили переработку и адаптацию под соответствующие цели.

Методики и технологии маркетинговых исследований, многократно описанные во множестве соответствующих учебников и научных статей, тем не менее, всегда актуальны и представляют научный интерес в своем прикладном виде. Именно в этом случае у исследовательского инструментария могут проявиться некоторые отраслевые, продуктовые, производственные или рыночные особенности, могут приоткрыться новые исследовательские возможности общеизвестных методик. Этот аспект и является предметом данного исследования.

Целью данного исследования стал поиск специфических особенностей в применении ряда матричных моделей, привлекаемых для разработки стратегий по сбыту продукции.

Маркетинговые исследования сбыта, как и маркетинговые исследования любого другого направления деятельности предприятия, представляют собой

сбор необходимой информации, её обработку, анализ и разработку прогнозов сбыта продукции.

Для нужд маркетинга применяется широкий набор методов сбора данных. Для сбора первичной, т.е. имеющейся в распоряжении только предприятия и потому обладающей определенным преимуществом, маркетинговой информации используются анкетные опросы потребителей и экспертов, фокус-группы, эксперименты, наблюдения, бизнес-разведка и др., вторичной – как минимум, анализ документов, статистических данных и результатов исследований маркетинговых агентств. Выбор методов сбора информации предопределяется такими факторами, как предмет и объект исследования (потребитель, товар, рынок, предприятие, конкурент), конъюнктура рынка, сроки получения результатов исследования, бюджет исследования и др. [5].

Классический набор методов анализа маркетинговой информации – табличный, графический, корреляционно регрессионный и дисперсионный (последние два применяются, чаще всего, для анализа мнений и предпочтений потребителей), ABC- и XYZ-анализ, различный набор матричных моделей в разработке стратегических решений – в последнее время дополняется компьютерными программами обработки и анализа информации, начиная с простейшей Excel[7]. Это ускоряет и углубляет анализ информации и даже открывает новые возможности для аналитического потенциала методов анализа.

Программа маркетинговых исследований сбыта не имеет каких-либо особенностей и после традиционных первых трех пунктов, отводимых определению целей и задач, подлежащих подтверждению или опровержению рабочих гипотез, определению методов исследования, программа должна включать [1; 3]:

1. Подготовительные работы (подготовка исследовательского инструментария, раздаточные материалы, описываются и утверждаются процедуры съёма информации и т.п.).

2. Разработка плана исследования.

3. Реализация плана исследования, проведение полевых работ, когда осуществляется сбор информации и контроль работы полевого персонала.

4. Обработка собранной информации, которая включает как простой статистический подсчёт распределения полученных ответов, так и более сложную математическую обработку: расчет корреляционных связей, факторный, кластерный анализ и пр.

5. Интерпретация полученных результатов (когда собранные данные и связи получают логическую интерпретацию, а гипотезы – либо подтверждаются, либо опровергаются).

6. Подготовка аналитического отчета.

Практика маркетинговых исследований показывает, что результативный сбыт продукции предприятия нуждается в материалах исследования следующих основных направлений [8]:

- анализ конкурентоспособности продукции;
- анализ «портфеля» направлений сбытовой деятельности;
- исследование конкурентных возможностей предприятия на рынке;
- исследование спроса, предложения, объёма и емкости рынка;
- исследование особенностей товародвижения;
- анализ особенностей деятельности различных типов посредников и конкурентов;
- изучение основных приёмов сбыта продукции.

Здесь и в далее в выводах даётся краткое описание использованных для исследования сбытовой деятельности анализируемого предприятия методов. Одним из направлений исследований сбыта является анализ номенклатуры производимой и реализуемой продукции. Для этого полезна матрица BCG, что продемонстрировано и в данном исследовании. Движение товаров по матрице показывает, насколько эффективная работа была проведена с ассортиментом или какой план действий необходимо разработать, чтобы вовремя исправить неблагоприятные тенденции.

Относительно анализа BCG необходимо сделать оговорку о том, что не всегда данный метод может быть применен для анализа ассортимента, так как мы не всегда располагаем информацией о состоянии рынка (росте/сокращении), данными об объемах продаж компании-лидера. Поэтому часто матрицу модифицируют. Один из способов модификации разработан И.А. Рыбальченко [9]. Недостаток информации о рынке, конкурентах, который всегда имеет место в практике предприятий, делает применение матрицы BCG, как инструмента стратегического анализа, планирования и контроля, ограниченным. Предложенный указанным автором способ модификации BCG выглядит надёжно аргументированным и позволяет устранить необходимость использования внешней информации, а весь анализ строится по результатам сбыта предприятия, информация о котором всегда доступна, точна и достоверна. Главное в предлагаемой модификации – корректно выделить базовую единицу, называемую автором как «группа продукта». Демонстрация подхода к определению групп продукта (комбинация «каскадного подхода» и матричного представления) как раз и убеждает в достаточности вторичной внутренней информации.

Исследование возможностей расширения сбыта продукции предприятия за счёт охвата новых сегментов рынка с последующим выбором маркетинговой стратегии можно осуществить с помощью матрицы И. Ансоффа (таблица 7.1.1).

Таблица 7.1.1- Общий вид матрицы И. Ансоффа

| | Рынок: новый | Рынок: старый |
|----------------------|---------------------|----------------------|
| Товар: новый | 60-70% | 25-35% |
| Товар: старый | 40-50% | 15-20% |

Цифры в ячейках матрицы означают:

- только 15-20 компаний из 100, придерживающихся стратегии «старый рынок, старый товар», несут в течение года убытки, низкий уровень риска;
- от 25 до 33 предприятий из 100 при выводе нового товара на старый рынок оказываются с потерями.

Цифры в третьей и четвертой ячейках матрицы также отражают уровень коммерческого риска для двух других оставшихся стратегий.

Матрица GE (матрица Мак-Кензи) – общепризнанная модель для анализа привлекательности рынка сбыта, которая осуществляется по двум оценкам: сила позиции бизнеса и привлекательность отрасли. Количество параметров/показателей для оценок может колебаться от 5 до 15. В качестве таковых для оценки силы позиции бизнеса могут быть объём сбыта в натуральных и денежных показателях, динамика сбыта в натуральных и стоимостных показателях, доля рынка предприятия в натуральных и стоимостных показателях, занимаемое место в сегменте, уровень рентабельности, маржа, позиция по отношению к дистрибьюторам, наличие патентов и прочих конкурентных преимуществ и др.

Привлекательность отрасли обычно оценивают с помощью таких параметров/показателей, как ёмкость рынка в натуральных и денежных показателях, динамика средних показателей рентабельности, состояние конкуренции на рынке, уровень входных барьеров, уровень среднеотраслевых издержек и их динамика, применяемые технологии и др.

Многомерная матрица GE, где наряду с высокой и низкой оценками выделяется средний уровень оценок, способна подсказать менеджменту предприятия три основных стратегических направления: 1) наступательная стратегия (инвестирование для роста), 2) оборонительная стратегия (сохранение, поддержание позиций) и 3) стратегии отказа от инвестирования, (уход, ликвидация).

7.2. Сбытовая деятельность исследуемого предприятия

Все отношения купли-продажи осуществляются на основании договоров. Изучим основные условия по нескольким договорам поставки (таблица 7.2.1).

Таблица 7.2.1 – Условия договоров поставки товаров, заключенных с исследуемым предприятием

| Предприятия-покупатели | Продукция | Срок действия договора | Преимущества | |
|------------------------|-----------------------------|------------------------|--|--|
| | | | для производителя | для клиента |
| 1 | 2 | 3 | 4 | 5 |
| Клиент 1 | Варёные колбасы, копчёности | По 31.05.2020 | - подача заявок по четвергам; - расчеты 2 раза в месяц; - транспортные расходы за счет покупателя при установлении станции назначения - франко-склад поставщика. | - покупатель вправе отказаться от приемки товара, поставка которого просрочена; - выставление электронных счет-фактур |
| Клиент 2 | Варёные колбасы, копчёности | До 31.12.2020 | -пролонгация договора; - доставка товара Покупателю производится транспортом Покупателя за его счет; - При нарушении сроков оплаты, пеня в размере однодневной учетной ставки рефинансирования, установленной ЦБ РФ | - покупатель вправе отказаться от приемки товара, поставка которого просрочена; - выставление электронных счет-фактур |
| Клиент 3 | Товары по заявке | До 31.12.2020 | - пролонгация договора; - доставка товара Покупателю производится транспортом Покупателя за его счет; - при нарушении сроков оплаты, пеня в размере однодневной учетной ставки рефинансирования, установленной ЦБ РФ | - пролонгация договора; - днем исполнения обязательств Поставщика по договору считается дата передачи товара Покупателю; - оплата в течение 30 календарных дней; - выставление электронных счет-фактур. |

Источник: составлено авторами по данным предприятия

Изучая договора, можно отметить, что структура представленных договоров соответствует требованиям [6]: все основные части – вводная, основная и заключительная – в них представлены. Также в договорах присутствуют предмет договора (ассортимент), количество поставляемого товара, цена товара. Однако, не ко всем заключенным договорам прилагаются спецификации.

Более подробно информация по договорам, заключенным предприятием, представлена в таблице 7.2.2.

Таблица 7.2.2 – Информация о количестве договоров и условиях оплаты за продукцию, 2018-2020 гг.

| Показатели | Годы | | | Отклонение 2020 г. от 2018 г. (+/-) |
|--------------------------------|------|------|------|---|
| | 2018 | 2019 | 2020 | |
| Количество договоров всего, | 486 | 479 | 480 | - 6 |
| в т. ч. с поставщиками | 238 | 234 | 175 | - 63 |
| - предоплата | 79 | 77 | 54 | - 25 |
| - отсрочка | 160 | 157 | 123 | - 37 |

Источник: составлено авторами по данным предприятия

Предметом маркетинговых исследований сбытовой деятельности предприятия является оценка ее сильных и слабых сторон (таблица 7.2.3).

Таблица 7.2.3 – Характеристика сильных и слабых сторон сбытовой деятельности исследуемого предприятия в 2019 г.

| Основные операции коммерческой деятельности | Сильные стороны | Слабые стороны |
|---|---|---|
| 1 | 2 | 3 |
| Организация хозяйственных связей с покупателями | Реализация продукции крупным оптовым ритейлерам | |
| Организация договорной работы покупателями | Договорная работа организована достаточно хорошо, все этапы отработаны. Заключение договоров осуществляется на достаточно выгодных условиях для предприятия | Договора носят типовой характер, не всегда учитывают особенности клиентов |

Окончание таблицы 7.2.3

| 1 | 2 | 3 |
|------------------------------|---|--|
| Формирование ассортимента | Широкий ассортимент производимой продукции | Формируется с учетом спроса, слабо анализируются перспективы изменений |
| Выбор форм и методов продажи | Предприятие постоянно участвует в различных ярмарках | Выбор форм и методов продажи ограничен |
| Стимулирование сбыта | Используются скидки, проводятся акции | Нет разработанной стратегии |
| Реклама | Носит точечный эпизодический характер | Нет стратегии и программы |
| Сервисное сопровождение | Предоставляется ряд дополнительных услуг (упаковка, взвешивание, нарезка) | Количество оказываемых услуг незначительно |

Источник: составлено авторами по данным предприятия

Исследуются также возможности и угрозы для сбыта продукции предприятия (таблица 7.2.4).

Таблица 7.2.4 – Характеристика возможностей и угроз сбытовой деятельности исследуемого предприятия в 2019 г.

| Угрозы | Возможности |
|---|--|
| Усиление конкуренции Уход клиентов к другим производителям | Развитие собственной торговой сети Расширение ассортимента с учетом изучения спроса потребителей Повышение эффективности маркетинга в деятельности предприятия |

Источник: составлено по данным предприятия

Анализ деятельности предприятия позволил выявить следующие негативные моменты в его сбыте:

- высокий уровень конкуренции на рынке;
- отсутствие маркетинговых исследований в целях расширения зоны сбыта

продукции.

На основе анализа сбыта исследуемому предприятию могут быть предложены следующие меры по совершенствованию деятельности (таблица 7.2.5).

Таблица 7.2.5 – Мероприятия по совершенствованию сбытовой деятельности исследуемого предприятия

| Направления | Методы совершенствования |
|--|--|
| Расширение маркетинга | - осуществление исследований рынка сбыта; - активизация рекламы реализуемой продукции; |
| Расширение дополнительных услуг | - выявления потребностей клиентов путем исследований и изыскания путей их удовлетворения; - разработка упаковки с учетом пожеланий клиентов |
| Расширение ассортимента | - производство продукции с учетом современных тенденций: с различными добавками (витаминами), производство для конкретных сегментов рынка (снеки мясные к пиву) и т.д. |
| Расширение использования компьютерных технологий на процессах закупки/отгрузки товаров | - расширения использования необходимого программного обеспечения; - создание базы данных поставщиков и покупателей. |
| Оперативное отслеживание потребностей клиентов/покупателей | - совершенствование обратных связей с клиентами, их регулярный опрос. |
| Смена приёмов продажи | - поиск дополнительных мест продажи; - участие в ярмарках. |

Источник: составлено авторами

Для построения товарной стратегии проведена экспертная оценка (эксперты – сотрудники отдела сбыта предприятия) рыночной позиции предприятия [4] (таблица 7.2.6).

Таблица 7.2.6 – Оценка рыночной позиции исследуемого предприятия

| Показатель | Колбасы | Копчености | Сосиски, сардельки |
|---------------------------|--|---|--|
| 1 | 2 | 3 | 4 |
| Основные сегменты рынка | Организации общественного питания. Торговые организации. Бюджетные организации | Организации общественного питания. Торговые организации. | Организации общественного питания. Торговые организации. Бюджетные организации |
| Объем сбыта | Анализ объемов сбыта в границах отдельных сегментов проводится | | |
| Рентабельность продаж | Сводные данные по товарным группам в рамках отдельных сегментов отсутствуют | | |
| Различия между сегментами | Объем заказа. Объем упаковки | Объем заказа. Объем упаковки | Объем заказа. Объем упаковки |
| Основные конкуренты | Конкурент 1, конкурент 2 | | |

Окончание таблицы 7.2.6

| | | | |
|---|--|---------------------------------|---------------------------------|
| Лидер рынка | Исследуемое предприятие | Данные отсутствуют | Данные отсутствуют |
| Критерии работы конкурентов | Анализируются ассортимент, цены | Анализируются ассортимент, цены | Анализируются ассортимент, цены |
| Барьеры вхождения на рынок | Не анализируются | Не анализируются | Не анализируются |
| Ключевые факторы успеха на рынке | Качество. Соотношение «цена-качество» | Соотношение «цена-качество» | Соотношение «цена-качество» |
| Потребители: | | | |
| Количество конкурентов | Более 10 | Более 10 | Более 10 |
| Общее количество | Выборка по отдельным сегментам не проводится | | |
| Количество закупок в год | ежемесячно | ежемесячно | ежемесячно |
| Принятие решения о покупке | Директор организации | Директор организации | Директор организации |
| Не удовлетворенные требования покупателей | Для торговли – расфасовка 1 и 0,5 кг | Претензии не предъявляются | Упаковка |

Источник: составлено авторами по результатам опроса экспертов

Обобщая оценку рыночной позиции исследуемого предприятия, необходимо отметить следующие положительные моменты:

- менеджменту известны целевые сегменты рынка и основные различия между ними;
- известны основные ключевые факторы успеха на рынках сбыта продукции предприятия;
- существует высокая степень осведомленности работников сбыта о процедуре принятия маркетинговых решений.

Выявленные в ходе оценки рыночной позиции негативные моменты можно представить так:

- менеджмент не располагает точными данными по количеству, составу конкурентов и их рыночным позициям;

- анализ деятельности конкурентов неоправданно ограничен мониторингом ассортимента и цен;
- не оцениваются барьеры вхождения в рынок.

7.3. Обоснование стратегии сбыта на основе результатов маркетинговых исследований

Для построения эффективной сбытовой политики необходима стратегия.

Матрица И. Ансоффа основывается на предпосылке, что наиболее целесообразные стратегии для роста сбыта – это стратегии производства и реализации существующих или новых продуктов на существующем или новом рынках. Данная матрица обладает, как минимум, двумя возможностями: 1) для менеджмента предприятия матрица выступает своего рода платформой для принятия стратегических решений о деятельности на рынках сбыта, 2) матрица служит диагностическим инструментом, способным описать возможные стратегии предприятия в условиях растущего рынка (таблица 7.3.1).

Таблица 7.3.1 – Матрица И. Ансоффа для исследуемого предприятия

| Стратегия проникновения | Вопрос: Есть ли возможности и перспективы роста на существующем рынке предприятия? | | |
|---|--|--------------------------------------|-------------------------------------|
| | Возможна | Вероятна | Не возможна |
| 1 | 2 | 3 | 4 |
| Описание существующего рынка и существующего товара | Рынок: Розничная торговля колбасными изделиями Товар: колбасные изделия | | |
| Темп роста рынка | Высокий | Замедляющийся, но растущий | Стагнация или снижение объёма рынка |
| Уровень потребления товара предприятия среди целевой аудитории (ЦА) | Ниже, чем в среднем по рынку | На уровне среднерыночных показателей | Выше, чем в среднем по рынку |
| Частота использования товара ЦА | Максимальна | Умеренна | Низка |
| Уровень дистрибуции товара на рынке (или доступа к товару) | Ниже, чем в среднем по рынку | На уровне среднерыночных показателей | Выше, чем в среднем по рынку |

Продолжение таблицы 7.3.1

| 1 | 2 | 3 | 4 |
|---|---|---|--|
| Уровень знания бренда | Ниже, чем в среднем по рынку | На уровне среднерыночных показателей | Выше, чем в среднем по рынку |
| Экономия от масштаба | Есть | | Нет |
| Товар предприятия имеет конкурентное преимущество на существующем рынке | Да | | Нет |
| Возможности высокого уровня инвестиций | Есть | | Нет |
| Стратегия развития рынка | Вопрос: Сможет ли предприятие выйти со старым товаром на новые рынки? | | |
| | Возможна | Вероятна | Не возможна |
| Описание нового рынка и текущего товара | Новый рынок: розничная торговля в близлежащих городах Текущий товар: колбасные изделия | | |
| Предприятие успешно в своей текущей сбытовой деятельности (товар востребован на существующем рынке или к нему высокая лояльность) | Да | Есть мелкие недочёты | Нет, необходимо совершенствовать продукт |
| Количество игроков на новом рынке | Небольшое количество игроков (1-3) | Средний уровень насыщения рынка (3- 10) | Высокий уровень насыщения рынка |
| Входные барьеры на новый рынок | Практически отсутствуют | Есть, но недостаточно высокое | Высокий уровень входных барьеров |
| Темпы роста нового рынка | Высокий | Замедляющийся, но растущий | Стагнация или снижение объёма рынка |

Окончание таблицы 7.3.1

| | | | |
|---|--|---|-------------------------------------|
| Товар обладает уникальными свойствами, имеет конкурентное преимущество или предприятие владеет уникальной технологией, или имеет уникальную прибыльную модель ведения бизнеса | Да | | Нет |
| Предприятие располагает дополнительным капиталом для инвестирования сбыта на новом рынке | Да | | Нет |
| Стратегия развития товара | Вопрос: Сможет ли предприятие расширить ассортимент товаров на текущем рынке? | | |
| | Возможна | Вероятна | Не возможна |
| Описание текущего рынка и нового товара | Текущий рынок: розничная торговля Новый товар: абсолютная новинка | | |
| Темпы роста текущего рынка | Высокий | Замедляющийся, но растущий | Стагнация или снижение объёма рынка |
| Ёмкость/объём текущего рыночного сегмента для предприятия | Большой | Средний | Небольшой |
| Текущий товар устарел, имеет недостатки или находится на стадии спада жизненного цикла товара | Да | Намечаются тенденции к снижению спроса на текущий товар | Нет |
| Внутриотраслевая конкуренция | Высокий уровень | Тенденции к ужесточению | Низкий уровень |
| Угроза входа на рынок новых игроков | Да | | Нет |
| Если успех в отрасли зависит от инновационности и постоянного предложения нового товара | Да | | Нет |

Окончание таблицы 7.3.1

| 1 | 2 | 3 | 4 |
|---|--|----------------------------|-------------|
| Уровень обновления ассортимента и появления новинок у ближайших конкурентов | Высокий | | Низкий |
| Стратегия диверсификации | Вопрос: Есть ли у предприятия необходимость в диверсификации ассортиментного портфеля | | |
| | Возможна | Вероятна | Не возможна |
| Описание нового рынка и нового товара | Новый рынок: розничная торговля Новый товар: производство колбасы с добавлением аскорбиновой кислоты и бета- каротина | | |
| Темпы роста текущих рынков сбыта предприятия | Стагнация или снижение объёма рынка | Замедляющийся, но растущий | Высокий |
| Уровень конкуренции на текущих рынках | Высокий | Тенденции к ужесточению | Низкий |
| Предприятие располагает свободными ресурсами для развития сбыта на новом рынке | Да | | Нет |
| Менеджмент предприятия имеет достаточный уровень компетенции для осуществления сбыта на новом рынке | Да | | Нет |
| Возможность роста на текущих рынках и с текущими товарами | Минимальны и отсутствуют | | Есть |

Источник: составлено авторами по данным предприятия

Матрица И. Ансоффа, как и любой другой матричный инструмент, служит выбору стратегий. Опираясь на неё, можно сделать выбор четырех стратегических направлений:

Стратегия проникновения на рынок (удержание, стабилизация или усиление позиции) – это стратегия совершенствования имеющегося опыта сбыта и извлечение максимально возможной прибыли от сбыта производимых товаров

на существующих рынках. Отдавая предпочтение данной стратегии, предприятие должно активизировать маркетинговые технологии, проводя маркетинговые исследования, акционные мероприятия по продвижению продукции и др.

Если принять затраты на стратегию проникновения на рынок за 100%, то затраты для других стратегий будут значительно меньше. Однако, это не означает, что эта стратегия наилучшая. Привлекательность той или иной стратегии на основе этой матрицы определяется величиной сбыта и вероятностью достижения этого сбыта. За потенциальный объём сбыта принимается ёмкость данного сегмента, вероятность достижения потенциального объёма сбыта определяют эксперты.

Стратегия разработки продукта (развитие продукта, линейное расширение). Эта стратегия реализуется на известном рынке путём поиска рыночных ниш. Очевидно, что такая стратегия обеспечивает минимальные риски, поскольку сбыт осуществляется на знакомом рынке, а потому и наиболее предпочтительна для предприятия.

Стратегия расширения рынка направлена на поиск и освоение нового рынка для уже освоенных товаров. Коммерческий риск в этом случае составляет 40-50 %, т.е. такая стратегия в сравнении с другими на матрице более рискованная.

Стратегия диверсификации предполагает разработку новых видов продукции одновременно с освоением новых рынков. Преимуществами диверсификации являются расширение масштабов производства и сбыта, обеспечение устойчивости бизнеса, использование имеющегося ноу-хау. Главная привлекательность диверсификации – это достижение эффекта синергизма.

Оценим также потенциал различных направлений бизнеса и проанализируем потенциал рынков для предприятия, используя матрицу «GE». Для построения матрицы необходима оценка привлекательности сегмента

(таблица 7.3.2) и оценка конкурентоспособности товара предприятия на различных рынках.

Таблица 7.3.2 – Оценка привлекательности рыночных сегментов предприятия

| Критерии привлекательности сегмента | Вес фактора, % | Оценка выраженности фактора, баллы (1-10) | Оценка сегмента, баллы |
|---|----------------|---|------------------------|
| | 100 | | 8,06 |
| Объем сбыта в сегменте значительный | 12 | 9 | 1,08 |
| Темпы роста сегмента высокие и/или превышает темпы роста рынка | 10 | 8 | 0,8 |
| Количество игроков в сегменте незначительно | 9 | 7 | 0,63 |
| Инвестиции в рекламу в сегменте находятся на низком уровне | 10 | 5 | 0,5 |
| Существуют возможности для расширения ассортимента в сегменте | 5 | 9 | 0,45 |
| Низкий уровень культуры использования продукта, что для предприятия означает возможность роста | 14 | 8 | 1,12 |
| Давление конкурентных марок не значительно (низкий уровень знания, лояльности, несформированный имидж продукта) | 12 | 8 | 0,96 |
| На рынке существуют неудовлетворённые и скрытые потребности | 15 | 10 | 1,5 |
| Ожидается долгосрочный рост объёма сегмента | 8 | 9 | 0,72 |
| Риски влияния внешних факторов (экономических, технологических, политических, социальных) минимальны | 5 | 6 | 0,3 |

Источник: составлено авторами по данным предприятия

Аналогичным образом экспертами выполняется оценка конкурентоспособности товара предприятия на основе ряда критериев. В данном случае она составила 6,20 баллов.

На основе полученных результатов строится матрица GE (рисунок 7.3.1).

| | | | | |
|----------------------------|-----------------------|--|----------------------|-----------------------|
| Привлекательность сегмента | Высокая (8-10 баллов) | | Рынок | |
| | Средняя (4-7 баллов) | | | |
| | Низкая (0-3 балла) | | | |
| | | Низкая (0-3 балла) | Средняя (4-7 баллов) | Высокая (8-10 баллов) |
| | | Конкурентоспособность товара предприятия | | |

Источник: составлено авторами по данным таблицы 7.3.2 и оценке конкурентоспособности продукции

Рисунок 7.3.1 – Матрица GE для исследуемого предприятия

Результаты исследования на основе матрицы GE показывают, что для увеличения доли на рынке менеджменту предприятия нужно придерживаться следующих моментов:

- активно вести поиск направлений усиления конкурентных преимуществ продукции;
- на основе умеренных инвестиций продолжить укрепление своих позиций на рынке сбыта;
- в мероприятиях по продвижению (в рекламе, промо-акциях и др.) следует активно выделять конкурентные преимущества продукции, при этом ориентируясь на ограниченные методы продвижения с максимальной результативностью;
- выявлять точки роста в своём целевом сегменте, конкурентов, у которых можно забрать долю рынка, т.е. тех, против которых предприятие располагает очевидными преимуществами, и использовать стратегию нападения на конкурентов;
- избегать прямой конкуренции с предприятиями, реализующими более конкурентоспособную продукцию.

