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Certified Associate in Project Management (CAPM)® Exam



VIJAY KANABAR
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Certified Associate in Project Management (CAPM)[®] Exam

Official Cert Guide

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Pearson

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Contents at a Glance

Introduction xxi

Part I Project Management Fundamentals

- Chapter 1 Becoming a Certified Associate in Project Management (CAPM)[®] 2
- Chapter 2 Projects and Project Management 16
- Chapter 3 Organizing for Project Performance 44
- Chapter 4 Development Approach and Life Cycle Performance Domain 92

Part II Predictive Approach

- Chapter 5 Planning, Project Work, and Delivery: Predictive Methodologies 120
- Chapter 6 Project Work and Delivery 172

Part III Adaptive Approach

- Chapter 7 Planning, Project Work, and Delivery: Adaptive Approaches 212
- Chapter 8 Overview of Adaptive Frameworks 256
- Chapter 9 Measurement, Tracking, and Managing Uncertainty 290

Part IV Business Analysis

- Chapter 10 Business Analysis Frameworks 324
- Chapter 11 Business Analysis Domains 350
- Chapter 12 Tailoring and Final Preparation 414

Part V Appendixes

- Appendix A Answers to the “Do I Know This Already?” Quizzes 430
- Appendix B PMI Project Management Process Groups and Processes 436
- Appendix C PMBOK 7 Project Performance Domains and Project Management Principles 438

Appendix D *PMI Certified Associate in Project Management (CAPM)[®] Exam Official Cert Guide* Updates 442

Appendix E Business Analysis Models and Their Usages 444

Glossary 451

Index 468

Online Elements:

Appendix F Study Planner

Glossary

Contents

Introduction xxi

Part I Project Management Fundamentals

Chapter 1 Becoming a Certified Associate in Project Management (CAPM)[®] 2

Foundation Topics	3
Understanding Project Management	3
Certified Associate in Project Management (CAPM) [®]	3
Scope of the CAPM Exam	4
How This Book Is Organized	8
Part I: Project Management Fundamentals	9
Part II: Predictive Approach	9
Part III: Adaptive Approach	10
Part IV: Business Analysis	10
Part V: Appendixes	11
Steps to Becoming a Certified Associate in Project Management (CAPM) [®]	11
Study and Exam-Taking Strategies	13
Suggested Reading and Resources	13

Chapter 2 Projects and Project Management 16

“Do I Know This Already?” Quiz	17
Foundation Topics	20
What Is a Project?	20
A Project	21
Project Manager	22
Understanding Project Management	22
Projects vs. Operational Work	23
The Role of Projects in Operations	24
Project-Based Operations	24
Programs and Portfolios	25
Creating Value Through Project Management	26
Project Management Process Groups	35
Project Management Challenges	36
Challenges with Issues, Risks, Assumptions, and Constraints	37
Project Management Trends	41
Business Analysis	41
Adaptive Project Management	41
Principles of Project Management	42

Summary	42
Exam Preparation Tasks	42
Review All Key Topics	42
Define Key Terms	43
Suggested Reading and Resources	43

Chapter 3 Organizing for Project Performance 44

“Do I Know This Already?” Quiz	45
Foundation Topics	50
Project Performance Domains	50
The Stakeholder Performance Domain	52
Identifying Stakeholders	52
Types of Stakeholders in a Project	53
Stakeholder Analysis	54
Types of Stakeholder Communication	55
Stakeholder Performance Domain Successful Outcomes	56
The Project Manager’s Role	56
Roles of the Project Manager in a Project	58
The Project Manager’s Required Skills	58
Project Organization Structures	70
Project Structure Concepts	70
Functional Project Organization Structures	70
Matrix Project Organization Structures	72
Projectized Project Organization Structures	73
The Power of Project Managers in Different Organization Structures	73
Project Management Office (PMO) and Steering Committees	74
The Project Management Office	75
The Steering Committee	75
The Team Performance Domain	76
Effective Execution of Projects	78
High-Performing Teams	78
Leadership and Interpersonal Skills Affecting All Team Members	78
Project Team Development Models	79
Conducting Meetings	80
Responsibility Assignment Matrix	83
Project Team Culture	84
Expectations for the Team Performance Domain	86
Applying the <i>PMI Code of Ethics and Professional Conduct</i>	86

	Summary	88
	Exam Preparation Tasks	88
	Review All Key Topics	89
	Define Key Terms	90
	Suggested Reading and Resources	90
Chapter 4	Development Approach and Life Cycle Performance Domain	92
	“Do I Know This Already?” Quiz	93
	Foundation Topics	97
	Fundamentals of the Project Life Cycle	97
	The Concept of a Project Life Cycle	97
	Visualizing a Project Life Cycle	98
	Stage Gates	99
	Project Life Cycle vs. Project Management Process Groups	100
	Project Life Cycle vs. Product Life Cycle	103
	Development Approach and Life Cycle Performance Domain Concepts	103
	Terms Relevant to the Development Approach and Life Cycle Performance Domain	104
	Choosing the Predictive Approach	105
	Choosing the Adaptive Approach	105
	Choosing a Hybrid Approach	106
	Life Cycles in Practice	107
	Industry Application: Predictive Life Cycle	107
	Industry Application: Adaptive Life Cycle	110
	Industry Application: Hybrid Life Cycle	111
	Considerations for Selecting a Development Approach	112
	Product, Service, or Result	113
	Project	114
	Organization	114
	Project Activity, Deliverables, and Milestones	115
	Project Activities	115
	Deliverables	115
	Measuring Deliverables	116
	Milestones	116
	Summary	118
	Exam Preparation Tasks	118
	Review All Key Topics	119
	Define Key Terms	119
	Suggested Reading and Resources	119

Part II Predictive Approach

Chapter 5 Planning, Project Work, and Delivery: Predictive Methodologies 120

“Do I Know This Already?” Quiz	122
Foundation Topics	127
Choosing the Predictive, Plan-Based Methodology	127
Process Groups of the Predictive, Plan-Based Approach	128
Initiating Processes	128
Planning Processes	129
Executing Processes	129
Monitoring and Controlling Processes	129
Closing Processes	129
Creating a Tailored Predictive Life Cycle	130
Performance Domains	130
Develop Project Charter	134
Develop Project Team	136
Develop Project Management Plan	137
Collect Requirements and Define Scope Statement	139
Create Work Breakdown Structure (WBS)	141
Define and Sequence Activities	144
Estimate Time and Resources	149
Identify Critical Path	151
Develop Schedule	156
Direct and Manage Project Work	157
Monitor and Control Project Work	159
Issues Management	159
Change Requests and Control	160
Monitoring and Controlling Project Cost and Schedule	162
Close Project or Phase	163
Foundations of Earned Value Analysis	165
Planned Value (PV)	166
Earned Value (EV)	