Для определения направлений продвижения продукции необходимо понимать содержание продуктового портфеля организации. Для оценки продуктового портфеля используется матрица BCG (рисунок 7.3.2).

| | | Наименование | Объём сбыта, т | Наименование | Объём сбыта, т |
|--------------------------|-----------------------------|-----------------------|----------------------|------------------------|----------------------|
| Темп прироста | Высокий (больше 10 %) | «Трудные дети» | | «Звёзды» | |
| | | Сардельки | 60 | | |
| | | Сосиски | 59 | | |
| | | Итого | 119 | Итого | - |
| | Низкий (меньше 10 %) | «Собаки» | | «Дойные коровы» | |
| | | Варёно- копчёные | 32 | Варёные колбасы | 128 |
| | | Сыро- копчёные | 21 | Полукопчёные | 68 |
| | | | | Копчёности | 82 |
| | | Итого | 53 | Итого | 278 |
| | | Низкая (меньше 1) | | Высокая (больше 1) | |
| Относительная доля рынка | | | | | |

Источник: разработано авторами по данным предприятия

Рисунок 7.3.2 – Матрица BCG по продукции, реализуемой исследуемым предприятием

На основании полученных данных возможны следующие выводы (таблица 7.3.3).

Таблица 7.3.3 – Конкурентные стратегии предприятия по матрице BCG

| ВЫВОДЫ: | |
|--|--|
| 1 | 2 |
| ТРУДНЫЕ ДЕТИ | ЗВЕЗДЫ |
| <p>№4 Доля группы в ассортиментном портфеле незначительна. Необходимо наращивать количество новинок и разработок. В отношении производимых марок сосисек и сарделек- следует создавать конкурентных преимущества, расширять каналы сбыта и обеспечивать им эффективную маркетинговую поддержка</p> | <p>№2 В ассортиментном портфеле предприятия недостаточно «звезд». Необходимо проанализировать возможность доведения сосисок и сарделек до «звезд», укрепляя имеющиеся у них конкурентные преимущества за счет повышения информированности о товаре. Второй вариант: изучить возможность создания новых товаров, способных стать «звёздами»</p> |

Окончание таблицы 7.3.3

| 1 | 2 |
|--|---|
| СОБАКИ | ДОЙНЫЕ КОРОВЫ |
| №1 Менеджмент предприятия первым шагом должен решить судьбу сырокопченых колбас. Необходима ликвидация этой товарной группы. Второй вариант: при большой емкости рынка можно попытаться превратить анализируемый товар в "дойную корову», что потребует реализации программ по репозиционированию / совершенствованию товара | №3 Поддержка должна быть сфокусирована на вареных колбасах и копченостях, обеспечивающих основную долю в сбыте. Цель- удержать положение. |

Источник: составлено авторами по данным предприятия

Таким образом, разработанные стратегии развития по каждой товарной группе позволят предприятию сосредоточиться на конкретных действиях в соответствии с разработанными стратегиями, что положительно скажется на продвижении продукции и позволит сконцентрировать усилия на конкретных результатах работы.

В целях совершенствования деятельности по сбыту продукции на предприятии предлагаются следующие направления/ мероприятия:

- активизация сбора необходимой информации для принятия обоснованных решений в коммерческой деятельности;
- обоснование объема закупок с учетом имеющихся товарных запасов и спроса конечных потребителей;
- внедрение новых рецептов с учетом современных тенденций в спросе;
- повышение заинтересованности поставщиков путем обеспечения эффективного сбыта продукции поставщика и др.

Эти мероприятия будут способствовать повышению эффективности сбытовой деятельности предприятия.

Построение матрицы BCG позволило определить стратегии развития для основных товарных групп, производимых исследуемым предприятием.

Необходимо решить вопрос по сырокопченым изделиям. Представляются возможными два варианта: 1) снять с производства или 2) довести эту товарную категорию до статуса «дойные коровы». При значительной ёмкости рынка с тенденцией к её увеличению целесообразен вариант 2. Это надо делать в рамках разработки и реализации специальной программы по репозиционированию товара, улучшению его характеристик.

В номенклатуре предприятия недостаточно товаров-«звёзд». Сосиски и сардельки следует развивать до уровня «звёзды», усиливая их рекламу, выстраивая дистрибуцию, укрепляя, таким образом, их конкурентные преимущества. В случае невозможности реализации такой цели нужна разработка новых колбасных изделий, способных занять место «звёзд».

В отношении вареных колбас и копченостей, составляющих основную долю продаж, акцент следует делать на удержании их положения.

Необходимо усилить разработку новинок. Существующие марки сосисек и сарделек следует продолжать развивать в такой последовательности: создание конкурентных преимуществ – рост дистрибуции – продвижение.

Таким образом, задействование сравнительно не широкого исследовательского инструментария, как в случае с данным исследованием, уже способно проникнуть в суть анализируемой проблемы и обеспечить менеджеров необходимой для обоснования маркетинговых решений информацией. Это указывает на необходимость и актуальность маркетинговых исследований сбытовой деятельности. Три матричных модели – матрица И. Ансоффа, матрица GE (матрица Мак-Кензи) и матрица BCG – позволяют структурировать информацию в рамках целей анализа и вывести аналитиков на должный уровень обоснования разрабатываемых решений.

Использованные для данного исследования матрицы-модели эффективны и при невысоком уровне информационного обеспечения процесса исследования, что создаёт практикующим маркетологам предпочтение в выборе данного исследовательского инструментария. Использованные для исследования

статистика сбыта предприятия и результаты экспертных оценок подконтрольны исследователям предприятия и служат достаточной и репрезентативной информационной базой. При этом глубина диагностирования исследуемой проблемы достаточна и не имеет нежелательного влияния на уровень обоснованности маркетинговых решений и, как показывает данное исследование, на уровень обоснования решений по сбытовой деятельности.

Можно сделать вывод о целесообразности не ограничиваться одним-двумя методами для анализа проблемы и применять для исследований некоторый набор методов примерно одинакового назначения. При их пакетном применении издержки возможного дублирования смягчаются расширением горизонта и определенным углублением исследований. Помимо этого, пакетное применение маркетингового инструментария способствует приданию применяемым методам дополнительных аналитических опций. Представляется, что комбинация и иных методов-моделей обладает синергетическими преимуществами и даёт больший исследовательский эффект. Для приведенного исследования возможен альтернативный набор матриц, в т.ч. матрица Хофера (стадия развития рынка – сила бизнеса на рынке), матрица ADL (стадия жизненного цикла товара-конкурентная позиция предприятия на рынке), матрица Вайсмана (привлекательность рынка – позиции предприятия в конкурентной борьбе).

Показателями/ критериями силы бизнеса обычно выступают доля рынка и её динамика, система дистрибуции, эффективность производства, возможности производства, объём производства, инновации, эффективность маркетинга и др. Стадии развития рынка принято отражать с помощью стадии жизненного цикла товара на рынке, динамики объёма рынка, состояния макро- и микросреды бизнеса и др.

Наличие в этом наборе матрицы ADL, а также матрицы Вайсмана даёт возможность исследовать конкурентные позиции предприятия, на что в меньшей степени сориентирован использованный в данном исследовании инструментарий.

Матрицу BCG в этом наборе в определённой мере способен заменить ABC-анализ, определяющий или оценивающий на соответствие правилу Паретто – оптимальность наиболее прибыльные в ассортиментном портфеле предприятия товары (группа А). Содержательны и другие выводы на основе ABC-анализа в отношении товаров группы В и группы С, которые служат лицам, принимающим решения, надёжным ориентиром. Объединённый с XYZ-анализом, позволяющим исследовать ассортимент на основе стабильности объёма сбыта групп товаров путем расчета коэффициента вариации, ABC-анализ становится незаменимым в исследовании товарного ассортимента.

Совмещение результатов ABC- и XYZ-анализов образует группы AX, VX, AY и VY. Первые две группы объединяют товары с высоким объёмом и стабильностью сбыта, спрос на которые хорошо прогнозируется. Эти товары должны быть всегда в наличии.

Товары двух других групп, напротив, недостаточно стабильные в сбыте, необходимое постоянное их наличие возможно путём увеличения страхового запаса.

В группу CZ объединяются товары, реализуемые на основе заказов. Некоторые из них могут быть без каких-либо потерь и последствий выведены из ассортимента, а сбыт других следует мониторить, так как их реализация может стать затруднённой и привести к потерям.

Помимо выводов, которые можно получить на основе ABC- и XYZ-анализов, в пользу их применения говорит и наличие под рукой необходимой информации для осуществления группировки товаров (прибыль или объём сбыта предприятия за соответствующие периоды).

Указанные и другие модели-матрицы основаны на задаваемых исследователями критериях, что является едва ли не определяющим элементом успеха или неудачи исследования, его объективности или ненадёжности. В представленном исследовании, в частности, судьбоносными для анализа и последующего на его основе принятия маркетинговых решений являются

критерии привлекательности сегмента и критерии конкурентоспособности товара, использованных для анализа с помощью матрицы GE (10 и 7 критериев соответственно). Выбор такого рода критериев требует самостоятельного изучения и обоснования. Более того, сами критерии – это результаты специальных исследований. Так, критерии, отражающие степень давления конкурентных марок, наличие/ отсутствие неудовлетворённых и скрытых потребностей, риски влияния внешних факторов на сбытовую деятельность предприятия и др. получены в результате исследований, которые могут проводиться или параллельно, или предварительно. Критерий «ожидается долгосрочный рост объёма сегмента» или подобный ему показатель может быть определен путём прогнозирования объёма сегмента, как минимум тремя методами. Вывод об увеличении сегмента делается, только если все три метода свидетельствует об увеличении и расхождения в трех вариантах расчётов прогнозов не составляют больше 10%.

В арсенале маркетинговых исследований находится множество методов прогнозирования: метод экстраполяции с его известными ограничениями в отношении временных периодов упреждения, интерполяция, прогнозирование с помощью коэффициента эластичности, методы экспертных оценок, метод аналогии, опрос потребителей, тестирование товара и рынка и др. Первые из указанных методов относятся к количественным, они опираются на использование статистических данных. Последние четыре – метод экспертных оценок и аналогии, опрос потребителей, тестирование товара и рынка – относятся к качественным методам. Выбор конкретного метода прогнозирования обусловлен целью исследования и спецификой базисной информации. В процессе прогнозирования анализируются причинно-следственные связи в деятельности предприятия на рынке, даётся количественная характеристика этим связям, оценивается их влияние на состояние и динамику рынка и на основе чего делаются попытки распознать ожидаемые изменения.

В интересах исследования сбыта менеджменту необходим прогноз рыночной конъюнктуры, прогноз спроса на товары предприятия и предприятий-конкурентов, прогноз непосредственно сбыта и др. Но независимо от вида прогноза, прогнозирование осуществляется в следующей последовательности: выбор наиболее соответствующих ситуации метода/ технологии прогнозирования; оценка пригодности выбранной модели; сравнение полученного прогноза с фактическими данными. Выбор метода прогнозирования, его последовательность не связаны с тем, какой период упреждения необходим: ближайший, краткосрочный, среднесрочный, долгосрочный.

В очередной раз подтверждая универсальность использованных матриц, вместе с тем, данное исследование демонстрирует возможность и целесообразность дополнения, в частности, матрицы И. Ансоффа, экспертными оценками на основе различных шкал и расширения за счёт этого её аналитических возможностей, придания ей большей направленности на предмет исследования.

В целом невозможно переоценить роль экспертных оценок в исследовании сбытовой деятельности предприятия, когда абсолютное большинство задействованных для тех или иных оценок критериев определяется экспертным путём. Экспертные оценки становятся незаменимы, когда речь заходит о необходимости исследования конкурентов и конкурентных позиций предприятия. В этих случаях вряд ли правильно состав экспертных групп ограничивать специалистами предприятия, необходим смешанный состав с включением сторонних экспертов, что как минимум, повышает непредвзятость, объективность оценок. Но и в этом случае, и в случаях с другими предметами исследования, наиболее актуальным пунктом является обоснованность выбора критериев/ показателей для оценок, которые далеко не всегда могут соответствовать оптимальному перечню по причине невозможности получить по ним ту или иную информацию.

Список использованной литературы

1. Березин И.С. Маркетинговые исследования. Инструкция по применению. 3-е изд., пер. и доп./ И.С. Березин.- Люберцы: Юрайт, 2017.- 383 с.
2. Гаджинский А.М. Логистика: Учебник для бакалавров / А.М. Гаджинский.- 21-е изд.- М.: ИТК «Дашков и К», 2017.-420 с.
3. Голубков, Е.П. Маркетинговые исследования: теория, методология и практика. 4-е изд., перераб. и доп / Е.П. Голубков.- М.: Финпресс, 2018.- 496 с.
4. Жукова, Т.Н. Коммерческая деятельность: учеб. пособие / Т.Н. Жукова. – М.: Вектор, 2017. – 256 с.
5. Каменева, Н.Г. Маркетинговые исследования: Учебное пособие/ Н.Г. Каменева, В.А. Поляков.- М.: Вузовский учебник, НИЦ ИНФРА- М, 2018.- 368 с.
6. Короткова, Т.Л. Коммерческая деятельность: учеб. для вузов / Т.Л. Короткова; под ред. Н.К. Моисеевой. - М.: Финансы и статистика, 2016. – 416 с.
7. Лебедева, О.А. Маркетинговые исследования рынка: Учебник / О.А. Лебедева, Н.И. Лыгина.- М.: ИД ФОРУМ, НИЦ ИНФРА- М, 2017.- 192 с.
8. Осипова, Л.В. Основы коммерческой деятельности: учеб. /Л.В. Осипова, И.М. Синяева. – М.: ЮНИТИ ДАНА, 2017. – 307 с.
9. Рыбальченко И. Практические методы разработки и анализа товарной стратегии предприятия на основе внутренней вторичной информации- https://www.cfin.ru/marketing/quasi_bcg.shtml (дата обращения 14.12.2020 г.).
10. Рыжикова Т.Н. Аналитический маркетинг: что должен знать маркетинговый аналитик: учебное пособие.- М.: ИНФРА- М, 2018.- с.288.

Глава 8. Корпоративный форсайт в системе стратегического управления предприятием

8.1. Место и роль долгосрочного прогнозирования в системе управления коммерческим предприятием

В современных условиях глобализации экономики и возрастающей конкуренции важнейшим фактором успешного управления коммерческим предприятием в долгосрочной перспективе является выбор эффективной стратегии ее развития.

Стратегия организации, в свою очередь, состоит из четкого понимания руководством долгосрочных целей компании и путей их достижения, которые выражаются в форме стратегического плана. Таким образом, стратегическое планирование определяет долгосрочные цели деятельности (с периодом упреждения – 20-30 лет), в том числе перспективные направления бизнеса.

Известно, что стратегическое планирование состоит из ряда последовательных этапов, одним из которых является прогнозирование. Эффективный стратегический план должен строиться на основе результатов качественного прогноза. Можно с уверенностью сказать, что во многом эффективность стратегического управления предприятием в целом зависит от качественно выполненного прогноза на долгосрочную перспективу. Прогноз в свою очередь должен учитывать целый ряд факторов, так или иначе воздействующих на развитие организации. К ним относятся:

- стратегический потенциал предприятия;
- факторы внешней среды прямого воздействия;
- факторы внешней среды косвенного воздействия;
- объективные закономерности развития рынка и многие другие.

Таким образом, роль прогнозирования в системе управления современным предприятием можно кратко охарактеризовать известной формулой – «Руководить – значит предвидеть».

В этой связи следует обратить внимание на тот факт, что одной из характерных проблем развития как отдельных корпораций, так и целых отраслей в нашей стране является отсутствие стратегического видения.

Многие российские компании вообще не занимаются вопросами стратегического планирования, так сказать «плывут по течению». Для других стратегическое планирование является во многом формальной процедурой, данью моды. В этих компаниях отраженные в стратегических планах долгосрочные цели и пути их достижения носят во многом случайный характер, в лучшем случае основанный на интуиции высшего руководства. Такие стратегии, которые не учитывают комплексного системного влияния массы внешних и внутренних, субъективных и объективных факторов, не могут являться гибким инструментом стратегического управления современным предприятием.

В настоящее время большинство экспертов говорят не просто о развитии, а о необходимости инновационного развития современной компании. В этой связи система стратегического управления организацией должна включать не только мониторинг сложившихся технологических трендов, но и прогнозирование развития соответствующих рынков, совершенствование структуры и системы управления предприятием, а также в некоторой степени конструирование желательной будущей реальности.

Как известно, прогноз представляет собой научно обоснованную, вероятностную оценку возможного состояния некоего объекта (или его характеристики) в будущем. На основании научно обоснованных прогнозов определяют также сроки и альтернативные пути достижения этих состояний.

Классическими этапами прогнозирования являются:

- 1 этап. Постановка задачи.
- 2 этап. Анализ объекта прогнозирования и его окружения.
- 3 этап. Сбор необходимых исходных данных.
- 4 этап. Непосредственное осуществление процедуры прогноза.

5 этап. Анализ результатов и составление отчета.

В настоящее время существует и используется огромное количество методов прогнозирования – по разным оценкам от 100 до 300. Во многом точность и достоверность прогноза зависит от выбранного метода. В отношении направленности прогнозы подразделяются на поисковые и нормативные. С помощью поисковых прогнозов определяют возможные состояния объекта прогнозирования в будущем, исходя из сложившихся тенденций развития в настоящем и прошлом, используя информацию ретроспективного участка развития.

Нормативные прогнозы имеют обратную направленность – их задачей является определение сроков и путей достижения поставленных целей.

С точки зрения используемой информации методы прогнозирования также подразделяются на два больших класса, а именно фактографические и экспертные методы.

Фактографические методы в своей основе имеют те или иные математические модели. Чаще всего, например, используются методы экстраполяции, а также корреляционный и регрессионный анализы.

Экспертные методы используют определенным образом формализованные экспертные оценки. Их недостатком является субъективность получаемых результатов. Однако с использованием данных методов могут быть спрогнозированы определенные скачки в развитии изучаемого явления.

Как правило, традиционное прогнозирование осуществляется специализированными организациями.

Однако, при всем многообразии используемых методов, а также достаточно большого опыта у классического прогнозирования существует целый ряд недостатков:

- они строятся узкими специалистами, без учета мнения представителей бизнеса, потребителей, органов власти и т.д.;

- не предусматривают альтернативного выбора того или иного пути достижения поставленных целей.

Анализ известных методов прогнозирования и практики их использования позволяет сделать вывод о том, что на их основе построить гибкий стратегический план современной организации практически невозможно.

В этой связи все возрастающую роль, особенно в странах с развитым гражданским обществом, приобретает так называемый метод форсайта [10]. Именно форсайт на сегодняшний день становится наиболее перспективным современным механизмом стратегического планирования в самых различных сферах деятельности. Этот метод, как известно, позволяет не просто предвидеть будущее, но и в определенном смысле выстраивать его [5].

Форсайт сегодня – это комплекс взаимосвязанных методов экспертного предвидения стратегических перспектив инновационного развития, в том числе вероятностная оценка технологических прорывов.

Целью форсайта является экспертная оценка перспективных сценариев развития событий, формирование желаемого будущего и исследование путей его достижения.

В общем виде форсайт представляет собой процесс взаимодействия представителей бизнеса, общественных организаций, органов власти и др., задачей которого является консенсус в отношении сценариев развития соответствующих социально-экономических систем. Одним из основных отличий метода форсайта от традиционного прогнозирования является то, что при форсайте определяется желаемое будущее, поэтому особую роль играет информация о будущем, полученная от тех экспертов, кто может влиять и влияет на приближение этого будущего.

Общим, при всем многообразии методов используемых в форсайт-проектах, является привлечение при составлении и обсуждении долгосрочных прогнозов самых широких слоев общества. Главной особенностью форсайта является то, что долгосрочные прогнозы, полученные на его основе, не только

показывают варианты видения будущего, но и формируют наиболее выгодны сценарии его развития.

С позиции стратегического управления форсайт позволяет принимать обоснованные инвестиционные решения на долгосрочную перспективу. Он позволяет сосредоточить основные ресурсы на обеспечение стратегического прорыва в наиболее перспективной области.

8.2. Основы технологии форсайт-исследований

Прежде всего основу форсайт-исследования составляет системный подход. На его основе проводится комплексное исследование всех сторон изучаемой проблемы. Исследуются взаимосвязи между элементами системы, а также их связи с внешней средой. Определяются слабые и сильные стороны системы, ее текущее положение, определяются внутренние и внешние условия развития, и, на основании этого, выявляются стратегические направления и приоритеты.

Форсайт направлен на оценку вероятных вариантов будущего, однако он на этом не останавливается и осуществляет выбор наиболее желательных из них. При форсайте выбор стратегии осуществляется на основе глубоких экспертных исследований, с привлечением самого широкого круга стейкхолдеров, благодаря чему появляются самые неожиданные предложения (варианты).

Метод форсайта основывается на том, что наступление предпочтительного варианта будущего во многом зависит от событий, происходящих сегодня. В этой связи выбор стратегии развития должен сопровождаться разработкой мер, необходимых для обеспечения этого варианта будущего.

Еще одним принципиальным преимуществом форсайт-проектов по сравнению с традиционным прогнозированием является возникновение и развитие неформальных связей между участниками. Это происходит потому, что форсайт-проект представляет собой систематический процесс, который заранее спланирован и тщательно организован.

В общем виде можно говорить о том, что форсайт представляет собой непрерывно развивающуюся специфическую методологию предвидения. В настоящее время какой-либо общепринятой методологии форсайт-исследований не существует, а выработанные теорией и практикой методики носят рекомендательный характер.

Рассмотрим наиболее часто встречающуюся последовательность шагов при форсайт-исследовании [8].

Первым этапом классического форсайт-проекта является формирование **поля форсайта**. Под этим понимается состав участников проекта. При этом некоторые из них принимают непосредственное участие в проекте, или являются субъектами объекта исследования, а остальные участвуют постольку, поскольку их интересы затрагиваются, либо могут быть затронуты в долгосрочной перспективе.

Поле форсайта состоит из трех, так называемых **кругов**.

Первый круг включает **пропагандистов и инициаторов**. К ним относятся организации и физические лица, непосредственно заинтересованные в результатах данного исследования (бизнесмены, инвесторы, ученые, принимающие решения политики и др.)

Второй круг составляют организации и физические лица, которых так или иначе грядущие перемены затрагивают, но которые не принимают активного участия в этих процессах.

В третий круг входят субъекты, которых перспективные преобразования могут затрагивать косвенно.

Далее процесс форсайта можно разделить на три самостоятельные фазы:

1. Пред-форсайт.
2. Собственно форсайт.
3. Пост-форсайт.

При этом во всех трех фазах поле форсайта остается неизменным.

Одним из первых шагов в фазе пред-форсайта является четкая формулировка **SCOPE** – области применения форсайта. В качестве SCOPE могут быть выбраны проблемы, касающиеся конкретных сфер экономики, науки, а также технологические проблемы или перспективы развития конкретной корпорации и т.п.

Одной из главных задач на этом этапе является нахождение основных элементов (индикаторов), которые определяют условия развития исследуемой области.

Область применения форсайта (SCOPE) характеризуется следующими элементами:

- фокус форсайта;
- горизонт форсайта;
- типы форсайта;
- методология форсайта.

Рассмотрим вкратце каждый из представленных элементов.

Фокус форсайта представляет собой главный вопрос (проблему) на выбранном для исследования предмете. Это могут быть, например, технологические, экономические (в т.ч. финансовые), и другие перспективы организации, отрасли, региона или страны в целом.

Горизонт форсайта представляет собой его временные рамки, то есть годы (период упреждения активного предвидения). По установившейся практике максимальные временные границы горизонта форсайта – 20-30 лет. При этом с точки зрения сложности предвидения будущих событий выделяют три разновидности горизонта:

- простой;
- сложный;
- комплексный.

Дадим некоторую обобщенную характеристику каждому из перечисленных типов.

При простом горизонте от начала до конца ясно виден весь процесс. Последствия того или иного события можно предвидеть с высокой вероятностью.

При сложном горизонте движение изучаемого процесса ясно только в общих чертах. Можно предвидеть очень много факторов, которые могут существенно повлиять на конечный результат.

При комплексном горизонте форсайта движение процесса к конечной точке весьма размыто. В ответ на действия участников процесса внешняя среда непрерывно искажается и в этой связи факторы внешней среды практически не предсказуемы.

Особое внимание при планировании горизонта форсайта рекомендуется уделять так называемым «слабым сигналам» – не очень важным на первый взгляд событиям, которые в будущем могут привести к значительным последствиям.

Что касается классификации форсайт-проектов, то чаще всего выделяют следующие основные **типы**:

1. С точки зрения инициирования:
 - форсайты, иницируемые снизу;
 - форсайты, иницируемые сверху.
2. По направленности:
 - технологические;
 - социальные;
 - экономические,
 - другие.
3. По глубине проработки:
 - быстрые;
 - фундаментальные.
4. По объекту исследования:
 - тематические;

- территориальные;
- корпоративные;
- прочие.

Форсайт может быть представлен как процесс, который в ходе активного действия заинтересованных сторон (стейкхолдеров), не останавливается на одном конкретном видении будущего, а уточняет, корректирует его. В тоже время в процессе форсайт-исследования выявляются «слабые сигналы», которые могут оказать существенное влияние на будущее.

Следующий шаг фазы пред-форсайта заключается в поиске ответов на следующие вопросы:

- кто является главными стейкхолдерами исследуемого процесса;
- кого можно использовать в качестве экспертов;
- кто, когда и в каком статусе может быть включен в форсайт-проект;
- кто будет принимать необходимые решения.

Далее нужно выбрать конкретные методы прогнозирования, с помощью которых будет осуществляться непосредственно форсайт-исследование.

Как уже отмечалось, форсайт представляет собой комплексное, системное исследование будущего. В этой связи, с точки зрения методологии, при проведении форсайт-исследований может быть использован целый набор **методов**.

Используемый в форсайте-проектах инструментарий на сегодняшний день включает многочисленные методы выработки знаний. К ним относятся, в том числе, ряд традиционных методов прогнозирования, различные методы генерирования идей и их анализ. В тоже время появились новые специальные креативные методы.

В общем комплексе методов, применяющихся в форсайт-исследованиях, часть из них выполняет прогнозную функцию, другая часть – аналитическую. Есть методы, которые помогают вырабатывать новые идеи относительно

будущего, а некоторые способствуют более эффективному взаимодействию участников форсайт-проектов.

В имеющейся литературе о форсайте [8] всю совокупность используемых методов подразделяют на четыре основные группы, которые можно озаглавить как:

1. Креативные методы, использующие творческий потенциал.
2. Методы прогнозирования и экспертизы.
3. Аналитические методы.
4. Методы, направленные на совершенствования взаимодействия.

Такая классификация во многом условна, так как часть методов используется для разных целей – для анализа среды, например, и для изучения тенденций, одновременно эти же методы могут быть использованы и для прогнозирования.

Другие методы могут применяться для выработки идей, решения текущих задач форсайта, а также для генерирования возможных вариантов будущего. На равных правах могут использоваться как качественные, так и количественные методы.

Приведем общий примерный список методов, которые в той или иной степени используются при проведении форсайт-исследований.

Так к методам, которые используются для целей прогнозирования и экспертизы следует отнести:

- метод Дельфи;
- метод разработки сценариев;
- метод определения критических технологий;
- методы экстраполяции;
- имитационное моделирование;
- метод исторических аналогий.

Методы, которые чаще всего используют для анализа:

- SWOT-анализ;

- STEP-анализ;
- анализ взаимного влияния;
- сканирование окружающей среды;
- деловые игры;
- экспертные панели;
- метод Дерева Релевантности;

К известным креативным методам относятся:

- фокус-группы;
- экспертные обсуждения;
- морфологический анализ;
- метод «мозгового штурма».

Инновационные креативные методы:

- дикие карты;
- дорожные карты развития.

Выбор конкретного метода для определенного форсайт-проекта индивидуален и зависит от целого ряда факторов:

- качество и количество имеющейся для анализа информации;
 - финансовые и другие ресурсы;
 - цели и горизонт форсайта-проекта;
 - компетентность экспертов;
- и другие.

На примере ряда методов рассмотрим особенности научного инструментария, используемого в форсайт-проектах.

Наиболее часто для этих целей используется **метод Дельфи**. Он основан на упорядоченном опросе экспертов, которые составляют некоторую экспертную панель. Особенностью данного метода является то, что он подразумевает не единичный опрос, а последовательность нескольких опросов одной и той же группы экспертов. При этом обеспечивается обратная связь с экспертами и им дается возможность скорректировать свои суждения в

соответствии с полученными обобщенными результатами. Этот метод используется для составления экспертных прогнозов.

Метод сценариев заключается в составлении вероятных сценариев развития событий в будущем. Этот метод предоставляет возможность специалистам провести анализ проблем и изложить свое видение по их развитию и преодолению. Далее эти предложения обобщаются и представляются в виде единого документа.

Метод экспертных оценок включает в себя ряд математических и логических процедур, которые направлены на получение, анализ и обобщение экспертной информации.

Достоинством метода является возможность разностороннего анализа сведений, полученных от высококвалифицированных экспертов.

Метод «мозгового штурма» предполагает свободное высказывание идей в отношении развития событий, которые затем отбираются и анализируются.

Деловые игры – метод, который основан на моделировании действий некоторой социальной системы. При этом представители экспертной группы выполняют определенные социальные роли.

Метод разработки дорожных карт основывается на том, что этапы, которые надо пройти на пути достижения конечной цели, представляются в виде некоего графа – дорожной карты. В итоге получается набор альтернативных путей (дорожных карт), которые в последующем подвергаются осмыслению и обобщению.

Метод подвергается дальнейшему развитию. Так один из вариантов данного метода направлен на анализ последовательности формирования технологий. Он в свою очередь позволяет, на основе использования статистических методов моделирования, проводить оценку времени, которое нужно для достижения промежуточных целей.

Целью данной публикации не является детальное описание всех методов, используемых в форсайт-проектах. В основном они известны и используются

для многих исследовательских целей. Познакомится с ними можно в специальных изданиях. Однако существует ряд специфических принципов, с учетом которых перечисленные методы используются при реализации форсайт-проектов:

1. Привлечение в качестве экспертов представителей различных общественных групп, в том числе научного сообщества, сферы бизнеса, гражданского общества, органов государственной власти и местного самоуправления, при обсуждении и сопоставлении разрабатываемых прогнозов. В результате достигается наиболее полное видение будущего, а также согласование наиболее выгодных путей его достижения.

2. Достижение наиболее развитой коммуникации между всеми участниками реализуемого форсайт-проекта.

3. Сосредоточение внимание на долгосрочном периоде (20-30 лет).

4. Координация, которая предполагает, что достижения в технологии и науке оцениваются в связи с социальной и экономической ситуациями.

5. Согласие, предполагающее согласованную работу представителей сферы бизнеса, науки, органов власти и гражданского общества по поиску консенсуса в отношении разработанных вариантов развития будущего.

В настоящее время выделяют несколько **типов** форсайт-исследований:

1. **Технологический форсайт.** На его основе определяются долгосрочные перспективы развития технологий.

2. **Социальный форсайт** – предполагает проведение долгосрочных прогнозов в отношении развития социальных явлений в обществе.

3. **Фундаментальный форсайт,** который проводится продолжительное время с привлечением СМИ, основывается на проведении нескольких этапов опросов различных кругов экспертов. Продолжительность проведения фундаментальных форсайтов достигает порой – одного, двух лет.

4. **Тематический форсайт** проводится в отношении какой-либо одной определенной сферы деятельности (например, здравоохранение).

5. **Территориальный форсайт** имеет целью исследование долгосрочных достижимых вариантов будущего конкретной территории (города, области, страны в целом).

6. **Корпоративный форсайт** предполагает исследование долгосрочных путей развития конкретной организации.

При любом типе форсайта принципиальным является то, что он должен включать консультационный процесс, который должен обеспечить эффективный обмен мнениями между основными участниками.

Можно также охарактеризовать некоторые общие мероприятия при организации и реализации форсайт-проектов:

1. Создание группы так называемых пропагандистов.
2. Организация управляющего комитета.
3. Принятие технологии управления подготовкой и реализацией проекта.
4. Формирование рабочей группы.
5. Обеспечение проекта необходимыми ресурсами.
6. Формирование экспертных групп специалистов и участников дискуссий.
7. Выбор методов организации и проведения опросов.
8. Обработка результатов проведенных опросов.
9. Подготовка итогового отчета.
10. Организация мониторинга и меры по развитию проекта.

Как уже отмечалось, форсайт-проект проходит три основные стадии:

1-ая стадия, пред-форсайт (предварительная стадия). На этой стадии определяются заказчики и пропагандисты форсайта, формулируются цели и задачи.

2-ая стадия, собственно форсайт. На этой стадии проводятся все запланированные опросы, их анализ, готовятся отчеты.

3-я стадия, пост-форсайт заключается в проведении верификации результатов, мониторинге и, в случае необходимости, в проведении повторных опросов.

8.3. Методология корпоративного форсайта в целях выбора эффективной стратегии предприятия

По нашему мнению, с точки зрения обеспечения конкурентоспособного стратегического развития коммерческой организации, в качестве перспективной методологии следует рассматривать корпоративный форсайт.

Основная задача форсайт-проектов на корпоративном уровне – предвидеть основные изменения потребительских предпочтений, рыночных тенденций, социальных условий и т.д. Эта задача решается за счет современного предвидения и идентификации сильных и слабых сигналов, поступающих из будущего. В тоже время эффективный анализ полученных факторов изменения внешней среды и составление дорожных карт продвижения этих изменений способствуют возможности уже заранее предусматривать необходимые меры по обеспечению устойчивого развития компании в долгосрочной перспективе.

Корпоративные форсайт-проекты методологически предполагают предвидение и активное конструирование долгосрочного будущего коммерческой организации. При этом, что касается конструирования, то он основывается прежде всего на определении основной инновационной тенденции характерной для отрасли, а также потенциальной способности предприятия к изменениям вообще, и к внедрению актуальных инноваций в частности.

Инициатором форсайт-проектов на уровне корпорации должны быть прежде всего руководители предприятия, а также его собственники. В отдельных случаях инициатором корпоративного форсайт-проекта может выступать консалтинговая компания.

Основным инструментом поиска альтернативных путей долгосрочного развития коммерческих структур в современных условиях, по мнению

большинства экспертов [1], является сценарный анализ. Как известно, именно этот метод рекомендуется использовать при стратегическом управлении нестабильными процессами, протекающими в турбулентной среде. Сценарный анализ, как правило, дает в этом случае ряд альтернативных вариантов развития событий. На основе подобных сценариев планируют и анализируют различные нестандартные ситуации. В конечном итоге, именно в результате использования этого метода, можно определить альтернативные пути достижения поставленной в корпоративном форсайте цели.

Положительным фактором использования сценарного анализа является также возможность оценить какие и когда необходимо принять меры для обеспечения долгосрочной стратегии организации. Кроме этого, сценарирование позволяет также осуществлять мониторинг политического, социального, экономического и технологического развития, от которых как раз и зависит долгосрочный инновационный тренд. Именно он формирует общие условия развития бизнеса вообще, а также конкретной коммерческой фирмы, в частности.

Альтернативность вариантов корпоративного форсайт-проекта позволяет синтезировать наиболее оптимальный план развития коммерческой компании на долгосрочную перспективу. В этой связи могут быть решены две последовательные задачи:

1. Выделяются основные ключевые точки развития организации и разрабатываются альтернативные варианты динамики этого развития.
2. Проводится анализ каждого из вариантов, исследуются его нюансы и особенности, а также последствия реализации.

В настоящее время известно два основных технологических подхода к выделению сценариев развития организаций, а именно: формальный и качественно-аналитический.

При формальном подходе сценарии строятся на основе возможных трендов изменений неких формальных количественных характеристик

(например, объем продаж, рентабельность, занимаемая доля рынка и т.д.). Полученные на основе этого подхода сценарии могут быть достаточно вероятны, как правило, для инерционно развивающихся предприятий и лишь на краткосрочную перспективу.

В отличие от формального подхода, качественно-аналитический подход рассчитан на анализ глубинных реальных политических, экономических, социальных и технологических процессов, непосредственно связанных с деятельностью организации. Этот подход, в первую очередь, обращает внимание на содержание выделяемых сценариев. Сценарии в этом случае строятся для абсолютно разных условий, в которых предстоит действовать коммерческой компании. Производится также учет возможных изменений основных факторов внешней среды и обосновываются мероприятия, которые необходимо предусмотреть для того, чтобы построенные сценарии могли быть реализованы.

Для построения сценариев корпоративного форсайт-проекта могут быть использованы следующие методы:

- метод знаковых событий;
- метод модификации будущего;
- метод построения сценарных матриц.

Рассмотрим более подробно каждый из них.

«Метод знаковых событий» основан на выделении возможных ключевых событий в долгосрочной перспективе развития организации. Он ищет ответ на вопрос как могут повлиять выявленные события на организацию, какова вероятность негативного или положительного эффекта и какова его величина.

«Метод модификации будущего» основан на анализе и обобщении официальных документов, касающихся деятельности организации в долгосрочной перспективе и выделении из них различного уровня факторов, которые будут влиять на развитие организации.

«Метод построения сценарных матриц» использует две основные технологии:

1. GBU (Good – желательные; Bad – нежелательные; Ugly – вредные).

При этом сценарии рассматриваются в отношении возможных вариантов развития событий.

2. BAER – при этом приеме определяются уровни изменений (низкий, средний, высокий) в различных сферах – политики, экономике, технологии и т.д.

В [1] предлагается следующий алгоритм разработки сценариев долгосрочного развития коммерческой структуры:

1 этап: формулировка цели, определение ключевых параметров. На этом этапе устанавливаются границы и определяются фокусы сценариев долгосрочного развития на планируемый горизонт.

2 этап: определение ключевых факторов внешней среды. На этом этапе устанавливаются факторы внешней среды, которые будут существенно влиять на стратегическое развитие организации.

3 этап: построение альтернативных сценариев. При этом с использованием вышеописанных методов выстраиваются альтернативные сценарии развития предприятия с учетом возможных изменений в экономике, политике, социальной и технологической сферах.

4 этап: анализ и наполнение сценариев. Здесь, полученные на предыдущем этапе сценарии, оформляются в возможные логически оправданные стратегии развития организации.

5 этап: установление факторов успешности. На данном этапе определяются факторы успешности реализации той или иной стратегии.

6 этап: выбор наиболее оптимальной стратегии развития. На последнем этапе составляется оптимальная стратегия предприятия с учетом выбранного фактора успешности.

Таким образом, обобщая вышесказанное можно утверждать, что использование сценарного метода для построения корпоративного форсайта позволяет предприятию, во-первых, значительно уменьшить неопределенность в своем развитии. Во-вторых, получить представление о том, как нужно будет

поступать, если развитие событий пойдет по тому или иному сценарию. В итоге коммерческая организация выстраивает логически обоснованную долгосрочную стратегию устойчивого развития.

В целом последовательность корпоративного форсайта может быть представлена в виде следующей схемы:

1. Построение макроэкономических тенденций, которые с заданной вероятностью будут формировать варианты будущего в данной отрасли, в данном регионе.
2. Установление стратегических целей развития коммерческой структуры.
3. Формирование альтернативных сценариев корпоративного форсайта.
4. Оценка способности и готовности организации к реализации каждого сценария развития.
5. Построение корпоративного форсайт-проекта на основе выбранных сценариев и с учетом потенциала организации.
6. Осуществление мониторинга и контроля реализации основных намеченных мероприятий, внесение необходимых изменений.

Как мы видим, создание корпоративного форсайт-проекта начинается с построения макроэкономических трендов, которые с определенной очевидностью будут определять будущее состояние отрасли и региона в отношении как минимум четырех основных сфер: экономики, политики, социума и технологии. В результате этого этапа будет получен перечень основных событий (в том числе появления инноваций), которые можно ожидать в исследуемой долгосрочной перспективе.

На втором этапе устанавливаются стратегические цели развития организации. При этом должно учитываться текущее состояние основных бизнес-процессов, структуры и системы управления предприятием.

В результате этого этапа кроме стратегических целей определяются возможные способы их достижения на долгосрочную перспективу.

На третьем этапе формируются альтернативные сценарии, которые должны учитывать текущее состояние факторов внешней среды предприятия, а также выявленные тренды микро- и макроэкономического развития. Рекомендуется, в результате этого этапа, выбрать один основной (базовый) сценарий и как минимум два – три сценария, учитывающих наиболее оптимистическое и наиболее пессимистическое развитие событий.

На четвертом этапе производится анализ потенциала организации и на его основе оценка способности и готовности предприятия к реализации каждого из выделенных сценариев. Результатом данного этапа должна быть оценка готовности и способности организации к реализации каждого из выбранных сценариев развития.

На следующем этапе осуществляется окончательное построение корпоративной стратегии, направленной на обеспечение устойчивого развития коммерческой компании в долгосрочной перспективе.

Последний, шестой этап должен предусматривать разработку процедур мониторинга и контроля реализации основных мероприятий проекта, а также должен предусматривать возможность внесения необходимых изменений в случае возникновения заранее предусмотренных критических ситуаций.

Список использованной литературы

1. Дудин, М.Н. Инновационный форсайт как инструмент конкурентоспособного развития предпринимательских структур: Монография/ Дудин М.Н., Лясников Н.В., Сафин Ф.М., Егорушкин П.А. – М.: Издательский Дом «Наука», 2013. - 216с.
2. Епифанова, Н.Ш. От форсайт-исследований к форсайт-организациям. «Актуальные проблемы экономики и права», 2011. №4. – с.143- 147.

3. Золотарева, М.Е. Применение форсайт-проектов в формировании стратегии инновационного развития высокотехнологичных компаний. «Мир». (Модернизация. Инновации. Развитие). 2016. – т.7. №4. – с.108-114.
4. Колужнова, Н.Я. Сущность, содержание и методология форсайта: проблемы адаптации к уровню региона. Сборник «Форсайт как инновационный инструмент формирования конкурентоспособности страны и региона в условиях глобализации. Материалы Первой Всероссийской Интернет – конференции». Иркутск, изд-во ИГУ, 2007. – с.7-22.
5. Коршунов, Г.П. Форсайт-исследования – методология активного прогнозирования. «Социология». – 2013. - №4. – с.115-122.
6. Крюков, С.В. Форсайт: от прогноза к формированию будущего. «Современная экономическая теория». – 2010. – т.8, №3, ч.2. – с.7-17.
7. Терешина, Н.П., Третьяк, В.П., Метелкин, П.В. Форсайт-технологии: Учебное пособие, - М.: РУТ (МИИТ), 2019. – 179 с.
8. Ланских, А.Н. Форсайт как новая методика управления развитием высшей школы WWW.https://cyberleninka.ru
9. Третьяк, В.П. Организационное обеспечение применения технологии форсайта. WWW.https://cyberleninka.ru
10. Шелюбская, Н.В. Практика форсайта в странах Западной Европы. WWW.https://cyberleninka.ru

Глава 9. Особенности формирования стратегии развития коммерческой деятельности (на примере космической отрасли)

9.1. Влияние коммерческой деятельности транснациональных корпораций на эволюцию концепции стратегического развития

Во второй половине XX века в условиях международного разделения труда и обострившейся конкуренции важным элементом многих экономик становятся крупные транснациональные компании – корпорации. Большинство ученых считают, что их возникновение обусловлено бурным развитием промышленности и научно-техническим прогрессом, а также потребностью в концентрации капитала. В своих работах Мильнер Б.З. пишет, что именно в этот период произошло разделение на собственников и управленцев, при этом уже в XXI веке процессы корпоратизации приняли новые формы вследствие того, что выгоднее становилась интеграция, выраженная в слиянии и поглощении, нежели конкурентная борьба [13, с. 69 – 78].

В настоящее время в теориях корпоративного стратегического планирования выделяют условия для активного развития промышленной интеграции вследствие снижения издержек, увеличения масштабов производства, ослабления конкуренции и четкого распределения ресурсов, при этом перечисленное выше становится возможным при реализации главной цели – достижения синергетического эффекта с помощью объединения усилий. Очевидно, что к плюсам данного процесса можно также отнести возможность выхода на новые рынки сбыта из-за диверсификации производства вследствие четкого распределения выпускаемой продукции и её объёмов. В данном случае можно утверждать, что крупные корпорации большинства стран мира осуществляют свою деятельность, находясь на IV или V этапе интеграционных процессов, что требует разработки конкурентоспособной стратегии развития (таблица 9.1.1) [10].

Таблица 9.1.1 – Основные этапы интеграционных процессов коммерческой деятельности [19]

| Этапы | Стадия | Характеристика |
|-----------------|--------------------------------|--|
| <i>Этап I</i> | Разделение труда | <ul style="list-style-type: none"> • между отдельными компаниями; • внутри одного предприятия; • активное участие принимают ТНК. |
| <i>Этап II</i> | Кооперация труда | |
| <i>Этап III</i> | Экономическое сотрудничество | <ul style="list-style-type: none"> • отношения между предприятиями разных стран; • долгосрочные хозяйственные связи; • снижение издержек; • усовершенствование производства; • увеличение производительности и эффективности труда; • улучшение качества продукции. |
| <i>Этап IV</i> | Экономическая интеграция | <ul style="list-style-type: none"> • деятельность ТНК; • вертикальная интеграция (охват всей цепочки производства); • горизонтальная интеграция (охват отрасли); • круговая интеграция (объединения предприятий разных отраслей); • интеграция предприятий, производящие товары субституты. |
| <i>Этап V</i> | Глобализация мировой экономики | <ul style="list-style-type: none"> • выход за пределы внутреннего рынка; • удовлетворение спроса; • стирание границ производства; • субъект глобализации – ТНК. |

В основе современной международной стратегии развития транснациональных корпораций лежат идеи, которые появились в результате эволюции крупных компаний под воздействием внешней экономической среды. В таблице 9.1.2 рассмотрено влияние корпоративной истории на подходы в области стратегического планирования, которые возникли вследствие определенных проблем в разные периоды времени. Примерно в 1950 – 1960 года корпорации стали слишком большими и сложными с позиции управляемости, поэтому была разработана стратегия дивизионализации или децентрализации, суть которой заключалась в передаче некоторых полномочий дочерним компаниям. Сложность данного подхода состояла в определении оптимального уровня децентрализации, что породило фундаментальный вопрос о процессах контролирования бизнес-единиц [9].

Таблица 9.1.2 – Эволюция стратегии развития транснациональной корпорации [5]

| Период | Стратегические проблемы | Стратегические концепции | Корпоративные стратегии |
|--------------------|---|---|-----------------------------------|
| 1950 – 1960 гг. | Централизованное управление (контроль) | Передача полномочий | Дивизионализация |
| 1960 – 1970 гг. | Сохранение роста | Увеличение управленческих навыков в совокупности с синергетическим подходом | Диверсификация |
| 1970 – 1980 гг. | Управление разнообразием | Портфельный подход к планированию | Сбалансированный портфель |
| 1980 – 1990 гг. | Плохие показатели эффективности диверсификации (разрушение стоимости) | Акционерная стоимость | Реструктуризация |
| Начало 1990-ых гг. | Агрессивное поглощение | Развитие компетенций и логики, преимущества родства | Объединенные портфели, Сокращение |
| Конец 1990-ых гг. | Глобализация | Глобальное присутствие (экономия от масштаба) | Мегаслияния |
| 2000-ые годы | Знание | Выявление и сохранение скрытых знаний | Управление знаниями |

В начале 1960-х годов актуальной становится стратегия диверсификации, поскольку многие рынки, на которых работали корпорации, достигли стадии зрелости. Для того чтобы снизить риски компании стали активно расширять свои сферы деятельности с помощью поглощения других фирм и достижения синергетического эффекта, однако в рыночных условиях такая тенденция привела к увеличению цены приобретаемых компаний и одновременно сократила возможности для создания дополнительной стоимости. В результате в 1970 – 1980 годах стратегической проблемой стало управление широко диверсифицированным бизнесом в условиях рецессии многих экономик, возрастания конкурентного давления и ускорения технологического прогресса, поэтому во многих корпорациях стали применять портфельный подход к

планированию деятельности, суть которого заключалась в нахождении баланса в управлении продуктовым ассортиментом (таблица 9.1.2) [1].

Несмотря на все усилия в области разработки оптимальных стратегий, в начале 1980-х годов применение концепции диверсификации привело к сильному снижению показателей эффективности и разрушению общей стоимости крупной компании. Проанализировав положения многих корпораций, ученые пришли к выводу, что успешнее и выгоднее фокусироваться на одном ключевом бизнесе, стараясь разрабатывать инновационные продукты и услуги в данной сфере деятельности. В результате актуальной стала тенденция к реструктуризации. Однако в начале 1990-х годов произошла интеграция двух концепций – на первый план вышел основной бизнес, который осуществляли корпорации в одной конкретной отрасли, но при этом диверсификация была нацелена на совместное использование ресурсов и приобретение конкурентных преимуществ – ключевых компетенций. Поскольку развитие крупных фирм происходило в рамках определенной отрасли национальной экономики, в условиях глобализации возникли новые риски, связанные с увеличением конкуренции со стороны транснациональных компаний. Поэтому в конце 1990-х годов начали происходить огромные по масштабам сделки слияния и поглощения. Однако в условиях стремительных технологических изменений, которые стали активно происходить в начале 2000-ых годов, многие корпорации приняли стратегию управления знаниями и внедрения инноваций (таблица 9.1.2) [10; 14; 23].

В современных условиях реализация долгосрочных целей предприятия является системой организационных и экономических мер, которые в совокупности принято считать стратегией развития бизнеса. Другими словами, это главное направление деятельности любой компании, в рамках которого необходимо обеспечивать согласование целей, видеть возможности и учитывать интересы персонала. При этом в стратегии развития необходимо принимать во внимание не только внутренние базисные процессы, но и эффекты от влияния

внешней среды предприятия. Так, например, П. Дойль утверждал, что стратегия – это совокупность именно управленческих решений по использованию ресурсов предприятий и, как следствие, достижение конкурентных преимуществ на целевых рынках сбыта в долгосрочном периоде [2; 3].

Таким образом, в современных реалиях стратегия развития коммерческой деятельности может разрабатываться на основе тех же принципов и характеристик, что и у транснациональных корпораций, только на международном уровне в рамках целых отраслей с целью расширения присутствия какой-либо страны. В данном случае космическая отрасль не является исключением, а наоборот – ярким примером, поскольку в большинстве стран мира стратегия развития ракетно-космической промышленности реализуется не только в интересах коммерческой деятельности, но и в рамках обеспечения обороны государства, а следовательно, существует возможность комплексного обеспечения стратегического развития всей отрасли на мировом уровне.

9.2. Общая характеристика мировой космической отрасли

В современных условиях в широком смысле под мировым космическим рынком понимают систему международных и внутригосударственных отношений по обмену товаров на деньги в рамках создания и изготовления космических товаров и предоставления услуг, а также их применение в других сферах, например, в обороне, науке, культуре, экономике и т.д. [21]

Объектами мирового космического рынка принято считать товары и услуги, которые используются не только в рамках космической деятельности, но и в других сферах, т.е. в интересах обеспечения решения задач безопасности государств, в области решения каких-либо социально-экономических проблем, в направлении развития науки и международного сотрудничества, в области предоставления услуг связи населению через компании-операторы и прочее [20].

Основной характеристикой мирового космического рынка является международная торговля товарами и услугами, которая отличается от обыденного и изолированного развития внутреннего космического рынка какой-либо страны. По сути, в современных условиях такой рынок любой страны становится частью мирового рынка при наличии развитого международного товарообмена.

Сегодня многие страны пришли к выводу, что космическая деятельность является приоритетным направлением национальной политики и одним из ключевых факторов в конкурентной борьбе на мировом уровне. Во-первых, это подтверждается увеличением бюджетов космических агентств ведущих стран, где Россия занимает четвертое место в мире значительно уступая США (рисунок 9.2.1). Во-вторых, тем фактом, что более 130 стран мира каким-либо образом причастны к реализации космических программ – в большинстве случаев это внутригосударственные программы, нацеленные на поддержание имиджа страны, а также на развитие систем связи. Однако около 31% стран, причастных к космическим программам, имеют в своём арсенале собственные космические аппараты. Несмотря на это, лишь шесть стран, активных участников мирового космического рынка, обладают развитой инфраструктурой, которая позволяет осуществлять космическую деятельность в полном цикле. Среди них можно выделить: Россию, США, ЕС, Японию, Китай, Индию [21].

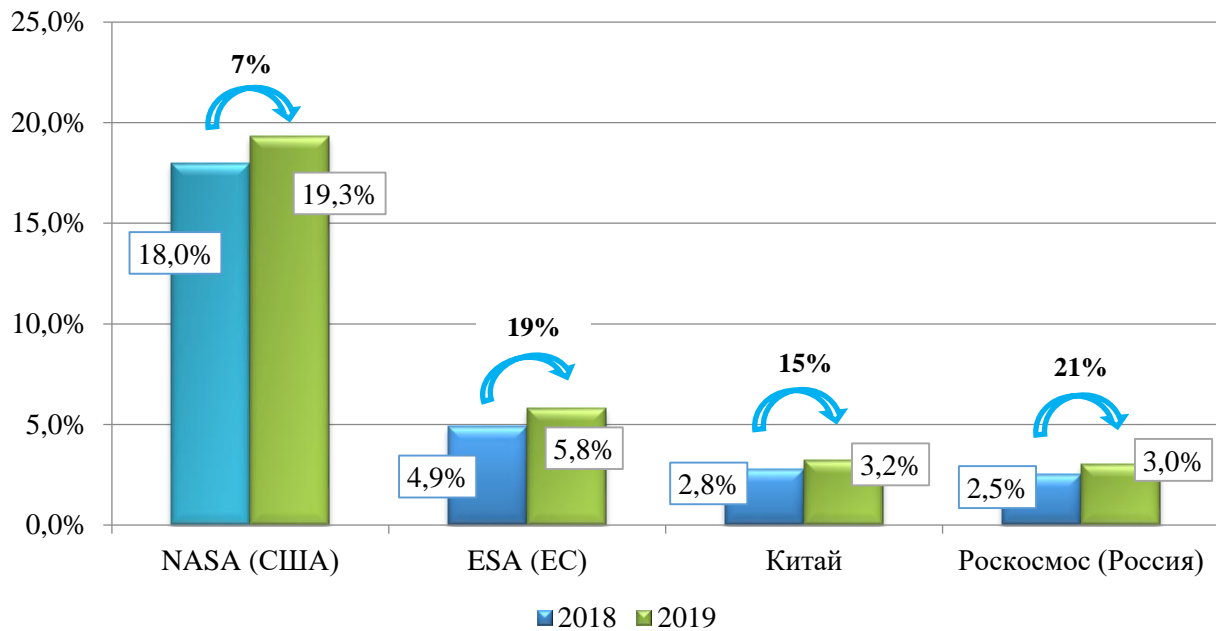


Рисунок 9.2.1 – Бюджеты космических агентств ведущих стран [7, 8]

На рисунке 9.2.2 представлена классификация стран, активно развивающих ракетно-космическую промышленность (РКП), по трем эшелонам.

Критерием отнесения России, США и Европейского союза (далее – ЕС) к первому эшелону является тот факт, что указанные страны – мажоритарии исследуемого рынка. Кроме того, они обладают технологиями коммерческих запусков в космос, а также имеют потенциал для создания инноваций в ракетно-космической промышленности, который позволяет им удерживаться в этой нише в среднесрочном и долгосрочном периодах без агрессивных стратегий [16].



Рисунок 9.2.2 – Классификация стран, осуществляющих космическую деятельность [16]

Ко второму эшелону отнесены Китай, Индия и Япония, которые показывают стремительное развитие ракетно-космических технологий, где национальные РКП формируют новые центры мировой космической деятельности. При этом в странах второго эшелона важнейшей частью национальной стратегии научно-технического развития считаются именно ракетно-космические технологии.

Странами третьего эшелона являются Южная Корея, Израиль, Иран, Бразилия, Сингапур, Индонезия, Канада и Люксембург, у которых свыше 10% национального импорта составляют продукты ракетно-космической промышленности. Перечисленные страны считаются перспективными развивающимися рынками сбыта, поскольку на сегодняшний момент у них не существует собственных технологий, недостаточно квалифицированных кадров, отсутствуют стабильные партнерские отношения или имеются проблемы с финансированием [4].

За последнее десятилетие мировой космический рынок достиг объема в 500 млрд долл. США, увеличившись в пять раз. Стоит отметить, что за последние двадцать лет на мировом рынке ракетно-космической деятельности произошли значительные изменения, связанные не только с увеличением самостоятельности стран путем создания и развития национальных РКП, но и с интеграционными процессами в рамках освоения и использования космического пространства [18]. Как показывает статистика за последние семь лет, наибольшая доля доходов от космической деятельности, порядка 80%, сосредоточена в сфере услуг по предоставлению телекоммуникации, навигации, запуску дистанционного зондирования Земли (ДЗЗ) и в рамках метеонаблюдения, при этом оставшиеся 20% относятся к строительству инфраструктуры для обслуживания ракетно-космической техники и к её созданию. На основе данных из диаграммы 9.2.3 можно сделать вывод, что именно косвенные эффекты от смежных областей (36%) приносят наибольшие выгоды для экономик, что сопоставимо с косвенными эффектами в рамках космической деятельности (31%).

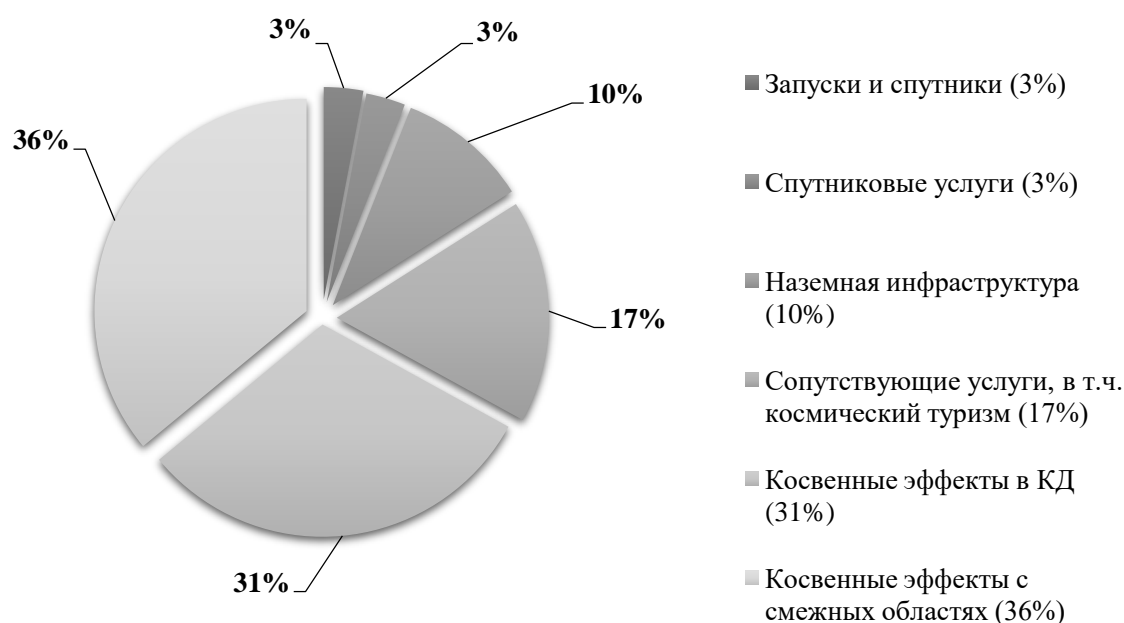


Рисунок 9.2.3 – Разбивка среднего процентного соотношения выгод от осуществления космической деятельности по всем странам мира за период 2013 – 2019 гг. [4]

Со временем многие государственные космические агентства решили снизить нагрузку на госбюджет, но без ущерба для развития отрасли, что стало стимулом для развития коммерческой космической деятельности, которая, в свою очередь, может быть самокупаемой и доходной по многим сегментам ракетно-космического рынка. Коммерческая космическая деятельность развивалась по двум основным направлениям. Во-первых, это целенаправленные действия государственных органов власти, во-вторых, потребности свободного рынка привели к необходимой и естественной эволюция инновационной отрасли космических технологий для удовлетворения потребностей в других отраслях. Нет никаких сомнений, что в ближайшие 10 лет развитие коммерческой космической деятельности будет происходить бурно, что позволит ей стать одной из перспективнейших отраслей для бизнес структур. По оптимистичным прогнозам зарубежных аналитиков, мировой космический рынок вырастит на 83% к 2040 году от 1,2 до 2,2 трлн. долл. США именно за счет коммерческой составляющей исследуемой отрасли [6].

Что касается Российской Федерации, то с 2003 года ГК «Роскосмос» курирует самое большое в мире количество запусков в год, другими словами, каждая третья ракета, покидающая нашу планету, отправляется в космос российскими специалистами. При этом практически все космонавты Земли (и американцы, и японцы, и европейцы, и другие) оказываются в космическом пространстве с помощью российских пусковых услуг. Однако, это совершенно не означает, что Россия является лидером мировой космической отрасли. Например, в 2015 году доля российских запусков ракет-носителей составила всего лишь 33% (29 из 87), США – 23% (20 из 87), Китай – 22% (19 из 87). Сегодня наибольшее количество стартов – порядка 80% – принадлежит США, которые, по прогнозам экспертов, должны были оказаться на третьей строчке данного рейтинга к 2019 году, однако американская пусковая программа уже сегодня является самой многочисленной [11].

Стоит отметить, что Российская Федерация уже сейчас является неким аутсайдером и играет роль «космического извозчика», по сути российские специалисты, обладающие опытом и исключительными технологиями, лишь запускают чужих астронавтов и чужие космические аппараты, в т.ч. спутники, от которых в последствие получают коммерческие выгоды иностранные операторы, предоставляя населению услуги спутникового телевидения.

По примерным оценкам объем международного космического рынка услуг составляет около 500 млрд долл. США, где запуск спутников с помощью различным ракет-носителей – 2% [4]. Другими словами, очевидное лидерство Российской Федерации в сегменте пусковых услуг становится ничтожным – всего 0,7%-1% от общего объема рассматриваемого рынка. Стоит отметить, что по другим направлениям большие успехи также отсутствуют, а доли можно сравнить со статистической погрешностью. Российская ракетно-космическая отрасль является аутсайдером в производстве и оказании телекоммуникационных услуг, в рамках деятельности по обеспечению дистанционного зондирования Земли, в изготовлении космических спутников и

аппаратов, а также в сфере страхования космических рисков. Единственным конкурентным преимуществом России является пилотируемая космонавтика в рамках функционирования Международной космической станции.

9.3. Современные проблемы и особенности формирования стратегии коммерческой космической деятельности

Внутринациональная программа под названием «Космическая деятельность России на 2013 – 2020 годы» была утверждена в конце 2012 года (сейчас на рассмотрении находится проект Стратегии развития ракетно-космической промышленности РФ до 2030 года и на дальнейшую перспективу) [19; 22]. В рамках развития ракетно-космической промышленности государством выделены три основных направления. Во-первых, необходимо обеспечить беспрепятственный доступ России в космическое пространство, развивать космическую технику, технологии и совершенствовать услуги по данному направлению, а также повышать инновационный уровень ракетно-космической отрасли и выполнять международные обязательства. Во-вторых, перспективным становится использование созданных космических средств в научных целях. В-третьих, продолжать пилотируемые полеты.

При изучении государственной программы по космической деятельности важным пунктом отмечен тот факт, что данная национальная отрасль к 2020 году должна в несколько раз увеличить объемы производства по сравнению с базовым 2011 годом, при этом главной целью является достижение Россией доли в 16% на мировом рынке по производству космической техники [15].

Очевидно, что отсутствие Стратегии коммерческой деятельности тормозит развитие отечественной космонавтики, и в тоже время техническое развитие потенциальных конкурентов становится основной причиной устаревания российских технологий, и как следствие это приводит к уменьшению спроса на международном рынке космических товаров и услуг. В связи со снижением финансирования отрасли, а также ввиду отсутствия научно-технических и

коммерческих амбициозных прорывов, происходит размытие потенциального кадрового резерва, что ведет к резкому ухудшению качества образования будущих специалистов отрасли и к увеличению вероятности наступления аварийных ситуаций. Тем самым «круг замыкается» – ещё больше снижается кадровая и коммерческая привлекательность отрасли.

Богатство компетенций и изобилие инфраструктуры ракетно-космической промышленности, при отсутствии современной стратегии развития приводит к размыванию финансирования отрасли, что подтверждается одним фактом – работы по одному госконтракту выполняют сразу десятки предприятий, отчитываясь друг перед другом. Таким образом, развитие технологий происходит очень медленно, конкурентные преимущества утрачиваются, а тем временем динамичные участники космического рынка, которые концентрируют свои усилия на узких специализациях, вырываются вперед. Например, американская ракета Falcon 9 приобрела большую популярность по сравнению с лидером рынка российской ракетой «Протон», а отечественные телекоммуникационные и навигационные системы характеризуются более низкой надежностью, срок их активной эксплуатации в два раза короче, чем у американских или европейских аналогов. Российские спутники дистанционного зондирования Земли обладают большей массой, которая превосходит конкурентов в 5 – 10 раз, однако это не добавляет качество получаемых данных. Стоит вспомнить два запуска межпланетных станций, которые состоялись в 1996-м и 2011-м годах, – они также оказались провальными – межпланетарные станции упали на дно Тихого океана [11].

До того, как на частных производствах в США произошло повышение производительности труда, индийская и китайская космонавтики ещё не присутствовали на мировом рынке запусков – у российской ракетно-космической промышленности было большое преимущество, которое касалось низкой системы оплаты труда и, как следствие, низких издержек на производство и разработку. Но уже сейчас этот фактор оказывает больше негативное

воздействие на приток в отрасль квалифицированных специалистов, нежели даёт ей конкурентное преимущество [17].

Крайним сегментом мирового космического рынка, где отечественная космонавтика до последнего времени не знала конкурентов, являлась пилотируемая космонавтика. В течение последних пяти лет стало понятно, что Россия потеряла своё монопольное положение в данном направлении. Однако некая уверенность в своих конкурентных преимуществах ещё осталась, несмотря на то, что в Америке конструируют сразу несколько пилотируемых кораблей, тем временем, в Китае уже производят пилотируемые и грузовые космические аппараты, а запуск китайской космической станции – дело времени [12].

В 2018 – 2019 годах экономическая ситуация в России значительно изменилась в лучшую сторону, и уже можно было говорить о том, что государство обладает ресурсами для полноценной загрузки космической отрасли. Однако представляется, что сама отрасль не готова принять значительное государственное финансирование.

В апреле 2019 года Владимиром Путиным было инициировано заседание Совета Безопасности в расширенном составе, где ключевой темой обсуждения стали приоритетные пути развития и совершенствования государственной политики в рамках космической отрасли, которые можно и следует рассматривать как основные положения для выбора приоритетных направлений развития отечественной космонавтики в ближайшей и среднесрочной перспективе.

Одно из важнейших направлений – это наращивание экспорта космических товаров и услуг. По оценкам аналитиков, только объем коммерческого мирового рынка услуг на сегодняшний день составляет более 183 млрд долл. США, и в ближайшие годы и десятилетия будет только увеличиваться.

В первую очередь необходимо сформулировать амбициозные цели и реалистичные задачи для их реализации, а затем сформировать комплекс

стратегических мероприятий с учетом возможностей конструкторских бюро предприятий ракетно-космической отрасли.

Во-вторых, на долгосрочную перспективу следует сформировать научно-технический, технологический и производственные заделы с помощью непрерывного мониторинга процессов создания и внедрения инновационных технологий, которые могут лечь в основу прорывной деятельности в рамках разработки космической техники нового поколения.

При этом камнем преткновения становится отсутствие эффективных механизмов инновационного развития в отечественной космической отрасли, которые необходимо найти. Возможно, реализация новых форм частно-государственного партнерства позволит аккумулировать организационные и административные, кадровые и финансовые ресурсы именно на приоритетных направлениях развития.

В-третьих, реализация любых стратегических целей и задач невозможна без развитой наземной инфраструктуры. Здесь можно отметить необходимость более активного использования космодромов Восточный и Плесецк.

Однако ключевой задачей является насыщение космической отрасли высококвалифицированными специалистами.

Поэтому на директивном уровне принято решение, прежде всего, реализовать основные направления государственной политики РФ в области космической деятельности в срок до 2030 года и на долгосрочную перспективу с учётом среднесрочных и долгосрочных мировых трендов, то есть реализовывать стратегические планы с учетом соответствующих уточнений и дополнений.

В качестве амбициозных, но реалистичных планов и целей в области космической деятельности в срок до 2030 года и на долгосрочную перспективу Роскосмос в настоящее время рассматривает несколько проектов, в том числе:

Проект 1. Создание и эксплуатация ракет-носителей семейства Ангара.

Проект 2. Лунная программа высадки российских космонавтов на поверхность Луны в 2030 году.

Проект 3. Создание лунной научной станции, над которым она будет работать самостоятельно или в содружестве со странами БРИКС (проект альтернативный проекту США под названием Deep Space Gateway).

Проект 4. Создание на Луне долгосрочной посещаемой базы для изучения Луны с помощью роботов-аватаров.

Проект 5. Космический буксир с ядерной энергодвигательной установкой.

По итогам заседания Совета безопасности, которое прошло в апреле 2019 года и касалось обсуждения основных путей развития и совершенствования государственной политики в рамках космической отрасли, можно предложить некоторую систему для предварительной укрупненной оценки предложений для выбора основных направлений развития отечественной космонавтики в ближайшей и среднесрочной перспективе.

Результаты расчетов по этой системе представлены в таблице 9.3.3, из которой следует, что показатель выполнения поручений президента Владимира Путина, данных на Совете Безопасности 16 апреля 2019 года, рассчитанный, как отношение фактической суммы оценок к сумме максимальных оценок по всем показателям (в процентах), для проекта 1 составляет 8,75%, для проекта 2 – 10,0%, для проекта 3 – 30,0%. Что говорит о необходимости выполнения поручений президента Владимира Путина для ракетно-космической отрасли будет тяжелой задачей, требующей напряжения всех сил и возможностей.

Таблица 9.3.1 – Укрупненная оценка предложений для выбора основных направлений развития отечественной космонавтики в ближайшей и среднесрочной перспективе по итогам заседания Совета Безопасности 16 апреля 2019 года (составлено автором)

| № п/п | Потенциал по итогам заседания Совета Безопасности 16 апреля 2019 года | Оценка потенциала (от 0 до 10) | | | | |
|-------|--|--------------------------------|-------------|--------------|---------------|--------------|
| | | Проект 1 | Проект 2 *) | Проект 3 **) | Проект 4 ***) | Проект 5 |
| 1. | Обеспечение лидирующих позиций в освоении космического пространства в рамках решения национальных задач, обеспечение безопасности, в т.ч. наращивание конкурентных преимуществ по экономическим и технологическим направлениям | 0 | 0 | 0 | 0 | 10 |
| 2. | Модернизация космической отрасли с внедрением инновационных моделей по управлению производством и научно-исследовательскими программами, повышение эффективности от использования результатов космической деятельности | 0 | 2 | 2 | 2 | 10 |
| 3. | Наращивание экспорта | 0 | 0 | 0 | 0 | 5 |
| 4. | Формирование научно-технического, технологического и производственного заделов опережающего развития в долгосрочном периоде | 0 | 0 | 0 | 5 | 10 |
| 5. | Развитие наземной инфраструктуры | 5 | 0 | 0 | 0 | 2 |
| 6. | Обеспечение отрасли квалифицированными кадрами | 0 | 5 | 6 | 7 | 2 |
| 7. | Реализуемость (инновационные технологии) | 0 | 0 | 0 | 5 | 10 |
| 8. | Амбициозность целей и планов (отсутствие аналогичных планов у конкурентов) | 0 | 0 | 0 | 5 | 10 |
| | ИТОГО количество баллов из 80 | 5 | 7 | 8 | 24 | 59 |
| | Показатель выполнения поручений президента Владимира Путина данных на Совете Безопасности 16 апреля 2019 года (сумма оценок/макс. сумма), % | 6,3% | 8,8% | 10,0% | 30,0% | 73,8% |

*) Это повторение по целям и задачам американской программы Apollo, но на современной технологической основе. Планируется, что пилотируемые полеты РФ будут осуществлены с помощью новой отечественной сверхтяжелой РН и корабля «Орел». Это отечественные аналоги программы США Артемиды, в соответствии с которой планируется, что пилотируемые полеты США будут осуществлены с помощью РН SLS и корабля «Орион». Программа США «Артемиды» делится на два этапа: первый этап - высадка на Луну в 2024 году и начало строительства международной окололунной станции Gateway. Возможный вклад России – шлюзовой модуль и системы обеспечения жизни. Второй этап - полеты на Луну, создание лунной инфраструктуры, сборка на станции транспортного корабля для полёта на Марс и проведение годового пилотируемого полета на орбите Луны для проверки возможности длительных полетов [файл «а-1 сша проект артемиды»].

**) Это повторение проекта США под названием Deep Space Gateway. Программа США была публично представлена НАСА в марте 2017 года как часть программы по разработке пилотируемого полёта на Марс. Россия обладает практически всеми технологиями, необходимыми для реализации проекта, которые в настоящее время используются в рамках международной программы МКС.

***) Может рассматриваться как амбициозный, который позволит активно разрабатывать и использовать программы искусственного интеллекта (ИИ). Сильная конкуренция со стороны Японии – мирового лидера в технологиях создания роботов.

Таким образом, перед российской космонавтикой ставится стратегическая задача обеспечить России лидирующие позиции на мировом космическом рынке в рамках осуществления коммерческой деятельности.

Сегодня стратегия развития коммерческой деятельности может разрабатываться на основе тех же принципов и характеристик, что и у транснациональных корпораций, только на международном уровне в рамках целых отраслей с целью расширения присутствия какой-либо страны. В данном случае космическая отрасль не является исключением, а наоборот – ярким примером, поскольку в большинстве стран мира стратегия развития ракетно-космической промышленности реализуется не только в интересах коммерческой деятельности, но и в рамках обеспечения обороны государства, а следовательно, существует возможность комплексного обеспечения стратегического развития всей отрасли на мировом уровне.

В современных условиях в широком смысле под мировым космическим рынком понимают систему международных и внутригосударственных отношений по обмену товаров на деньги в рамках создания и изготовления космических товаров и предоставления услуг, а также их применение в других сферах, например, в обороне, науке, культуре, экономике и т.д.

Многие страны пришли к выводу, что космическая деятельность является приоритетным направлением национальной политики и одним из ключевых факторов в конкурентной борьбе на мировом уровне. За последнее десятилетие мировой космический рынок достиг объема в 500 млрд долл. США, увеличившись в пять раз. Однако доля России на этом рынке – всего 1,5 – 2%.

Внутринациональная программа под названием «Космическая деятельность России на 2013 – 2020 годы» была утверждена в конце 2012 года [19]. В направлении развития ракетно-космической промышленности государством выделены три основных направления. Во-первых, необходимо обеспечить беспрепятственный доступ России в космическое пространство, развивать космическую технику, технологии и совершенствовать услуги по

данному направлению, а также повышать инновационный уровень ракетно-космической отрасли и выполнять международные обязательства. Во-вторых, перспективным становится использование созданных космических средств в научных целях. В-третьих, продолжать пилотируемые полеты.

При изучении государственной программы по космической деятельности важным пунктом отмечен тот факт, что данная национальная отрасль к 2020 году должна в несколько раз увеличить объемы производства по сравнению с базовым 2011 годом, при этом главной целью является достижение Россией доли в 16% на мировом рынке по производству космической техники [15].

Однако анализ действующих директивных документов, определяющих стратегические перспективы развития РКП, показал, что определены конечные показатели, но практически не прописаны экономические механизмы и экономическое обоснование выделения необходимых ресурсов для реализации поставленных планов, достижения целей и решения конкретных задач. Для промышленности и, в частности, для ракетно-космической отрасли необходим не стратегический анализ, а конкретные практические рекомендации по формированию международной стратегии развития коммерческой деятельности.

Очевидно, что отсутствие Стратегии коммерческой деятельности тормозит развитие отечественной космонавтики, и в тоже время техническое развитие потенциальных конкурентов становится основной причиной устаревания российских технологий, и как следствие это приводит к уменьшению спроса на международном рынке космических товаров и услуг. В связи со снижением финансирования отрасли, а также ввиду отсутствия научно-технических и коммерческих амбициозных прорывов, происходит размытие потенциального кадрового резерва.

Таким образом, перед российской космонавтикой ставится стратегическая задача обеспечить России лидирующие позиции на мировом космическом рынке в рамках осуществления коммерческой деятельности.

Список использованной литературы

1. Ansoff H.I. Strategic Management. – Wiley, 1979. – 322 p.
2. Doyle P. Marketing management and strategy // Harlow: FT Prentice Hall. – 2006. – 464 p.
3. Porter M.E. Competitive Strategy: Techniques for Analyzing Industries and Competitors. – New York: The Free Press, 1980. – 397 p.
4. PricewaterhouseCoopers «Main trends and challenges in the space sector 2019». – URL: www.pwc.fr/space
5. Scott A. Strategic Planning // Textbook of the Edinburgh Business School [Электронный ресурс]. – Режим доступа: <https://www.ebsglobal.net/EBS/media/EBS/PDFs/Strategic-Planning-Course-Taster.pdf>
6. The Organization for Economic Cooperation and Development «The Space Economy at a Glance 2017». – URL: <http://www.oecd-ilibrary.org/content/book/>
7. The Organization for Economic Cooperation and Development «The Space Economy at a Glance 2018» [Электронный ресурс]. – URL: <http://www.oecd-ilibrary.org/content/book/>
8. The Organization for Economic Cooperation and Development «The Space Economy at a Glance 2019» [Электронный ресурс]. – URL: <http://www.oecd-ilibrary.org/content/book/>
9. Андреева А.А. Виды и элементы стратегии развития предприятия // Вестник Волжского университета им. В.Н. Татищева. – 2018. – №20. – С. 186 – 192
10. Аникин В.И. Актуальные стратегии диверсификации деятельности международных корпораций (роль и место в современной мировой экономике) // Государственное управление. Электронный вестник. – 2019. – №31. – С. 1 – 31

11. Годовой отчет Государственной корпорации по космической деятельности «РОСКОСМОС» за 2019 год [Электронный ресурс]. – URL: <https://www.roscosmos.ru/media/img/docs/Reports/>
12. Закон Российской Федерации «О космической деятельности» от 20 августа 1993 года №5663-1
13. Мильнер Б.З. Теория организации: учебник / Б.З. Мильнер. – 8-е изд., перераб. и доп. – М.: ИНФА-М, 2019. – 848 С.
14. Мичурина О.Ю. Роль и место интеграционных процессов в мировой экономике // Вестник Астраханского государственного технического университета. Серия: Экономика. – 2018. – №2. – С. 7 – 17
15. Официальный документ «Стратегическое развитие Государственной корпорации по космической деятельности «РОСКОСМОС» на период до 2025 года и перспективу до 2030 года» [Электронный ресурс]. – URL: <https://www.roscosmos.ru/media/files/docs/2017/dokladstrategia.pdf>
16. Парфенова Е.В., Васютина Е.С. Компенсационные эффекты трансформации внешнеэкономических связей в области международного сотрудничества (на примере ракетно-космической промышленности) // XXIX Международные Плехановские чтения. 24 – 26 февраля 2016 г.: сборник статей: в 3 т. – Москва: ФГБОУ ВО «РЭУ им. Г.В. Плеханова», 2016. – Т. 3. – С. 105 – 109
17. Парфенова Е.В., Горохова И.В. Стратегическое планирование инновационного развития как основа экономического роста Российской Федерации // Журнал «Научные исследования и разработки: экономика». – ВАК: ПИ № ФС77-43690 от 2011-01-24, 2016. – Т. 4. – № 3. – С. 39 – 42
18. Перминов А.Н. «Модернизация ракетно-космической промышленности России на современном этапе: проблемы и пути решения» [Электронный ресурс]. – URL: federalbook.ru/files/OPK/Soderjanie/OPK-7/III/Perminov.pdf

19. Распоряжением Правительства РФ «Государственная программа РФ «Космическая деятельность России на 2013 – 2020 годы» от 28 декабря 2012 года № 2594-р
20. Розанова Н.М. Экономика отраслевых рынков / Н.М. Розанова. – М.: Издательство Юрайт; ИД Юрайт, 2019. – 906 с.
21. Тютевина Е.С. Структура и пути развития мирового и отечественного космического рынка // Экономические науки. – 2018. – № 7 (80). – С. 118 – 129
22. Указ Президента РФ «Основные положения Основ государственной политики Российской Федерации в области космической деятельности на период до 2030 года и дальнейшую перспективу» от 19 апреля 2013 года №Пр-906
23. Ушакова О.А. Развитие стратегического планирования в мировой и российской практике // Вестник оренбургского государственного университета. – 2017. – №6 (167). – С. 239 – 243

Глава 10. Концепция мультикоммуникационной логистической системы как инновационный путь развития логистического менеджмента на микро, мезо, макро уровнях

10.1. Концепция развития мультикоммуникационной логистической системы промышленной компании

Рассмотрим методику решения проблем логистизации бизнеса. В качестве инструментария логистического менеджмента охарактеризуем мультикоммуникационную логистическую систему. Данная технология коррелирует с задачами, поставленными на государственном уровне, является наукоемкой, позволяет оптимизировать бизнес-процессы на качественном новейшем уровне с учетом заданной многофакторности и высокой динамичности экономических связей, что заявлено в Национальных программах РФ по развитию Национальной технологической инициативы [17] и Цифровой экономики [19]. Предлагаемая методика мультикоммуникационной логистической системы соответствует сквозным цифровым технологиям: промышленный интернет, нейротехнологии.

Значимым преимуществом применения принципов мультиагентных технологий во всех сферах хозяйственной деятельности является использование всестороннего опыта и симбиоз участников товаропроводящей сети. [1]

Развитие нового информационного общества, ускорение информационных потоков, пересмотр условий функционирования предпринимательской среды на логистических принципах [11] приводит к перестройке экономического мышления в сторону формирования электронной среды взаимоотношений с контрагентами.

В контексте использования преимуществ мультиагентных систем выделим предпосылки для решения задач, связанных с логистизацией деятельности промышленных компаний:

- индивидуализация бизнеса, оперативность и гибкость реагирования бизнес-структур на рыночную конъюнктуру; [10]
- экономическое обоснование и объективность принятия решений по управлению взаимоотношениями с контрагентами и ассортиментом в динамично развивающихся условиях;
- необходимость оцифровки (автоматизации) возрастающих в экспоненциальной прогрессии информационных потоков; [3]
- объединение промышленных компаний в союзы и кластеры;
- использование организационного и человеческого капитала максимального возможного числа субъектов по всей цепи поставок;
- непропорциональная структура рынка логистических услуг;
- построение системы сбора логистической информации и отчетности.

Ядром идеологии мультикоммуникационной логистической системы выступает обеспечение прозрачности финансовых потоков на основе статистики бизнес-отношений товаропроводящей сети, что в конечном счете минимизирует субъективизм, повышает ответственность задействованных в логистических операциях субъектов управления, уменьшает временные потери и альтернативные убытки бизнес-структур.

Таким образом, под мультикоммуникационной логистической системой следует понимать совокупность людских и информационных ресурсов, организованных с целью ускорения движения материальных ресурсов и оптимизации финансовых ресурсов предприятий, входящих в логистическую цепь.

Предприятия, добровольно входящие в мультикоммуникационную логистическую систему, опираются на принципы, представленные на рисунке 10.1.1.



Рисунок 10.1.1 – Идеологический подход развития мультикоммуникационной логистической системы микро уровня

Для реализации принципов мультиагентных систем и повышения эффективности закупочной, сбытовой, сервисной логистики предложен авторский механизм организации логистического портала предприятия (рисунок 10.1.2).



Рисунок 10.1.2 – Элементы логистического портала предприятия

Логистический портал содержит:

1. Коммерческую / внешнюю элементную базу в составе:

- модуль поставщиков,
- модуль потребителей.

Доступ к коммерческому элементу осуществляется закодировано, путем рейтингования контрагентов достигается соревновательный (конкурентный) эффект.

2. Консалтинговую / внутреннюю элементную базу:

- мотивация персонала по логистике,
- логистическое бюджетирование,
- логистический анализ.

Полномочия на портале устанавливаются в зависимости от статуса сотрудника.

Далее рассмотрим методологическую основу логистического портала.

Матричный метод управления товарами или формирования товарного ассортимента и номенклатуры, в результате чего повышаем рентабельность бизнеса.

Последовательность применения матричного метода в данном случае такова:

1. Определить показатели эффективности формирования ассортимента по каждой товарной позиции. Пример системы показателей представлен в таблице 10.1.1.
2. В ходе корреляционно-регрессионного анализа определить степень важности показателей.
3. По показателям, имеющим сильную степень влияния, построить управленческую матрицу. Принцип построения матрицы управления товарным ассортиментом на основе подхода ABC показан в таблице 10.1.2.

Таблица 10.1.1 – Информационная база матричного метода управления товарами

| Показатели эффективности товарного ассортимента | Показатели эффективности номенклатуры материальных ресурсов |
|--|--|
| Объем продаж, руб. | Объем закупок, руб. |
| Рентабельность продаж, % | Логистические затраты, руб. |
| Среднемесячный заказ, руб. | Среднемесячные затраты, руб. |
| Коэффициент оборачиваемости | Коэффициент оборачиваемости |
| Темп роста продаж, % | Темп роста затрат, % |
| Неликвиды, % | Неликвиды, % |

Таблица 10.1.2 - Матрица управления товарным ассортиментом

| Продажи Неликвиды | А | В | С |
|----------------------|---|--|--|
| А | Лидирующие продукты с выявленным положительным трендом | Успешные привилегированные товары | С большой вероятностью данные продукты характеризуются сезонностью |
| В | Благоприятные продукты | Товары, по которым необходим регулярный мониторинг продаж | Продукты, демонстрирующие стабильную выручку, но не новые |
| С | Продукция, по которой можно попробовать сезонные скидки для ускорения оборачиваемости на данном этапе | Товары, обеспечивающие определенную долю продаж компании, но с негативной тенденцией | Продукция, демонстрирующая отрицательный тренд |

Индивидуальные рейтинги покупателей и поставщиков. Методика индивидуального рейтингования в работе впервые применена в реальном секторе экономики. В соответствии с концепцией мультикоммуникационной логистической системы с помощью рейтингов покупателей осуществляется поиск индивидуального подхода по реализуемым договорным отношениям. Многокритериальный рейтинг может иметь любое математическое обеспечение (например, ABC-метод, бинарный метод, рэнкинг [13] и др.). [9]

Отметим показатели, по которым можно осуществлять многопараметрическое рейтингование клиентов и поставщиков (таблица 10.1.3).

Таблица 10.1.3 - Состав информационного обеспечения управления финансовыми потоками в логистике

| Показатели эффективности работы с покупателями | Показатели эффективности работы с поставщиками |
|--|---|
| Размер задолженности, руб. | Размер задолженности, руб. |
| Срок взаимоотношений, мес. (М) | Срок взаимоотношений, мес. (М) |
| Срок образования задолженности, дни | Срок образования задолженности, дни |
| Число срывов сроков оплаты (С) | Число срывов сроков поставок |
| Процент брака готовой продукции | Результаты входного контроля качества |
| Число отгрузок (О) | Число отгрузок (О) |
| Кумулятивная величина отгрузок за период сотрудничества, руб. (К) | Кумулятивная величина отгрузок за период сотрудничества, руб. (К) |
| Среднемесячный размер отгрузок = K / O | Среднемесячный размер отгрузок = K / O |
| Платежная дисциплина (вероятность срывов сроков оплаты в краткосрочной перспективе), % = C / O | Дисциплина поставщика (вероятность срывов сроков поставок в краткосрочной перспективе), % = C / O |
| Частота сотрудничества (среднемесячное количество заказов товаров) = O / M | Частота сотрудничества (среднемесячное количество заказов товаров) = O / M |
| Наличие и количество промо акций | Количество сервисных услуг |

В зависимости от позиции клиента может применяться либо программа лояльности в том или ином варианте, либо приостанавливаться отгрузки, либо меняются договорные отношения в части формы и срока платежа.

Мотивация персонала в логистике, носящая многокритериальный характер оплаты труда. Подход в распределении зарплаты следующий:

- имеется базовый оклад;
- премиальный фонд распределяется по сотрудникам в зависимости от вклада в повышении эффективности логистической системы предприятия.

Параметры мотивации сотрудников в сфере логистики устанавливаются по степени их важности на возможность снижения затрат и получения внутрипроизводственных резервов.

Показатели эффективности работы логистов могут быть оценены по шкале и содержать следующие критерии: степень качества и брака закупаемого сырья и готовых товаров, уровень устойчивости базы потребителей и поставщиков, уровень внезапных заказов сырья и материалов, допущение дефицита / переизбытка товаров, дисциплина новых поставщиков и потребителей, своевременность материального обеспечения, скорость выполнения заказов.

Логистическое бюджетирование. Регламент работы центров логистической ответственности.

Алгоритмом взаимовлияния материальных и финансовых ресурсов в рамках логистических бюджетов в консалтинговой части логистического портала является управления запасами по буферным зонам.

Критериальная основа буферного управления запасами представлена в таблице 10.1.4.

Таблица 10.1.4 – Шкалы буферов запасов

| Оценочные критерии | Расчет | Шкала для критерия, попадающего в красный диапазон | Шкала для критерия, попадающего в желтый диапазон | Шкала для критерия, попадающего в зеленый диапазон |
|--|--|--|---|---|
| Степень неликвидов (рассчитывается по готовой продукции и сырью) | Запасы, содержащиеся на складе компании более 85 дней / Суммарные запасы * 100% | >9% | 2-8% | <1% |
| Альтернативная прибыль (руб.) | Натуральный объем залежалых товаров, вызванный дефицитом сырья * (Цена – Себестоимость 1 шт. товара) | >10% прибыли в течение отчетного периода | 0 | до 9,9% прибыли в течение отчетного периода |
| Рентабельность потенциальной сделки | Альтернативная прибыль / Выручка потенциальной сделки * 100% | < 5% запланированной рентабельности | норматив | < 1-3,5% от запланированной рентабельности |
| Коэффициент оборачиваемости сбытовых запасов | Выручка от продаж / Готовая продукция | Снижение уровня по сравнению с аналогичным показателем за предыдущий отчетный период | Рост значения критерия по отношению к предыдущему отчетному периоду | ± 3% по сравнению с аналогичным показателем за предыдущий отчетный период |
| Коэффициент оборачиваемости снабженческих запасов | Себестоимость / Сырье и материалы | Снижения уровня по сравнению с аналогичным показателем за предыдущий отчетный период | Рост значения критерия по отношению к предыдущему отчетному периоду | ± 3% по сравнению с аналогичным показателем за предыдущий отчетный период |

Далее применяется авторский коэффициент логистической системы согласно формуле (10.1.1):

$$Kб = 0,8 * \sum Y + 0,15 * \sum G + 0,05 * \sum R, \text{ где} \quad (10.1.1)^1$$

$Kб$ – интегральный коэффициент системы буферного управления запасами;

$\sum Y$ – число критериев, соответствующих желтой зоне;

$\sum G$ – число критериев, соответствующих зеленой зоне;

$\sum R$ – число критериев, соответствующих красной зоне.

На последующем этапе обеспечивается связь состояния количества и качества материальных ресурсов с бюджетированием финансовых потоков, исходя из значения $Kб$ (1), как это представлено в таблице 10.1.5.

Таблица 10.1.5 - Шкала $Kб$ в регулировании финансовых потоков логистических бюджетов

| Величина $Kб$ | Нормативный процент бюджетирования сбытовых запасов к объему продаж (бюджет производства) | Нормативный процент бюджетирования снабженческих запасов к потребностям в производстве (бюджет материальных затрат) |
|---------------|---|---|
| 2,85-4,5 | 15% | 10% |
| 1,8-2,84 | 10% | 5% |
| 0,3-1,79 | 25% | 20% |

Концепт логистического анализа заключается в экономическом мониторинге логистической системы предприятия посредством комплекса критериев для выявления тенденций развития микрологистических систем. Скомпилированный комплекс аналитических критериев представим таким образом: состав и структура оборотного капитала по элементам: дебиторская задолженность, денежные средства, запасы, прочие оборотные средства; баланс дебиторской и кредиторской задолженности по позициям: сумма, доля в активах предприятия, коэффициент оборачиваемости, средневзвешенный срок погашения; структура и оборачиваемость запасов; темпы роста логистических

¹ Весовые коэффициенты проставлены исходя из логики ABC-метода

затрат, соотношение логистических затрат и полной себестоимости; «омертвленные затраты»; темпы прироста базовых элементов / ресурсов логистической системы: задолженность, запасы, логистические затраты; плотность логистического потока (логистические затраты в единицу времени); потери, вызванные дефицитом материальных ресурсов (упущенные возможности или альтернативные затраты).

Таким образом, в результате общий алгоритм взаимодействия звеньев мультиммуникационной логистической системы в рамках предпринимательской структуры выглядит следующим образом (рисунок 10.1.3):



Рисунок 10.1.3 – Элементы мультиммуникационной логистической системы на микро уровне и их взаимосвязь

Предлагаемая концепция развития мультиммуникационной системы промышленного предприятия позволит достичь следующих эффектов:

- коммерческая эффективность вследствие индивидуализации контрактов, снижения логистических затрат, минимизации неликвидов;

- повышение уровня логистического сервиса в режиме онлайн для предприятий с высоким индивидуальным рейтингом;

- ускорение оборачиваемости сбытовых запасов вследствие объективизации стимулирования продаж;
- развитие электронной торговли на рынках B2B;
- работа с постоянными поставщиками на предмет ослабления договорных условий, основываясь на индивидуальном рейтинговании поставщиков;
- усиление контроля за сроками поставок;
- регулярная модификация потребительских свойств изделий на основе управленческих матриц;
- экономия времени вследствие мгновенного расчета показателей для анализа и формирования индивидуальных контрактов, объединения усилий участников цепи.

10.2. Формирование инновационной логистической системы города

Человечество проблема организации передвижения грузов и людей, развития транспортной инфраструктуры города волнует со времен появления колеса. А после того, как предприниматели вышли на межрегиональную торговлю, людей заинтересовали вопросы логистики товаров.

Определим, что мы будем понимать под логистической системой города. Логистическая система города – это часть инфраструктуры города, отличающаяся динамикой и единой цепочкой ее участников, в основу которой положено единство управления потоками транспорта и пассажиров.

Далее исследование по большому счету проводилось в преломлении к малым городам России, в частности на примере развития Обнинска Калужской области.

В работе представлена двух аспектная методология формирования логистической системы города: во-первых, построенная на логистически ориентированных методах регулирования движения со стороны органов власти города, а во-вторых, использующая концепт мультиагентных технологий.

Мультиагентная логистическая система формируется для оптимизации во всей логистической цепи графиков движения финансовых потоков и материальных потоков в городской среде в виде разумной совокупности и опыта людских и информационных потоков и ресурсов.

Ядром адаптации мультиагентных технологий к логистической системе города выделим следующие концептуальные ее принципы:

- объективизация принятия решений по регулированию транспортных потоков на основе авторской разработанной системы количественных критериев;
- обширное использование интернет и веб технологий;
- функционирование в рамках целевых параметров уменьшения нагрузки на дороги и сокращения времени в пути;
- синергетический эффект от широкого участия в системе всех задействованных субъектов;
- своевременное реагирование на изменение дорожной ситуации; [14]
- взаимное участие горожан и администрации в корректировке дорожной ситуации, развитие социального капитала;
- открытая архитектура системы в зависимости от изменений науки и технологий.

На наш взгляд эффективная логистическая система малого города, построенная на принципах и преимуществах мультиагентных технологий, призвана решать следующие основные задачи:

- минимизация затрат времени и финансовых ресурсов участников движения в городе;
- обеспечение актуальной информацией о состоянии на дорогах в режиме онлайн органов внутренних дел города.

Отметим, что предлагаемая авторская мультикоммуникационная логистическая система малого города коррелирует с задачами, поставленными в подпроекте «Умный городской транспорт» проекта «Умный город» и с рядом

показателей Умного города. [18] Так, в качестве требований к умному городскому транспорту прописаны: система видеофиксации нарушения правил движения; администрирование парковочного пространства; интеллектуальное управление общественным транспортом; установка системы «умный светофор»; создание умных остановок; мониторинг эксплуатации дорожного полотна.

Изучив опыт других регионов и зарубежных стран по организации городского движения, учитывая задачи интеллектуализации транспортной инфраструктуры [5], основываясь на симбиозе участников в рамках проектируемой мультиагентной системы, авторами к основным связующим элементам мультимедийной логистической системы малого города отнесены:²

Система фото видео фиксации нарушений ПДД, дорожной обстановки на улицах города. Комплексный план по оснащению дорог города уже разработан. Так, из бюджета города на программу «Дорожное хозяйство города Обнинска» в 2019 году предусмотрено более 442 млн руб.

Для слежения за дорожной обстановкой, фиксацией ПДД, дорожных заторов создание организации **Дорожных волонтеров** из числа студентов ИАТЭ НИЯУ МИФИ, молодежных организаций города, детей сотрудников УВД Обнинска. Кроме того, молодежь может проводить соцопросы об отношении жителей города к транспортным проблемам. Подобный опыт уже успешно применяется в Казахстане, где в Павлодаре заключено соглашение между вузом и администрацией города о сотрудничестве в области мониторинга дорожных ситуаций. Студенты соответствующих направлений подготовки во время практики анализируют на разных участках дорог время и степень заторов, сведения передаются в городское МВД.

² Условные обозначения: *Курсив* – уже внедряется в городе Обнинске Калужской области; **Полужирный** – предлагаемый инновационный метод регулирования дорожных ситуаций; *Полужирный курсив* – проекты, планируемые к внедрению

Веб-приложение **«Интерактивная карта дорог города»**, в котором в режиме реального времени можно посмотреть имеющиеся аварии, пробки, места ремонта, информация об установленных новых знаках.

Фиксация по сигналам с мобильных телефонов скоплений пассажиров, автомобилистов, грузопотоков. Подобная система в числе других цифровых решений была заявлена в рамках соглашения между Калужской областью и сотовыми операторами на Петербургском Международном экономическом форуме 2019.

Веб-сервис в режиме онлайн для автомобилистов. Функционал программы: маршрутизация, предложение нескольких вариантов; информирование о свободных парковочных местах в режиме онлайн на ключевых городских объектах, у крупных торговых центров и магазинов (в рамках подпроекта «Умные парковки»); рекомендации времени выезда при планировании поездки. Аналогом данного сервиса можно назвать Яндекс. Карты, однако сервис Яндекса не содержит модуля по парковочному пространству города, не позволяет вести долгосрочное планирование отъезда.

Веб-приложение в режиме онлайн для пассажиров. Функционал сервиса: онлайн демонстрация движения всех видов общественного транспорта (включая такси) в городе; сравнение времени в пути разными видами транспорта и пешком; модуль расписания городского и междугороднего транспорта; информирование о новых маршрутах, изменении в маршруте и графике движения на регулярных для данного пассажира видах и маршрутах общественного транспорта. Можно внедрить на базе приложения Яндекс. Транспорт.

Возобновить работу сервиса «Активный гражданин» и для проведения опросов населения в режиме онлайн дополнить его разделом **«Активный пешеход и активный автолюбитель»**.

Разделить город на мини виртуальные районы и оснастить каждый из них «Тревожными кнопками». Нажатие гражданином на «тревожную кнопку»

будет означать сигнал об аварии, автомобильной пробке, другом неблагоприятном дорожном событии. Предполагается, что сигнал от кнопки поступает в подразделении ДПС по городу Обнинску. Как перспективный вариант продолжения «тревожной кнопки» на будущее дополнить аппарат возможностью отослать фиксирующее фото, видео.

Для мотивации участия в мультикоммуникационной системе и активности в веб-сервисах дорожного движения населения города **разработка социального рейтинга горожан**. Подобный опыт уже, например, имеется в Китае. Зарубежный опыт свидетельствует о том, что социальный рейтинг граждан – это многоаспектное понятие, он может включать в себя возможность набрать баллы за следующие действия: информирование о дорожных ситуациях; отдельный сбор мусора; активность в совместных онлайн покупках; членство в общественных организациях города; участие в субботниках; лайки и положительные отзывы на официальных городских страницах в соцсетях и т.п. При этом гражданин накопленные баллы может потратить на: льготы по местным налогам и выдачу кредита в местных отделениях банков; скидки в определенных магазинах, дополнительные баллы для ребенка при поступлении в местный вуз. Гражданам с низким социальным рейтингом, например, не продается алкоголь, их не выпускают за пределы города / страны.

Введение налога на езду в пробках. По опыту США такая мера способна привести к переходу от личного транспорта к общественному, экономии бензина, повышению бюджетной эффективности.

Поскольку Обнинск входит в Северную агломерацию Калужской области и пассажиропоток характеризуется интенсивностью не только внутри города, но и мобильностью населения между соседними городами (Белоево, Жуков, Малоярославец, Боровск, Балабаново, Нара и др.), целесообразен **переход локальной транспортно-логистической системы к бесшовным перевозкам**, успешные проекты которых реализованы в Лондоне и Барселоне. Для этого предполагается заключение долгосрочного соглашения между администрацией

города, РЖД, ПАТП, а также введение в оборот многофункциональных городских карт по типу карты «Тройка». Карта О (для примера) позволит населению экономить вследствие введения разных режимов оплаты по принципу ценового бандлинга. Кроме того, организация бесшовных перевозок в агломерации предполагает введение веб-приложения, в котором в онлайн режиме реализуется навигация по разным видам транспорта и вариантам (в том числе мультимодальным) с указанием времени и стоимости проезда, своевременное информирование пользователей об изменении в режиме и стоимости регулярных для них маршрутов, поиск ближайшей остановки и навигация к ней, онлайн приобретение билетов по выбранному маршруту, пополнение карты О онлайн. Все это снизит социальную напряженность, повысит имидж города, нормализует режим работы транспорта, минимизирует время передвижения.

Таким образом, в представленной мультикоммуникационной логистической системе города реализуется принцип синергии администрации и соответствующих министерств и ведомств города, мотивированное вмешательство всех участников движения.

Что касается затрат на внедрение системы, то в условиях цифровизации общества, они по большому счету включают в себя трудозатраты и энергозатраты на создание представленных мобильных приложений, а также административные действия муниципалитета по решению использования элементов мультикоммуникационной системы и заключению соглашений с партнерами.

Как уже отмечалось ранее, представленная мультикоммуникационная логистическая система малого города во многом исходит из задач введенного Минстроем РФ стандарта «Умный город». Однако представленная модель не содержит комплексных оценочных критериев эффективности транспортно-логистической инфраструктуры города, в том числе в преломлении к создаваемой инновационной мультикоммуникационной логистической системе

в условиях цифровизации. Поэтому далее нами обосновывается состав критериев, которыми необходимо дополнить существующую статистику.

Итак, модернизированная система статистики городской логистики может включать следующие количественные критерии, отобразим их в таблице 10.2.1.

Таблица 10.2.1 – Система мониторинга состояния и эффективности транспортно-логистической системы города

| № | Показатель | Отношение к современной статистике в РФ |
|----|---|---|
| 1 | Динамика и частота аварийности | Имеется |
| 2 | Динамика и частота «пробок» | Нет |
| 3 | Уровень диджитализации транспортно-логистической системы города. Определяется процентом населения, пользующегося транспортными интернет и веб сервисами | Нет |
| 4 | Информатизированный контроль за движением общественного транспорта | Определяется как «да / нет» |
| 5 | Количество электронных услуг, оказываемых автолюбителям города | Нет |
| 6 | Загруженность дорог (городской трафик) по виртуальным районам города | Нет |
| 7 | Средняя время пассажира в пути | Нет |
| 8 | Среднее время автомобилиста в пути | Нет |
| 9 | Затраты на содержание транспортной системы (ремонт дорог, обслуживание автомобильных сервисов, зарплата сотрудников, регулирующих движение) | Частично |
| 10 | Динамика автомобилей на 1000 чел. населения | Имеется |
| 11 | Динамика пассажиропотока | Имеется |
| 12 | Динамика грузопотока | Имеется |

Как видим из таблицы 10.2.1, половина показателей транспортного мониторинга на данный момент в официальной статистике не присутствует вообще.

Внедрение предлагаемой в данной работе мультимедийной логистической системы малого города позволит, на наш взгляд, укрепить позиции «умных городов» России, сделает их более привлекательными для жизни, что в конечном итоге приведет к повышению уровня интеллектуального капитала жителей и инновационной активности находящихся в городе компаний.

В качестве стратегических перспектив развития умной транспортно-логистической системы города по прогнозам экспертов можно отнести:

- стимулирование и развитие использования каршеринга, в том числе экологического, в целях смещения структуры людских потоков в городе, оптимизации городской эко среды, формирования нового вида бизнеса; [15]
- подземные сети для доставки малогабаритного груза;
- использование в транспортной системе города дронов и беспилотников для доставки товаров и пассажиров, что в результате будет способствовать снятию напряжения и разгрузке наземного транспорта и дорожного покрытия.

10.3. Инновационная система регулирования региональной логистики

Формируемая мультикоммуникационная логистическая система на макро уровне развитого региона призвана обеспечить решение круга задач регулирования и развития деятельности индустриальных парков:

- отсутствие системно созданной логистической отчетности, информация которой обеспечит прозрачность логистической деятельности на предприятиях и на территории логистических комплексов;
- ускорение бизнес-связей резидентов индустриального парка, что обеспечивает наращивание налогооблагаемой базы;
- загруженность дорог, прилегающих к территории индустриального парка [2];
- рассогласованные графики перевозчиков, работающих с резидентами и распределительными центрами, в том числе при непосредственном регулировании потоков участников логистического кластера типа Freight Village;
- необходимость цифровизации прогрессирующих информационных потоков, возникающих для обеспечения товародвижения;
- диспропорциональный рынок транспортно-логистических услуг.

Аналогично микрологистической системе региональную логистику предлагаем регулировать в рамках логистического портала макро уровня (рисунок 10.3.1).



Рисунок 10.3.1 – Состав логистического портала региона (субъекта федерации)

Охарактеризуем смысловое наполнение элементов мультикоммуникационной системы в аспекте регулирования региональной логистики:

1. Институты развития призваны на основе мониторинга логистической системы индустриальных парков, сайта резидентов и макроэкономических показателей логистики региона обеспечить предложения в сфере инновационной логистики.

2. Правительство региона в лице министерства экономического развития осуществляет налаживание государственной статистики в связи с

возникновением субъектов нового качества (логистических комплексов), которая как минимум может включать критерии логистического анализа: степень синхронизации участников кластеров, соотношение логистических затрат и ВРП, отсутствие сверхлимитного времени нахождения крупногабаритного транспорта в индустриальном парке и близлежащих территориях, уровень возвратов товаров, процент невыплаченной задолженности, оборачиваемость по типам запасов. Созданная информационная система позволит автоматически рассчитывать эффективность деятельности резидентов индустриальных парков в виде показателей коммерческой и бюджетной эффективности.

3. Компании – резиденты индустриального парка (в форме логистического портала предприятия, взаимосвязанного для формирования макроэкономической отчетности с институтами развития и министерством экономического развития субъекта федерации).

4. Логистический кластер формата Freight Village осуществляет регулирование логистических потоков, используя методы: индивидуальные рейтинги транспортных компаний, матричный метод выбора новых транспортных компаний, регулирование плотности транспортной загрузки и режимов работы складов, формирование бюджетов запасов распределительных центров по узким буферным зонам, бюджетирование продаж распределительных центров и транспортно-логистических услуг, многопараметрическая мотивация персонала в сфере логистики.

5. Транспортные компании, осуществляющие деятельность в рамках логистического кластера, используют методы логистически ориентированного менеджмента: онлайн формирование и отслеживание выполнения транспортно-логистических услуг; согласованный с кластером бюджет (график) отгрузки товаров.

6. Муниципалитет, на чьей территории расположен индустриальный парк, мониторит качество социальной устойчивости в связи с работой резидентов

индустриального парка и логистического кластера по критериям, связанным с экологическим менеджментом, трудовыми ресурсами резидентов.

Таким образом, под мультиммуникационной логистической системой региона понимается совокупность информационных и человеческих потоков, координируемых единым логистическим центром регионального института развития и организованных с целью ускорения движения материальных ресурсов и оптимизации финансовых ресурсов предприятий-резидентов и снижения социальной напряженности в регионе, развития инфраструктуры территории.

В развитие инновационной логистической системы региона [4] и в связи с новыми логистическими преобразованиями предлагаем на основе модификации имеющегося мирового опыта состав показателей статистики региональной логистики.

В соответствии с мировой практикой оценки логистических систем применяется так называемый *logistics performance index (LPI)* по версии Всемирного банка [20], методика которого в настоящее время заключается в субъективных оценках экспертов ряда стран по группам показателей: *Customs* (эффективность и скорость работы таможенных органов), *Infrastructure* (качество инфраструктуры логистических компаний), *Logistics quality and competence* (уровень компетенций логистических провайдеров), *International shipments* (взаимодействие с международными компаниями), *Tracking and tracing* (возможность отслеживания перемещений грузов), *Timeliness* (своевременность поставок).

Определенные успехи по оценке вклада в ВВП сектора e-commerce на государственном уровне имеются в системе статистики в Евросоюзе. [16] Так, в рамках Евростатистики формируются данные по разделам:

- «Цифровая экономика и общество» (оснащенность персонала корпораций портативной компьютерной техникой и средствами связи, цели использования интернет, структура сайтов);

- «Электронный бизнес» (число покупателей в интернет, структура электронной торговли, проблемные зоны интернет-торговли, соотношение рынков интернет-продаж товаров и услуг).

Для оценки развития товаропроводящих сетей в Европе используется анализ структуры пассажиро и грузо потоков по видам транспорта.

В работе для определения вклада рынка транспортно-логистических услуг и в качестве инструмента мониторинга деятельности логистических комплексов (в частности формата Freight Village) предлагается целый комплекс параметров, включающий в себя стандартные параметры логистической инфраструктуры, анализа их инновационного потенциала, оценочные критерии логистического сервиса, развития электронных форм предоставления услуг. Элементы разработанной системы статистики логистических систем (государственной системы статистики логистических систем) представим на рисунках 10.3.2 - 10.3.6:

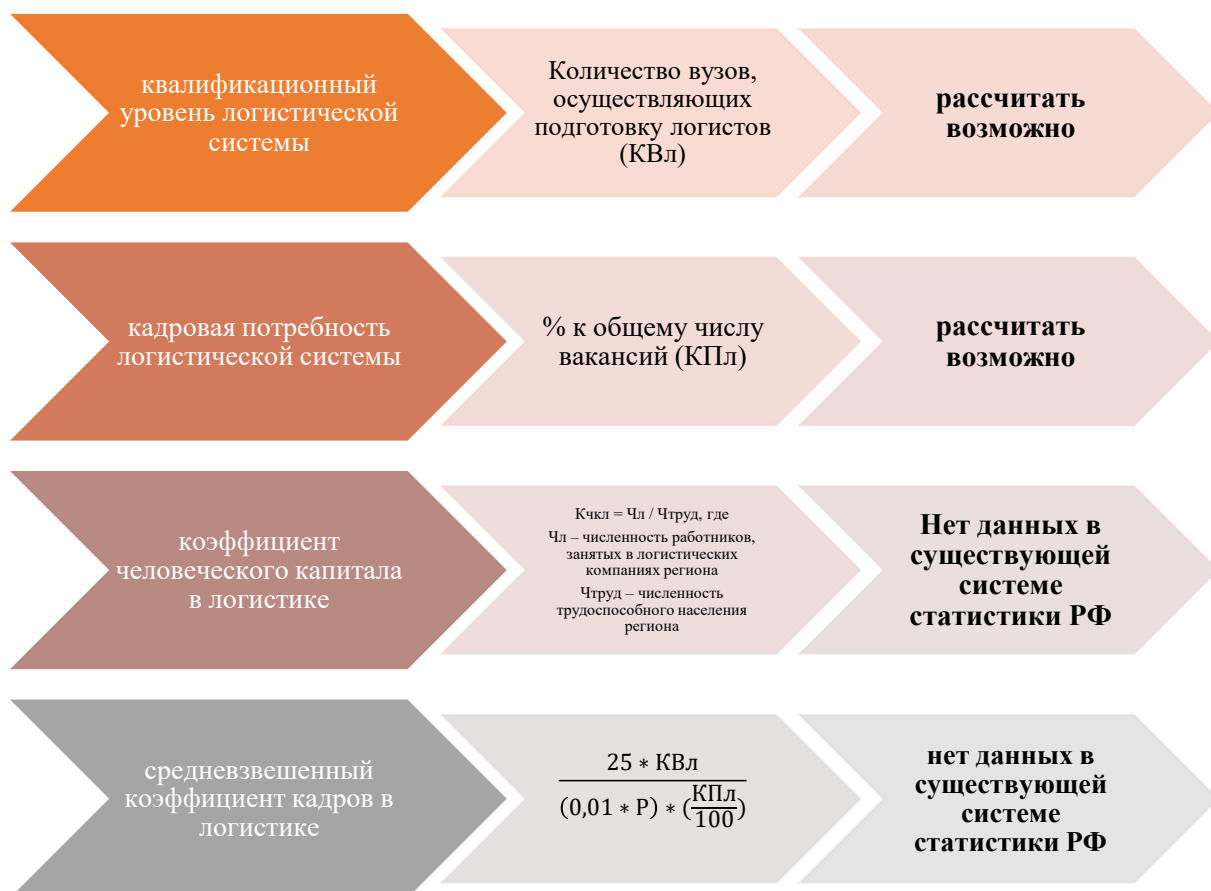


Рисунок 10.3.2 – Кадровый потенциал логистической системы

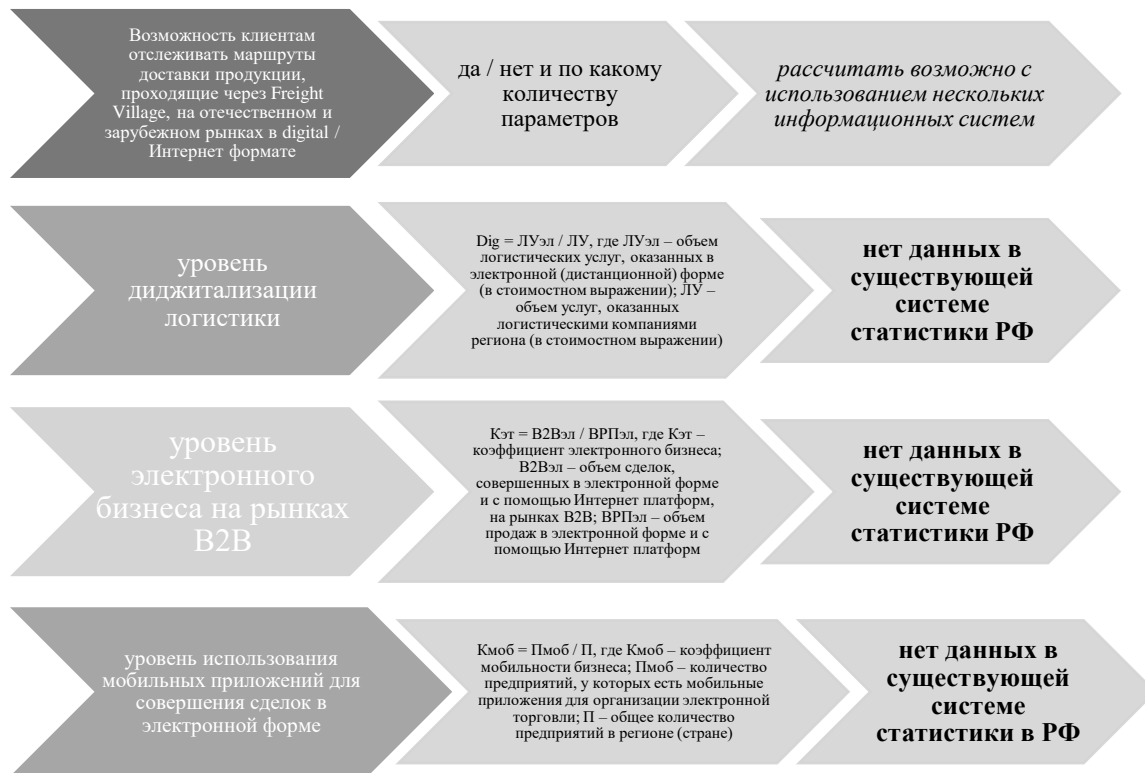


Рисунок 10.3.3 – Цифровое развитие логистической системы

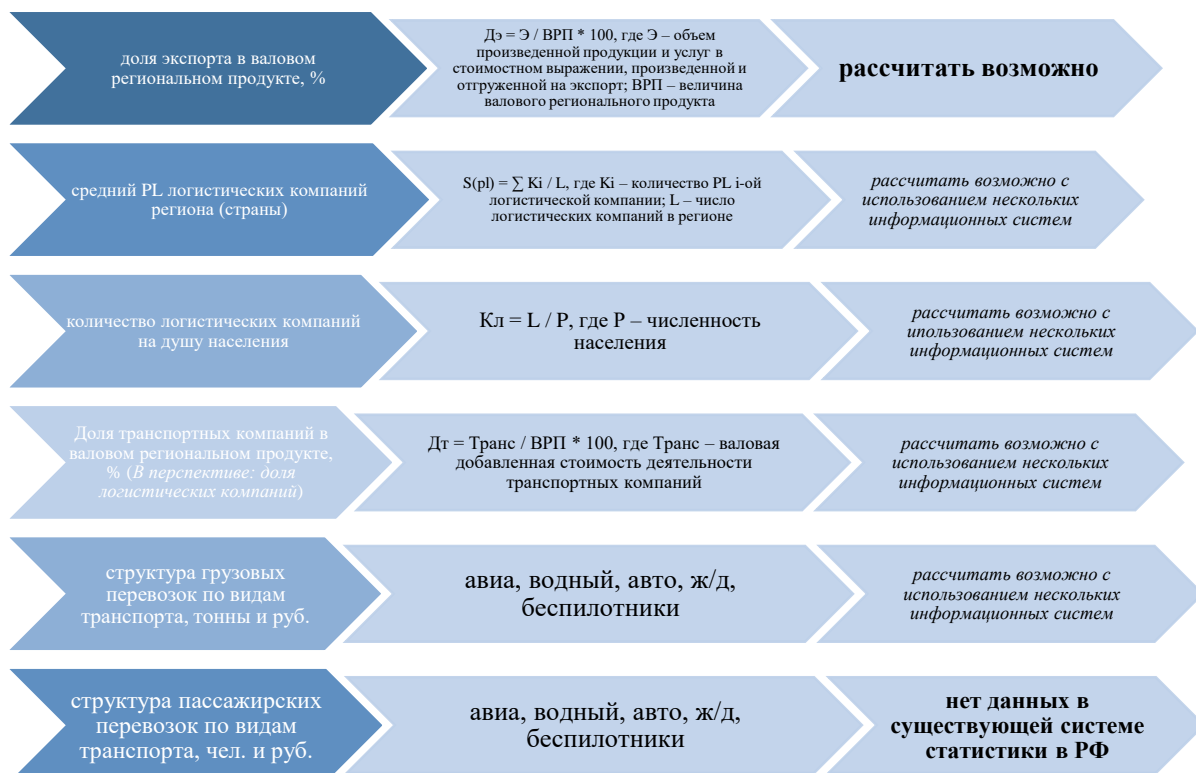


Рисунок 10.3.4 – Общий уровень развития рынка транспортно-логистических услуг

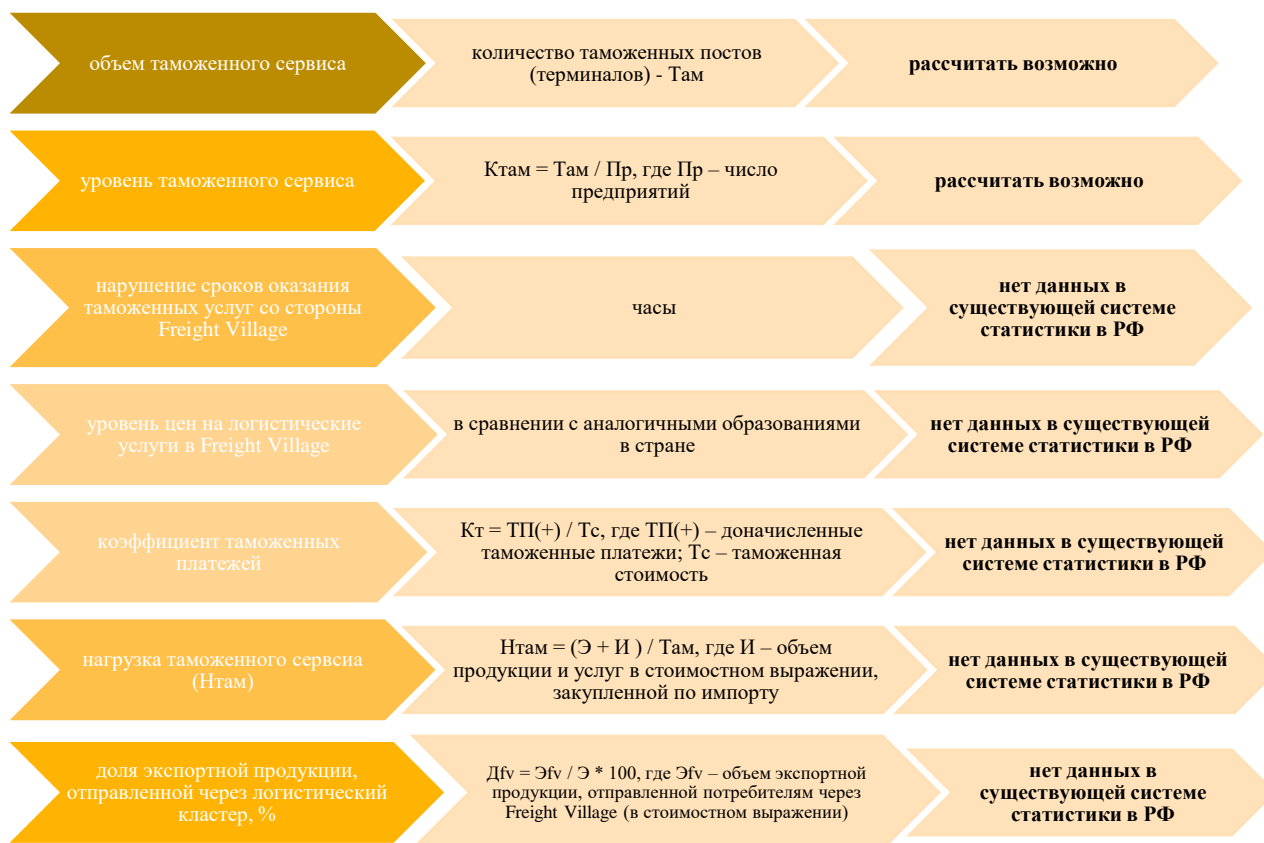


Рисунок 10.3.5 – Таможенно-логистическая инфраструктура

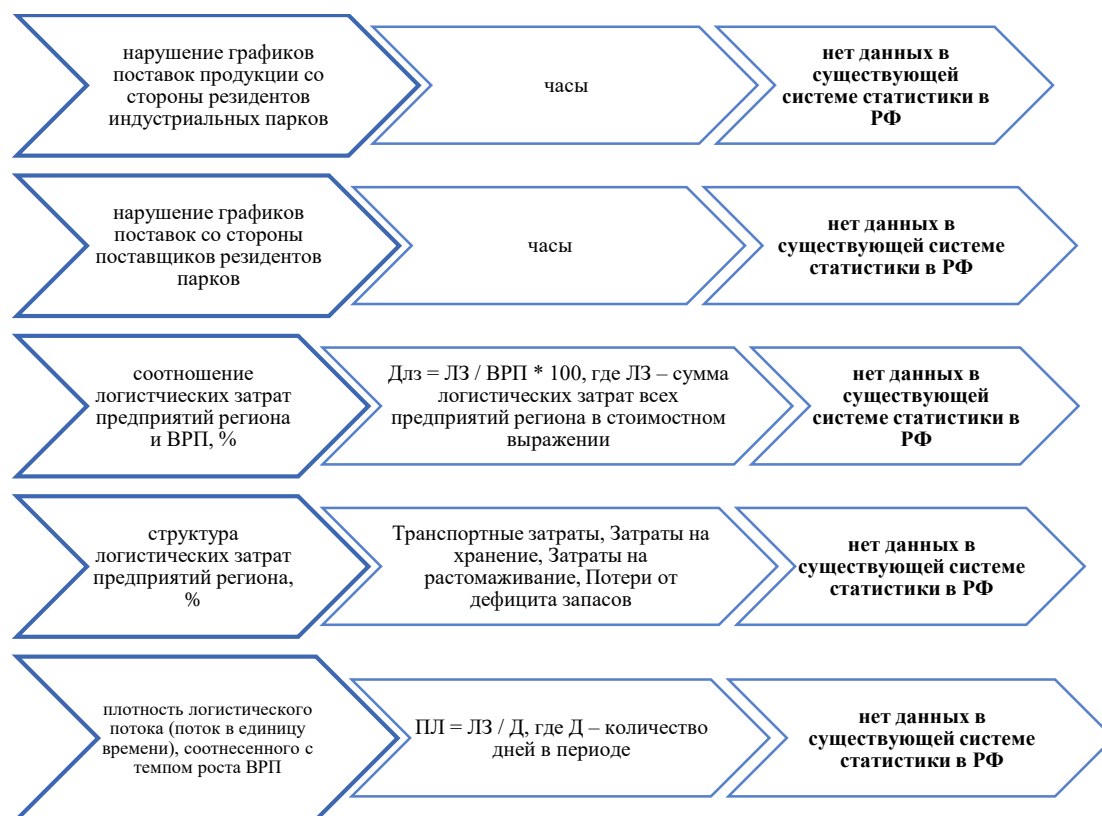


Рисунок 10.3.6 – Эффективность логистических цепочек

Отметим, что в рамках существующих систем государственной статистики в России и мире представляется проблематичным применение данных оценочных критериев. Так, официальным статистическим учетом в Российской Федерации возможен простой расчет только 19% из предлагаемых показателей (рисунок 10.3.7).

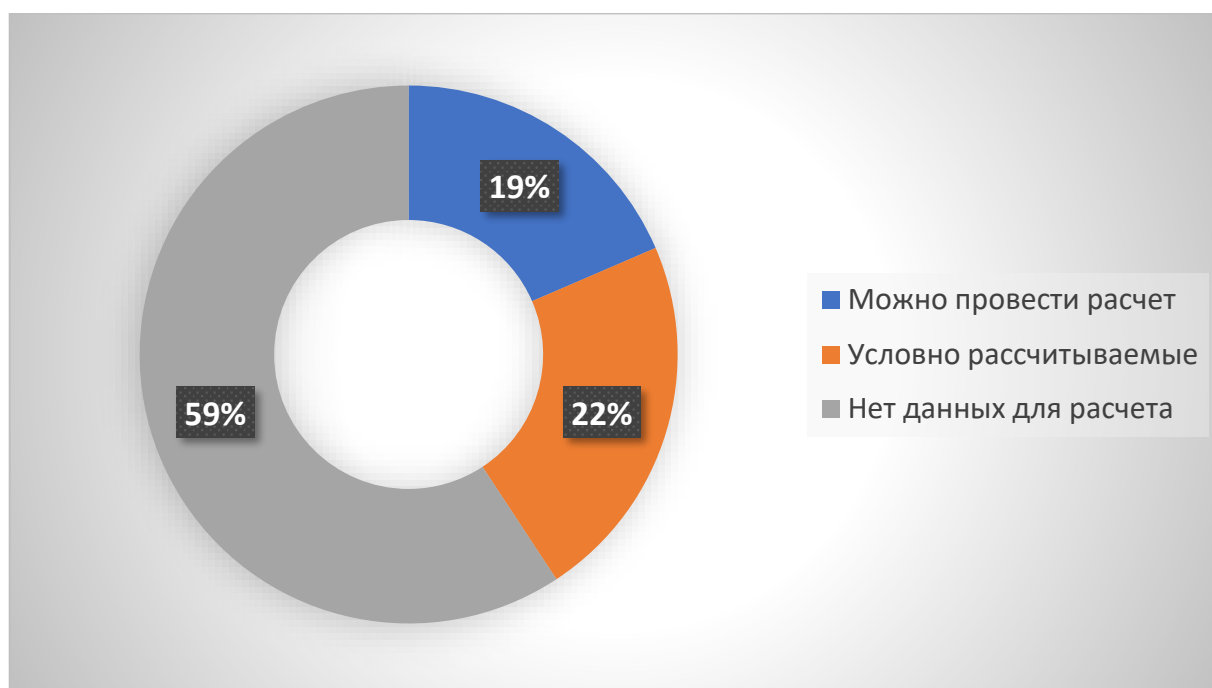


Рисунок 10.3.7 – Оценка структуры предлагаемой статистической базы для оценки логистической привлекательности регионов РФ

Таким образом, ставя во главу угла методики мультикоммуникационной логистической системы региона мониторинг эффективности и регулирования на основе пилотной апробации статистики логистики региона, имеем следующий механизм ее реализации (рисунок 10.3.8).



Рисунок 10.3.8 – Алгоритм функционирования информационных потоков в рамках мультикоммуникационной логистической системы региона

Итак, в результате разработаны методические подходы логистически-ориентированного многопараметрического регулирования деятельности логистических комплексов, материальных потоков резидентов промышленного парка, дистрибуционных зон, направленных на повышение эффективности региональной логистической системы. В итоге спроектирован алгоритм построения, функционирования, развития мультикоммуникационной логистической системы, в котором реализованы авторские методики: состав информационного обеспечения государственной статистики для оценки региональной логистики; методика рейтингования транспортных компаний; система мотивации персонала, задействованного в логистической системе транспортно-логистических комплексов; концептуальные положения теории мультиагентных систем в логистике.

Далее приведем сравнительную характеристику методик инновационной эволюции логистического менеджмента предприятий, города, региона (таблица 10.3.1).

Таблица 10.3.1 – Краткая характеристика методов логистического менеджмента для формирования и развития мультикоммуникационных логистических систем

| Метод / элемент логистического менеджмента | Микро уровень - предприятия, работающие для рынков B2B | Макро уровень – отраслевые и региональные распределительные и логистические центры, индустриальные парки | Транспортная инфраструктура и логистическая система города |
|--|--|---|--|
| 1 | 2 | 3 | 4 |
| Многокритериальный логистический анализ | Аналитические оценки идентичны: - неликвиды - логистические затраты, их уровень - баланс задолженностей - структура и оборачиваемость по видам запасов - плотность логистического потока - затраты на омертвленный капитал - рентабельность логистических затрат - упущенные выгоды и т.п. | | В качестве параметров оценки транспортной инфраструктуры городской среды предлагаются показатели, связанные с уровнем аварийности, загруженности дорог, наличием онлайн сервисов по отслеживанию дорожной обстановки для горожан и автолюбителей, уровень информированности о дорогах руководства города |
| Опросы | Отраслевое анкетирование руководства предприятий о внутренних механизмах логистического регулирования | Специализированное анкетирование представителей муниципальных и региональных органов власти, институтов развития о состоянии транспортно-логистической инфраструктуры | Опросы населения и автолюбителей в рамках порталов типа «Активный гражданин» |

Продолжение таблицы 10.3.1

| 1 | 2 | 3 | 4 |
|---|--|--|--|
| Многокритериальный логистический анализ | Аналитические оценки идентичны: - неликвиды - логистические затраты, их уровень - баланс задолженностей - структура и оборачиваемость по видам запасов - плотность логистического потока - затраты на омертвленный капитал - рентабельность логистических затрат - упущенные выгоды и т.п. | | В качестве параметров оценки транспортной инфраструктуры городской среды предлагаются показатели, связанные с уровнем аварийности, загруженности дорог, наличием онлайн сервисов по отслеживанию дорожной обстановки для горожан и автолюбителей, уровень информированности о дорогах руководства города |
| Опросы | Отраслевое анкетирование руководства предприятий о внутренних механизмах логистического регулирования | Специализированное анкетирование представителей муниципальных и региональных органов власти, институтов развития о состоянии транспортно-логистической инфраструктуры | Опросы населения и автолюбителей в рамках порталов типа «Активный гражданин» |
| Логистическое бюджетирование. Управление по центрам логистической ответственности | Бюджеты продаж, запасов, закупок, погашения задолженности, логистических затрат, коммерческих затрат с выделением центров ответственности в отделах продаж, снабжения, логистики, финансовом | Создание системы сбора логистической информации. Бюджеты продаж логистических услуг, запасов в распределительных центрах, графики товародвижения продукции в распределительных центрах и у резидентов. Выделение центров региональной логистической ответственности: | Бюджет в рамках бюджета города на развитие транспортной инфраструктуры. Центры ответственности: управление транспорта администрации города, УВД города, гражданская инициатива |

Продолжение таблицы 10.3.1

| 1 | 2 | 3 | 4 |
|--|---|---|--|
| | | Исполнительный орган субъекта РФ, институты развития субъекта РФ, логистический кластер формата Freight Village, Территориальный орган Федеральной службы государственной статистики, муниципалитет, предприятия – резиденты индустриальных парков | |
| Индивидуальные рейтинги | Товаров, материальных ресурсов, клиентов, поставщиков | Логистические операторы для рынков B2B: - клиентов - транспортных компаний Распределительные центры на рынке B2C: - поставщиков - транспортных компаний | Социальный рейтинг населения |
| Матричные методы управления долгами и товарами [6] | Принцип построения идентичен | | - |
| Субъекты логистического менеджмента | Центры логистической ответственности, поставщики, потребители | Исполнительный орган субъекта РФ, институты развития региона, муниципалитет территории с индустриальным парком, Территориальный орган Федеральной службы государственной статистики, логистический кластер формата Freight Village, центры логистической ответственности резидентов индустриального парка | Администрация. Агентство городского развития |
| Стимулирование деятельности субъектов логистического менеджмента [7] | Отделов сбыта, снабжения, логистики | Персонал по продажам и снабжению: идентично Персонал службы логистики по взаимодействию с транспортными компаниями по критериям: | - |

Окончание таблицы 10.3.1

| 1 | 2 | 3 | 4 |
|---|---------------|--|---|
| | | <ul style="list-style-type: none"> - своевременность доставки продукции - доставка продукции в нужном ассортименте - выполнение сроков поставок новыми операторами - динамика уровня логистических затрат - альтернативные потери вследствие доставки товаров не по плану - наличие / отсутствие жалоб со стороны потребителей - уровень неликвидов в распределительных центрах - время простоя в распределительных центрах - количество оказываемых сервисных услуг <p>Весовые критерии выставляются в зависимости от современных целевых ориентиров</p> | - |
| Управление буферными зонами запасов [8] | См табл. 10.4 | Границы буферных зон и шкал, критериев эффективности буферных зон уже, чем в промышленности на рынках B2B. Также ниже временная граница для корректировки уровня буфера. Поскольку из-за большего числа субъектов логистического менеджмента эффект кнута проявляется сильнее | - |

Полагаем, что предложенные методы логистически ориентированного управления предприятием, городом, регионом отличает объективизация принимаемых решений по развитию бизнес-отношений, городской среды, логистической системы.

На микро уровне реализация бизнес-связей в рамках алгоритма логистического портала позволит компаниям выделять более устойчивые сегменты и индивидуализировать договорные условия.

При этом важно отметить, что изложенная в работе методика формирования и использования статистики логистики может быть расширена и применена во всех регионах РФ и охватить всю государственную статистику.

Список использованной литературы

1. Алибеков Б.И., Мамаев Э.А. Мультиагентные системы в логистике: информационно-аналитические аспекты // Вестник Дагестанского государственного университета. Серия 1. Естественные науки. - 2017. - Том 32. - Вып. 4. – с. 56-62.
2. Булочников П.А., Смирнов К.Б. Межрегиональная дифференциация пространственного развития регионов Российской Федерации // Петербургский экономический журнал. – 2019. - №4. – с. 68-75.
3. Денисов И.В., Положишникова М.А., Куттыбаева Н.Б., Петренко Е.С. Цифровые предпринимательские экосистемы: бизнес-платформы как средство повышения эффективности // Вопросы инновационной экономики. – 2020. - №1. – с. 45-56.
4. Заенчковский, А.Э. Методологические основы информационно-логистического управления инновационной деятельностью в региональных научно-промышленных комплексах: дис. на соискание ученой степени д.э.н.: 08.00.05 / Заенчковский Артур Эдуардович; ЯрГУ им. П.Г. Демидова. – Ярославль, 2016. – 359 с.
5. Кондрашева Н.Н., Степнова О.В. Цифровые технологии в муниципальном управлении // Наука и бизнес: пути развития. – 2020. - №1. – с. 115-117.
6. Кузнецова А.А. Матричные методы управления долгами и товарами. - Калуга: ИД «Эйдос», 2012. – 96 с.
7. Кузнецова А.А. Построение системы мотивации и стимулирования труда персонала отдела логистики // Российский экономический Интернет-

журнал. – 2016. - №2. – Режим доступа: <http://e-rej.ru/upload/iblock/9a2/9a270f286751e17fdd84d19489bb5f5e.pdf>.

8. Кузнецова А.А. Управление запасами предприятия с использованием формирования буферных зон // РИСК: Ресурсы. Информация. Снабжение. Конкуренция. – 2017. - №2. – с. 6-8.

9. Кузнецова А.А. Формирование индивидуального рейтинга поставщиков // Финансовая стратегия предприятий в условиях нестабильности экономики: сб. науч. тр. по материалам Всероссийской научно-практической конференции. / Академия менеджмента и бизнес-администрирования. Москва, 2017. – С. 92-98.

10. Левина А.Б., Якунина Ю.С. Разработка модели управления процессами сервисной логистики // Вестник ЮУрГУ. Серия «Экономика и менеджмент». – 2020. - №1. – с. 180-188.

11. Мищенко Д.В. Использование мультиагентных систем в космической отрасли // Устойчивое развитие науки и образования. – 2018. - №9. – с. 219-226.

12. Покровская О.Д., Заболоцкая К.А. Рейтинговая методика комплексной оценки терминально-логистических комплексов // Инновационный транспорт. – 2018. - №3. – с. 3-9.

13. Салимова Т.А. Как выбрать поставщика: шесть основных методов оценки // <http://www.elitarium.ru/ocenka-postavshchik-metod-ocenka-postavka-cena-kachestvo-tehnologiya-pokazatel-vozmozhnost-obsluzhivanie-zavisimost-audit-informaciya/> (дата обращения: 27.11.2020).

14. Трегубов В.Н., Морозов Э.В. Инновационные логистические технологии внутригородских транспортных перемещений в урбанистических системах // Инновационная деятельность. – 2016. - №3. – с. 43-51.

15. Федоненко М.В. Опыт развития «умных» городов в современном мире // Социально-экономические явления и процессы. – 2019. - №2. – с. 61-72.

-
16. <https://ec.europa.eu/eurostat/> - Евростатистика (дата обращения: 18.12.2020).
 17. <https://nti2035.ru/nti/> - Национальная технологическая инициатива (дата обращения: 15.12.2020).
 18. <https://russiasmartcity.ru/> - Умные города (дата обращения: 15.12.2020).
 19. <https://data-economy.ru/> - Цифровая экономика России (дата обращения: 15.12.2020).
 20. <https://lpi.worldbank.org/> - Logistics performance index (дата обращения: 20.12.2020).

Глава 11. Проблемы и перспективы применения современных цифровых технологий на промышленных предприятиях

11.1. Влияние цифровой трансформации на деятельность промышленных предприятий

Внедрение цифровых технологий и новых управленческих подходов способствует не только сохранению на рынке уровня конкурентоспособности промышленных предприятий, но и расширению их возможностей.

Применяемые предприятиями технологии являются действенным инструментом повышения эффективности использования его ресурсов. Они не только определяют качество и скорость производственных процессов, но и позволяют решать конкретные бизнес-задачи, что в современных условиях имеет определяющее значение.

Решение проблемы разработки эффективных методов управления промышленными предприятиями в условиях цифровизации является приоритетной задачей, как на локальном, так и региональном уровне [4].

Существенную роль в развитии отечественных промышленных предприятий всегда играло и продолжает играть государство, оказывающее поддержку их деятельности [5]. Программно-целевое управление реализуется в приоритетных национальных проектах [9], таких как «Научно-технологическое развитие Российской Федерации» [1], «Цифровая экономика Российской Федерации» [2], имеющие целью инновационное преобразование реального сектора экономики России. В условиях наложения санкций на Российскую Федерацию и роста роли импортозамещения значение подобного управления еще больше увеличивается [11].

Внедрение инновационных технологий в процессы государственного управления приводит к значительным изменениям в развитии социально-экономических отношений в стране. Информационные технологии,

применяемые в процессах государственного управления, становятся с течением времени сложнее и разнообразней [15].

В июле 2020 Президентом РФ Путиным В.В. был подписан Указ «О национальных целях развития Российской Федерации до 2030 года». Данным Указом определены следующие пять национальных целей развития:

- а) сохранение населения, здоровье и благополучие людей;
- б) возможности для самореализации и развития талантов;
- в) комфортная и безопасная среда для жизни;
- г) достойный, эффективный труд и успешное предпринимательство;
- д) цифровая трансформация [3].

Таким образом, работа над достижением цели осуществления цифровой трансформации является в настоящее время приоритетным направлением развития на уровне государства. Принятие данного нормативного документа создает основы для целенаправленной работы промышленных предприятий в данной области.

Государство поддерживает разработки по внедрению отечественных цифровых продуктов, платформенных решений на базе сквозных информационных технологий, таких как искусственный интеллект, интернет вещей, робототехника, распределенные реестры.

Кризис, вызванный распространением коронавирусной инфекции, ускорил многие процессы, связанные с развитием информационных технологий, придал новый импульс цифровизации, поставил с новой остротой вопросы цифровой безопасности, кибербезопасности, переосмысления рационального распределения функций между человеком и искусственным интеллектом. В новых условиях пандемии применение современных технологий обособленной работы стало особенно актуальным.

Период, связанный с пандемией коронавируса, оказался для многих предприятий тяжелым испытанием. Компании же, которые уже начали

использовать к моменту начала пандемии наиболее востребованные в её период технологии, напротив, получили возможность для быстрого развития и роста.

Для промышленных предприятий такими технологиями стали автоматизация и цифровизация производственных процессов.

Министерство экономического развития РФ составило и опубликовало прогноз социально-экономического развития Российской Федерации на 2021 год и на плановый период 2022 и 2023 годов. В соответствии с данным прогнозом ожидаются следующие изменения в динамике промышленного производства в последующие три года (таблица 11.1.1).

Таблица 11.1.1 – Динамика промышленного производства

| в % г/г | 2019 | 2020 | 2021 | 2022 | 2023 | 2023 /2019 |
|--|------|------|------|------|------|---------------|
| Промышленность – всего | 2,3 | -4,1 | 2,6 | 3,6 | 2,3 | 4,3 |
| Добыча полезных ископаемых | 2,5 | -7,8 | 1,7 | 5,2 | 1,1 | -0,2 |
| Обрабатывающие производства | 2,6 | -1,5 | 3,1 | 3,0 | 3,3 | 8,1 |
| Обеспечение электрической энергией, газом и паром; кондиционирование воздуха | 0,0 | -2,8 | 3,0 | 1,5 | 1,6 | 3,3 |
| Водоснабжение; водоотведение, организация сбора и утилизации отходов, деятельность по ликвидации загрязнений | -5,2 | -5,0 | 2,8 | 0,8 | 1,4 | -0,2 |

По прогнозу Минэкономразвития в 2021–2023 гг. будет происходить постепенное восстановление промышленного производства. На динамику добычи полезных ископаемых будут оказывать существенное влияние параметры сделки ОПЕК+.

При этом в обрабатывающей промышленности рост производства прогнозируется на уровне более 3% в год в среднесрочной перспективе.

К 2023 году промышленное производство увеличится на 4,3% по сравнению с 2019 г., в том числе в обрабатывающих производствах – на 8,1%.

Расширение инвестиционного спроса определит высокие темпы роста отраслей машиностроения (производство компьютеров, электронных и оптических изделий возрастет на 20,8%, производство электрического оборудования – на 5,8%, производство машин и оборудования, не включенных в другие группировки, – на 7,9%). Из промежуточных производств наиболее высокими темпами будут развиваться отрасли, совмещенные с производством товаров инвестиционного назначения (производство химических веществ и химических продуктов увеличится на 24,9%, производство резиновых и пластмассовых изделий – на 12,5%, обработка древесины и производство изделий из дерева и пробки, кроме мебели, производство изделий из соломки и материалов для плетения – на 12,6%, производство прочей неметаллической минеральной продукции – на 6,7%).

В среднесрочной перспективе доля обрабатывающих производств в общем объеме промышленного производства возрастет на 3,7 п.п к 2023 г. за счет машиностроительного комплекса (на 0,7 п.п.), химического производства (на 0,6 п.п.) при сокращении доли производства кокса и нефтепродуктов (на 0,3 п.п.) [17].

Следует отметить, что процессы цифровизации отечественной экономики происходят в сложных условиях.

В таблице 11.1.2 показана динамика годовой инфляции в Российской Федерации с 2011 года по 2020 год, выраженной в % относительно предыдущего периода. Инфляция рассчитывалась как сумма коэффициентов инфляции за 12 месяцев. Такой способ позволяет оценить динамику изменения уровня инфляции в целом, сглаживая сезонные отклонения [19].

По оценке Минэкономразвития России, годовой темп инфляции на протяжении 2020 года оценивался на уровне 4,1–4,2% [18].

Однако по итогам года показатель темпа инфляции составил 4.05%.

**Таблица 11.1.2 - Таблица инфляции в Российской Федерации
в период с 2012 по 2020 год**

| Год | % относительно предыдущего периода |
|------|------------------------------------|
| 2011 | 6,10 |
| 2012 | 6,58 |
| 2013 | 6,45 |
| 2014 | 11,36 |
| 2015 | 12,91 |
| 2016 | 5,38 |
| 2017 | 2,52 |
| 2018 | 4,27 |
| 2019 | 3,05 |
| 2020 | 4,05 |

На рисунке 11.1.1 показаны темпы роста потребительских цен. Как видно из данных, полученных по итогам расчетов Минэкономразвития России, потребительские цены увеличились практически во всех сегментах потребительского рынка [18].

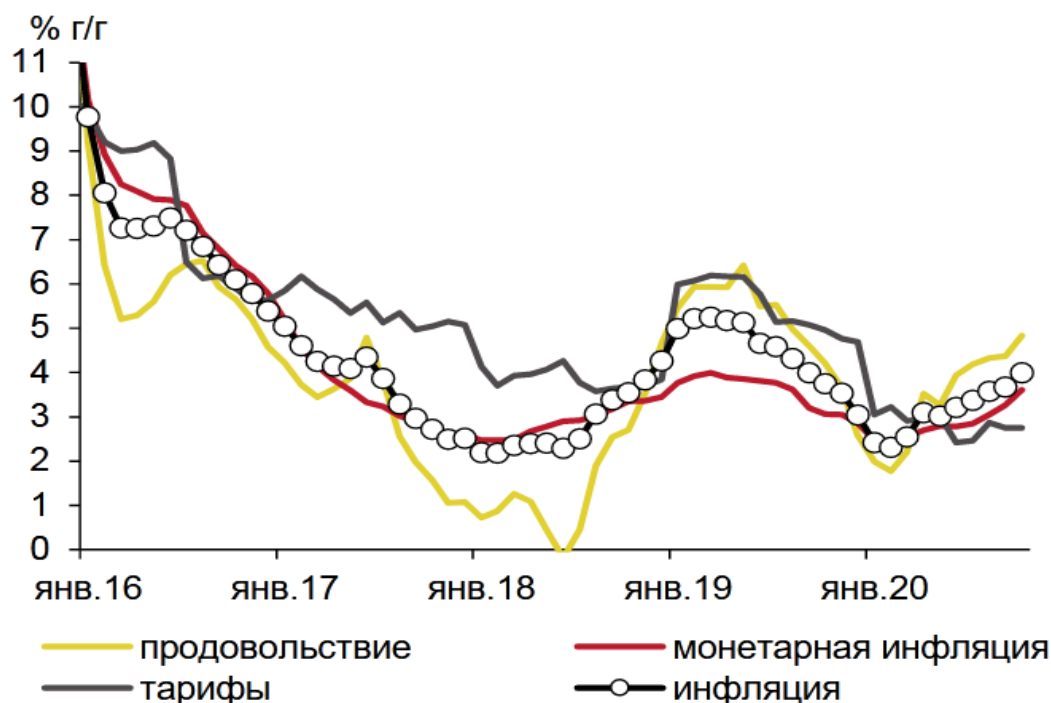


Рисунок 11.1.1 – Темпы роста потребительских цен

Исследовательская и консалтинговая компания «Gartner» в качестве наиболее значимых стратегических технологических трендов в 2021 году выделила следующее.

Тренд 1: Интернет поведения. Данная технология позволяет собирать, объединять и обрабатывать информацию из многих источников, включая: коммерческие данные клиентов; данные граждан, обрабатываемые государственным сектором и правительственными учреждениями; социальные сети; общедоступные системы распознавания лиц; и отслеживание местоположения. Растущая сложность технологии, которая обрабатывает эти данные, позволила этой тенденции развиваться. Интернет поведения стал еще одной ступенью в концепции «интернета вещей». Идея данной технологии заключается в том, что по аналогии с вещами к интернету на постоянной основе могут быть подключены и люди. Фитнес-браслеты и «умные» часы и другие устройства отслеживают пульс, местоположение человека и прочую информацию о человеке. Следует отметить, что развитие Интернета поведения может иметь важные этические и социальные последствия в зависимости от целей и результатов индивидуального использования.

Тренд 2: общий опыт. Он сочетает в себе обобщенную информацию об опыте клиентов, опыте сотрудников и опыте пользователей. Обрабатываемая информация в дальнейшем трансформируется в бизнес-результат.

Тренд 3: вычисления, повышающие конфиденциальность. Они объединяют в себе три технологии, которые защищают данные во время их использования. Первая обеспечивает надежную среду, в которой конфиденциальные данные могут быть обработаны или проанализированы. Вторая выполняет обработку и аналитику децентрализованным образом. Третья шифрует данные и алгоритмы перед обработкой или аналитикой.

Тренд 4: распределенное облако. В данном случае данные хранятся на различных, распределенных в сети серверах, управление архитектурой,

администрирование и обновление при этом остаются ответственностью поставщика общедоступных облачных сервисов.

Тренд 5: операции в любом месте. Модель осуществления работ из любого места приобрела жизненно важное значение для бизнеса, существующего в условиях пандемии COVID-19.

Тренд 6: сеть кибербезопасности. Она представляет собой распределенный архитектурный подход к масштабируемому, гибкому и надежному управлению кибербезопасностью. Многие активы в настоящее время существуют за пределами традиционного периметра безопасности. Сеть кибербезопасности, по сути, позволяет определить периметр безопасности вокруг личности человека или вещи.

Тренд 7: интеллектуальный композиционный бизнес. Его основное качество состоит в способности адаптироваться и коренным образом перестраиваться в зависимости от текущей ситуации. Поскольку организации работают в режиме меняющейся цифровой трансформации, они должны быть гибкими и принимать быстрые бизнес-решения, основанные на имеющихся в настоящее время данных.

Тренд 8: инженерия искусственного интеллекта. Надежная инженерная стратегия искусственного интеллекта способствует повышению производительности, масштабируемости, интерпретируемости и надежности моделей искусственного интеллекта, обеспечивая при этом полную отдачу от инвестиций в него. Проекты, связанные с внедрением и использованием искусственного интеллекта, часто сталкиваются с проблемами надежности функционирования, масштабируемости и управления, что делает их сложной задачей для большинства организаций.

Тренд 9: гиперавтоматизация. Её основная идея состоит в автоматизации всего, что может быть автоматизировано. Многие организации используют одновременно целый спектр различных, не согласованных друг с другом технологических решений. Что не способствует слаженности общего процесса.

В тоже время в современных условиях высокая эффективность технологических процессов и адаптивность управления становится обязательным требованием для сохранения позиций компании на рынке [21].

Развитие всех этих трендов во многом спровоцировано сочетанием востребованности обществом различных проявлений комфортности и стремлением контролировать процессы с минимальными усилиями.

С течением времени появляются более современные, дешевые и доступные технологии.

В настоящее время происходит промышленное освоение VI технологического уклада, оно охватывает наноэлектронику, генную инженерию животных, мультимедийные интерактивные информационные системы, высокотемпературную сверхпроводимость и т.п. [7].

Индустрия 4.0, следующая эволюция в промышленном производстве, обещает обеспечить подлинную интеграцию информационных операционных технологий. Это позволит значительно повысить эффективность при одновременном снижении затрат. Однако для достижения этой цели компаниям придется переосмыслить, как и где производятся, обрабатываются и хранятся данные, осуществляются вычисления, связанные с промышленными процессами.

В данном случае речь идет уже не столько о параметрах и характеристиках оборудования и повышении уровня автоматизации, сколько о применении передовых компьютерных моделей для принятия более обоснованных и оперативных решений. Интерес представляет уже не столько изучение эксплуатационных характеристик и их влияние на качество продукции на выходе, сколько выявление взаимозависимостей и причинно-следственных связей в системе производства, исследование и совершенствование всего производственного цикла.

Работа с подобными взаимозависимостями требует исследования большого объема данных. Информация аккумулируется с различных датчиков,

устройств и машин. С течением времени всё большее распространение получают более удобные для работы в подобном формате периферийные (граничные) вычисления. Информация в таком случае обрабатывается на месте её появления, а не в облачном центре обработки данных, что позволяет значительно экономить временные ресурсы, необходимые для сетевого отклика, а также позволяет более эффективно использовать пропускную способность сетей.

Большинство производств работают в режиме 24 часа, 7 дней в неделю, 365 дней в году. Трудно планировать изменения инфраструктуры, когда любое время простоя напрямую влияет на пропускную способность линий и доходы, получаемые от производства продукции.

Еще одной сложной задачей является внедрение новых навыков в области информационных технологий. Задействованные в производстве сотрудники привыкли к производственным линиям, оборудованию, сетям и протоколам, которые они использовали в течение многих лет. Но Индустрия 4.0 требует от них принятия новых решений и технологий.

Решения Индустрии 4.0 провоцируют существенные изменения, они требуют произвести замену промышленного оборудования, датчиков, ИТ-архитектуры, инфраструктуры хранения данных и сети. Для их внедрения также требуются опыт в области внедрения подобных услуг и трансформация бизнеса в целом. Ни один поставщик не может сразу предоставить клиенту полностью готовое решение. В результате заказчики вынуждены осуществлять все необходимые доработки самостоятельно или привлекать представителей поставщиков и консультантов, способных оказать им помощь [20].

В качестве реакции на ситуацию, поставщики информационных сервисов для промышленных предприятий пытаются ориентироваться при реализации масштабных инновационных проектов на три ключевые принципа:

- простота;
- массовость;
- значимость.

«Простота» предполагает стремление сделать сложные технологии интуитивно очень понятными, решения максимально учитывают полученный ранее потребителями пользовательский опыт.

«Массовость» инноваций означает их ориентацию на широкий круг потребителей, возможность поддерживать масштабируемость проектов.

«Значимость» инноваций напрямую связана с их полезностью и ценностью для потребителей.

Несмотря на специфику информационных технологий, их внедрение сопряжено с проблемами характерными для материальных товаров. Внедрение инноваций в области применения цифровых технологий также вызывает сопротивление, как со стороны их создателей, так и со стороны потребителей. В качестве инструмента снижения сопротивления изменениям со стороны их потенциального потребителя предприятия прибегают к формированию специальной коммуникационной политики [13].

Уровень инновационного потенциала определяется как величиной и объемом ресурсов, так и их сбалансированностью, способностью их дополнения друг друга.

Еще одной возможностью и одновременно фактором, усиливающим конкуренцию, является развитие такой практики как расширенное предпринимательство. Концепция «расширенного предприятия» не нова. Предприятия обращались к ней и ранее. Практика показывает, что деятельность организаций, входящих в состав корпораций значительно более эффективна по сравнению с результатами работы разрозненных предприятий. Функционирование «расширенного предприятия» позволяет поддерживать целые экосистемы партнерских отношений. Такие отношения могут складываться между всеми взаимодействующими друг с другом участниками процесса. Они могут распространяться на поставщиков, партнеров, привлекаемых к процессам разработки инноваций университеты, стартапы, и тому подобные организации, позволяют применять модели «экономики

совместного использования». Развитие подобных взаимоотношений приводит к формированию кросс-индустриальных открытых экосистем.

В последние десятилетия получили активное развитие системы так называемых «виртуальных» организаций. Их деятельность позволяет объединять большое число людей, работающих одновременно, но в различных местоположениях и в различное время. Зачастую эти организации создаются государственными органами и призваны предоставлять услуги одновременно большому количеству человек.

В современных компаниях всё более активно начинает применяться сетевое управление и горизонтальные связи. Цифровые технологии позволяют в режиме реального времени осуществлять управленческую деятельность. Внедрение информационных технологий открывает широкие возможности для развития бизнеса и приводит к повышению эффективности предпринимаемых действий.

В настоящее время все большее развитие получила концепция расширенного предприятия. Связано это с целым рядом факторов:

1. Локализация спроса. Одновременно с усилением процессов глобализации отмечается тенденция к индивидуализации работы с потребителем, усиление индивидуального подхода к удовлетворению спроса конечного потребителя, создание возможностей максимального удовлетворения спроса в месте его возникновения.

2. Быстрый рост цифровых и постоянно меняющихся технологий, непрерывное появление разрушающих инноваций. Система принятия управленческих решений должна быть гибкой, а сами решения должны приниматься оперативно. Новые условия требуют соответствующего стиля управления, расширения прав и возможностей руководителей, поддержание в организации духа инноваций, постоянное обучение сотрудников.

3. Развитие цифровых технологий, обеспечивающих клиентоориентированность. Обмен большими объемами информации, создание

инноваций совместно с конечными потребителями для решения их конкретных проблем. Развитие цифровых технологий позволяет производителям ориентироваться на клиента, интегрировать его в свою экосистему и в процесс разработки совместных инноваций.

Развитие цифровых технологий значительно расширило рынок сбыта для предприятий. Глобальные организации получили возможность децентрализации управление без потери целостности. Стало возможно применение многоцентрового, расширенного корпоративного подхода. Реализация принципа локализации позволяет компаниям предоставлять востребованную в локальных экосистемах продукцию, оперативно реагировать на индивидуальные ожидания клиентов. В настоящее время клиентоориентированность является ключевым фактором сохранения позиций на рынке, а цифровые технологии позволяют поддерживать обратную связь с потребителями.

В новых реалиях создание совместных с потребителем инноваций и ориентация на клиента становятся нормой, в связи с чем для компаний становится критически важным использовать интеллектуальные возможности и гибкость большой экосистемы для создания конкурентной инновационной продукции. Характерной чертой информационных технологий является то, что они могут применяться во всех сферах человеческой деятельности [6]. Отследить и удовлетворять насущные потребности рынка также могут и инновационные стартапы. Они способны стать результативной составляющей экосистемы, позволяющей успешно преодолевать проблемы, вызываемые, например, появлением разрушающих инноваций.

Проблема разрушающих инноваций, называемых также подрывными (англ. Disruptive innovations), в последние годы стала особенно остро. Новые технологии не только привносят возможность экономии всех видов ресурсов и повышают уровень комфортности жизни населения, но, одновременно, разрушают целые отрасли ранее успешно и стабильно функционировавшие на рынках.

Появление разрушающих инноваций приводит к краху сформировавшихся экономических цепочек, полностью изменяют структуру рынков. Одновременно с этим появление новых технологий открывает новые возможности для компаний, шансы на выживание на рынке которых в других условиях были минимальными.

Для промышленных предприятий проблема разрушающих инноваций является крайне сложной. Изменение технологических циклов требует значительных материальных затрат, а разрушение функционирующих линий и переход на новые технологии может обернуться полным крахом для предприятия.

Многие зарубежные компании с целью сохранения своих позиций на рынке сами занимаются исследованием и поиском потенциальных разрушающих технологий. Подобная работа позволяет им с одной стороны предпринимать попытки к управлению появлением подобных технологий, а с другой стороны дает им возможность оказаться лидерами в разработке и предоставлении новых технологий. А это повышает их шансы на сохранение в новых условиях уже сформировавшейся клиентской базы, предоставление новых товаров тем же потребителем, что и ранее.

Данная работа сопряжена с большими материальными вложениями. Тем не менее многие коммерческие компании идут на данные траты с целью сохранения в дальнейшем своих конкурентных позиций на уже сформировавшемся рынке.

Для отечественных промышленных предприятий проблема возникновения разрушающих инноваций является сложной для решения, поскольку она требует быстрой реакции на меняющуюся на рынке ситуацию, а изменения отлаженных производственных циклов в нашей стране происходят крайне медленно.

Такая ситуация еще больше толкает производителей к отказу от быстроустаревающих товаров, что не способствует реализации на практике политики отказа от сырьевой экономики.

При поиске новых решений также активно используются цифровые технологии, позволяющие моделировать процессы и делать точные и детальные расчёты будущих процессов.

Данная деятельность оправдана, и она дает свои результаты. Лидерство на рынке получают предприятия и даже страны, своевременно осуществившие переход к полномасштабному применению цифровых технологий и активно внедряющие инновации.

Появление новых технологий способно разрушить не только отрасли, имеющие непосредственное отношение к производству теряющей свою актуальность продукции, оно отражается на прибыльности и смежных отраслей.

Теряется необходимость в логистических операциях, поставке комплектующих, меняются закупаемые для производства основные и вспомогательные материалы.

Данная ситуация усугубляется в связи изменениями конъюнктуры рынка. Цифровые технологии делают бизнес-среду не только более доступной для входа на чужие рынки, но и открывают возможности для сильных конкурентов к проникновению на локальные рынки, ранее не представлявшие для них интереса.

Еще одной сложностью, связанной с появлением разрушающих технологий, является снижение ценности производимого товара, после появления на рынке новых аналогов. Параметры, которые выступали в качестве повышающих их конкурентоспособность на рынке, с появлением новых технологий перестают быть ценными для потребителей.

Создание инновационных экосистем позволяет промышленным предприятиям выходить за пределы их традиционных отраслевых границ.

Что касается ориентированности на клиента и работы с его конкретными потребностями, то цифровые технологии позволяют решить данную проблему путем масштабирования цифровых решений.

Рост цифровых технологий требует способности быть локальным в глобальном мире, гибким в быстро меняющемся технологическом ландшафте и

открытым в экосистеме совместных инноваций. Расширенное предприятие, поддерживаемое цифровизацией, является ответом на вызовы цифровой экономики [27]. Существует также мнение о необратимости происходящих трансформаций.

По оценкам Бостонской Консалтинговой группы промышленность росла в среднем примерно на 8% ежегодно в период с 2008 по 2018 год [22].

Цифровая трансформация приводит не только к улучшению внутренних процессов промышленного предприятия, но и позволяет более полно удовлетворять потребности конечного потребителя.

11.2. Современные цифровые технологии как средств повышения эффективности промышленных предприятий

Современные цифровые технологии являются действенным средством повышения эффективности промышленных предприятий. С течением времени они становятся всё сложнее и внедряются во всё большее число производственных процессов.

Руководство промышленных предприятий, работающее в быстро изменяющихся внешних условиях, вынуждено рассматривать и применять новые бизнес-модели. Однако подобные изменения всегда сопряжены с высоким уровнем риска.

Принципы получившего широкое распространение интернета вещей начали использоваться и в промышленности, в производственные процессы внедряются системы периферийных вычислений, разрабатывается специализированное программное обеспечение, позволяющее отслеживать параметры в режиме реального времени и принимать оперативные управленческие решения.

Промышленный Интернет вещей предлагает варианты разрешения целого комплекса проблем с помощью сенсорных решений, которые превращают традиционные системы производства в цифровые сети передачи данных.

Внедрение промышленного интернета вещей открывают возможности для удаленного контроля и автоматизированного управления без участия человека.

Использование промышленного интернета вещей может стать трансформирующим фактором для промышленных предприятий, которые сейчас пытаются найти новые пути развития своего бизнеса и завоевать место на рынке.

Такое применение технологий позволяет сократить необходимые для осуществления производственного процесса ресурсы, использовать их более рационально. Обработка огромного массива информации неминуемо приводит к сбоям, в случае формализации процессов и их автоматизации, число таких сбоев кратно сокращается.

Еще одним преимуществом внедрения промышленного интернета вещей является получение в режиме реального времени информации, и как следствие, повышение уровня осведомленности о рисках в производственных процессах. Например, возможна настройка автоматических оповещений о наступлении неблагоприятных условий. Такими условиями могут быть, например, приближение негативных погодных явлений, резкие изменения температуры, если данный фактор критичен для производственного процесса или хранения готовой продукции.

На основе оперативной информации менеджеры предприятий могут принять срочные меры по устранению конкретных негативных последствий, кроме того, в условиях применения цифровых технологий работа по систематизации информации и выявлению закономерностей значительно облегчается, а это способствует, в частности, устранению потенциальных рисков до их возникновения.

Сенсорные системы также могут помочь сотрудникам отслеживать условия эксплуатации в рамках планового технического обслуживания, например, указывать, когда установленный срок службы оборудования подходит к концу. Своевременный сигнал о необходимости замены деталей позволяет

предотвратить незапланированные остановки производственного процесса.

Внедрение промышленного интернета вещей может быть нацелено на сокращение количества претензий от потребителей, а, следовательно, на повышение прибыльности предприятия.

Возможности промышленного интернета вещей не являются неким отдаленным будущим, использование его возможностей для практического, реального применения доступно уже в настоящее время.

Разработаны и уже успешно функционируют различные специальные инженерные решения в данной области.

Прогресс, достигнутый всего за последние 5-10 лет, существенно снизил затраты на датчики и сбор данных. В настоящее время уже активно применяется зондирование, использование систем сетевых датчиков и другие перспективные решения.

Основа для дальнейшей работы и новых технологических предложений уже заложена, но многие направления в данной области только начинают изучаться.

Применение беспроводных технологий открывает еще больший потенциал для отслеживания производственных процессов практически в режиме реального времени [14]. Всё более распространенным становится цифровой мониторинг. Огромный потенциал для применения новых разработок на промышленных предприятиях имеет сочетание таких технологий как визуализация дополненной реальности, создание цифровых двойников, машинное обучение, искусственный интеллект.

Цифровая трансформация делает реальной адаптацию бизнес-моделей к новым условиям. Развитие данной области находится, однако, на самой ранней стадии развития [22].

Исследовательская и консалтинговая компания «Gartner» прогнозирует, что к 2025 году традиционные центры обработки данных перестанут существовать, а 80 % центров обработки данных переместятся на периферию.

Периферийные (граничные) вычисления представляют собой обработку и анализ данных в местах, расположенных в наиболее приближенных к точкам их сбора. Как правило, такие места расположены в периферии сети, что и дало название данному роду вычислений. Обработка данных на периферии превращает собранную на месте её возникновения информацию пригодной для последующей работы с ней.

Децентрализованный подход к пограничным вычислениям снижает пропускную способность и, следовательно, негативно отражается на скорости производственных процессов. Децентрализованная, распределенная вычислительная парадигма также является фундаментальной для технологии блокчейн [8].

При использовании периферийных вычислений обработка данных начинается в точке сбора, и только те данные, которые должны быть сохранены, отправляются в облако. Это делает периферийные вычисления более эффективными и масштабируемыми, а также снижает нагрузку на сеть.

Граничные (периферийные) вычисления появились с распространением устройств Интернета вещей и нашли применение в различных обстоятельствах. Периферийные вычисления могут производиться и в вышках сотовой связи, и в смартфонах, в устройствах, относимых к Интернету вещей, в самоуправляемых автомобилях, и, конечно, в производственном оборудовании.

Устройства, устанавливаемые на периферии, могут быть оборудованы пограничными серверами, пограничными шлюзами или микроцентрами обработки данных, которые облегчают локальную обработку информации и сокращают время передачи данных в облако.

Рациональное применение периферийных вычислений может привести многочисленные преимущества в деятельность промышленных предприятий. Результатом их внедрения могут стать:

- снижение эксплуатационных расходов;
- повышение операционной эффективности;

- увеличение пропускной способности;
- сокращение непроизводительного времени и незапланированных простоев;
- снижение затрат и частоты технического обслуживания;
- улучшение качества продукции;
- повышение безопасности работы сотрудников;
- оптимизация цепочек поставок;
- сокращение объема запасов и затрат на их хранение [23].

Дорогостоящая пропускная способность сетей и скорость отклика заставляют многие предприятия делать выбор в пользу граничных (периферийных) вычислений. Они идеально подходят для тех мест, где требуется ограниченное сетевое подключение к облачным сервисам, вычислениям, аналитике и хранилищам. Это лучший выбор, когда производителю требуется мгновенная обработка данных для принятия решений в режиме реального времени без необходимости сначала отправлять данные в облако.

Применение технологии периферийных вычисления является действенным инструментом управления риском. Перебои в подключении к облаку больше не останавливают производственные процессы.

Одновременно развивается и соответствующее новым технологическим решениям промышленное программное обеспечение.

Все большее распространение получает супервизорное управление и сбор данных (англ. Supervisory control and data acquisition (SCADA)).

Супервизорное управление и сбор данных – это объединение программных и аппаратных элементов, с помощью которого на промышленном предприятии возможно выполнение следующего функционала:

- управление производственными процессами локально или из удаленных мест;
- мониторинг, сбор и обработка данных в режиме реального времени;

- непосредственное взаимодействие с устройствами, такими как датчики, клапаны, насосы, двигатели и многое другое, через программное обеспечение человеко-машинного интерфейса (НМИ);

- протоколирование событий в файлах-журналах.

НМИ (англ. Human-machine interface) – человеко-машинный интерфейс, инженерные решения, обеспечивающие взаимодействие человека-оператора с управляемыми им машинами.

Системы супервизорного управления и сбора данных позволяют контролировать и поддерживать стабильный режим работы, обрабатывать данные для принятия управленческих решений и оперативно сообщать о проблемах в системе, что сокращает время простоя.

Микрокомпьютеры, которые выполняют работу по взаимодействию с массивом объектов, таких как НМИ, датчики, конечные устройства и заводские машины, проводят первичную обработку, а затем направляют информацию, извлеченную из этих объектов, на компьютеры с программным обеспечением системы супервизорного управления и сбора. Программное обеспечение системы супервизорного управления и сбора распределяет, обрабатывает, отображает данные, а затем помогает операторам и другим сотрудникам изучать данные и принимать решения.

Системы супервизорного управления и сбора данных могут использоваться предприятиями как государственного, так и частного секторов экономики. Эти системы успешно работают на различных типах предприятий, поскольку они могут работать как с простыми конфигурациями, так и с большими и сложными установками.

Программное обеспечение системы супервизорного управления и сбора позволяет в режиме реального времени получать информацию от различных компонентов системы, подключенных к интернету. Кроме того, система легко расширяется, её можно дополнять при необходимости любым количеством блоков управления и датчиков [25].

Система супервизорного управления и сбора может, например, оперативно уведомить оператора о том, что при производстве партии товара часто выдаются ошибки. Оператор приостанавливает работу и просматривает данные системы через HMI, чтобы определить причину проблемы. Оператор просматривает данные и обнаруживает, что конкретное оборудование неисправно. Возможность системы уведомить оператора о возникающих проблемах позволяют быстро устранять их и предотвращать потерю производимого товара.

Система супервизорного управления и сбора могут успешно применяться в:

- электроэнергетике;
- топливной промышленности;
- металлургическом комплексе;
- машиностроительном комплексе;
- химико-лесном комплексе;
- промышленности строительных материалов;
- легкой промышленности;
- пищевой промышленности;
- и многих других отраслях.

Системы супервизорного управления и сбора данных уже в настоящее время применяются повсеместно. Они, например, используются и для обеспечения безопасности производства нефтеперерабатывающих заводов и для отслеживания потребления энергии в жилых домах.

Эффективное использование подобных систем могут привести к значительной экономии временных и материальных ресурсов.

Современные системы супервизорного управления и сбора позволяют получать доступ к данным в режиме реального времени из любой точки мира. Такой доступ к информации в режиме реального времени позволяет правительствам, предприятиям и частным лицам принимать основанные на данных решения о том, как улучшить свои процессы. Без соответствующего

программного обеспечения было бы чрезвычайно трудно, если не невозможно, собрать достаточные данные для принятия последовательно обоснованных решений.

Кроме того, большинство современных приложений систем супервизорного управления и сбора предоставляют возможности использования функций быстрой разработки приложений, они позволяют пользователям относительно легко разрабатывать приложения, даже если они не обладают обширными знаниями в области разработки программного обеспечения.

На рынке разработки промышленного программного обеспечения также идет активная конкурентная борьба. Появляются новые программные платформы промышленной автоматизации, на которые переходят предприятия в стремлении сокращения затрат на внедрение программных решений. Аналогично другим видам систем, системы супервизорного управления и сбора данных также обладают свойством к развитию, улучшается качество системы, увеличиваются её возможности.

В качестве конкурентных преимуществ, привлекающих внимание потенциальных потребителей промышленного программного обеспечения, разработчики выделяют совместимость их разработок с другим программным обеспечением, возможность уплачивать фиксированную плату в зависимости от количества серверов, возможность оплаты по факту использования функций, простоту и скорость установки программного обеспечения [28]. Для удобства работы операторов в системах предусматривается визуализация условий протекания технологических процессов.

Цифровые технологии открывают новые возможности, они применимы для решения задач бизнеса любого масштаба, и именно они помогают современным компаниям быть успешными.

Их внедрение способствует углублению связей с существующими клиентами, построению новых деловых отношений, созданию преимуществ бренда.

Развитие цифровых технологий открывает новые возможности для поиска и реализации имеющегося потенциала, способствует не только решению современных проблем, но и использованию изначально неблагоприятной ситуации на благо интересов предприятия.

Список использованной литературы

1. Постановление Правительства РФ от 29.03.2019 N 377 (ред. от 31.03.2020) «Об утверждении государственной программы Российской Федерации «Научно-технологическое развитие Российской Федерации» // «Собрание законодательства РФ», 15.04.2019, N 15 (часть III), ст. 1750.
2. Постановление Правительства РФ от 02.03.2019 г. N 234 (ред. от 07.12.2019 г.) «О системе управления реализацией национальной программы «Цифровая экономика Российской Федерации» // «Собрание законодательства РФ», 18.03.2019, N 11, ст. 1119.
3. Указ Президента Российской Федерации от 21.07.2020 № 474 «О национальных целях развития Российской Федерации до 2030 года».
4. Борисова О.А., Головацкий Н.Я., Колесникова С.В., Выпряхкина И.Б. и др. Современные проблемы регионального управления проектами: отраслевой аспект: коллективная монография. - М.: Издательство «Научный консультант», Москва, 2016. – 168 с.
5. Веселовский М.Я. Совершенствование господдержки отечественных корпораций // Вопросы региональной экономики. 2012. № 2 (11). С. 78-82.
6. Веселовский М.Я., Никонорова А.В. Информационные технологии как платформа повышения эффективности инновационной экономики // Аудит и финансовый анализ. 2016. №4, С. 432-435.
7. Веселовский М.Я., Федотов А.В., Вилисов В.Я., Меньшикова М.А., и др. Формирование конкурентных преимуществ российских предприятий в условиях экономической нестабильности: коллективная монография / Под редакцией М.Я Веселовского, И.В. Кировой. Москва, 2017.

8. Голош Д.Д., Цуканов А.А. Анализ плюсов и минусов криптовалюты и сфер применения блокчейн технологий // Устойчивое развитие: общество, экология, экономика: материалы XV международной научной конференции. В 4-х частях. Под редакцией А.В. Семенова, Н.Г. Малышева. – 2019. – С. 404-417.

9. Долгушин А.Б. Совершенствование методов программно-целевого управления природопользованием на примере приоритетного национального проекта: диссертация ... кандидата экономических наук: 08.00.05 / Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации. Москва, 2012.

10. Ерофеева И.В., Плотников С.В. GR-коммуникации в информационном пространстве Забайкальского края // Научные труды Северо-Западной академии государственной службы. 2020. Т.3. №1(5), С.435-440.

11. Маковецкий М.Ю., Череповецкий П.С. Развитие экономики России в условиях антироссийской санкционной политики // Актуальные вопросы развития экономики. Материалы международной научно-практической конференции. Под редакцией В.В. Карпова и А.И. Ковалева; Омский филиал Финансового университета при Правительстве РФ. 2015. С. 45-50.

12. Морковкин Д.Е. Стратегические факторы инновационного преобразования реального сектора экономики России в условиях импортозамещения // Современная наука: актуальные проблемы теории и практики. Серия: Экономика и право. 2015. №9-10. С.19-23.

13. Никонорова А.В. Информационные технологии как инновационный инструмент повышения эффективности экономики // Транспортное дело России. 2015. №6, С. 50-52.

14. Никонорова А.В. Использование мобильного маркетинга как средства стимулирования сбыта // Маркетинг в России и рубежом. – 2010. – № 4. – С. 18-222.

15. Никонорова А.В. Цифровизация экономики и её влияние на процессы государственного управления // Экономика и предпринимательство. –

2019. – № 5 (106). – С. 213-216.

16. Никонорова А.В. Устойчивое развитие экономических субъектов как результат реализации ответственной социальной политики // Проблемы устойчивого развития российских регионов: материалы Всероссийской научно-практической конференции с международным участием.– Тюмень: Тюменский индустриальный университет. – 2014. – С. 114-117.

17. Официальный сайт Министерства экономического развития Российской Федерации. Прогноз социально-экономического развития Российской Федерации на 2021 год и на плановый период 2022 и 2023 годов [Электронный ресурс] URL: https://www.economy.gov.ru/material/directions/makroec/prognozy_socialno_ekonomicheskogo_razvitiya/prognoz_socialno_ekonomicheskogo_razvitiya_rf_na_2021_god_i_na_planovyy_period_2022_i_2023_godov.html (дата обращения 27.12.2020 года)

18. Официальный сайт Министерства экономического развития Российской Федерации. Картина инфляции за октябрь 2020 года [Электронный ресурс] URL: <https://www.economy.gov.ru/material/file/4235ab5c8d82bbdf49852d99a3c14317/201106.pdf>

19. Уровень инфляции в Российской Федерации. Таблица инфляции. [Электронный ресурс] – <http://уровень-инфляции.рф/таблица-инфляциииhtml> (дата обращения 30.12.2020 года)

20. Colombo P., Sagert R. Enabling Industry 4.0 Transformation Through Edge Computing URL: <https://blog.se.com/power-management-metering-monitoring-power-quality/2020/11/20/enabling-industry-4-0-transformation-through-edge-computing/> (дата обращения 25.12.2020 года)

21. Gartner Top Strategic Technology Trends 2021 URL: <https://www.gartner.com/en/publications/top-tech-trends-2021> (дата обращения 28.12.2020 года)

22. Godinot C. Insurance and Inspection – How to Take Advantage of IIoT Digitized Power. URL: <https://blog.se.com/power-management-metering-monitoring-power-quality/2020/12/02/insurance-and-inspection-how-to-take-advantage-of-iiot-digitized-power/> (дата обращения 21.12.2020 года)
23. Hamilton Eric What is Edge Computing: The Network Edge Explained URL: <https://www.cloudwards.net/what-is-edge-computing/> (дата обращения 28.12.2020 года)
24. Kiseleva N.V., Panichkina M.V., Klochko E.N., Nikonorova A.V., Kireev S.V. Creation of clusters of small enterprises of the region // International Journal of Economics and Financial Issues. 2016. Vol. 6. № 2. pp. 294-297.
25. PriyaS.What is SCADA Systems? URL:<https://blog.se.com/industrial-software/2020/07/29/what-is-scada-systems/>(дата обращения 22.12.2020 года)
26. Reznichenko D.S., Tishchenko E.S., Taranova I.V., Charaeva M.V., Nikonorova A.V., Shaybakova E.R. Sources of formation and directions of the use of financial resources in the region // International Journal of Applied Business and Economic Research. 2017. Т. 15. № 23. С. 203-219.
27. Tricoire Jean-Pascal The Rise of the Extended Enterprise in Today’s Digital URL: <https://blog.se.com/energy-management-energy-efficiency/2018/07/13/the-rise-of-the-extended-enterprise-in-todays-digital-economy/> (дата обращения 30.12.2020 года)
28. What is SCADA? URL: <https://inductiveautomation.com/resources/article/what-is-scada> (дата обращения 29.12.2020 года)

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**ДАННОЕ ИЗДАНИЕ ПРЕДНАЗНАЧЕНО ИСКЛЮЧИТЕЛЬНО ДЛЯ ПУБЛИКАЦИИ НА
ЭЛЕКТРОННЫХ НОСИТЕЛЯХ**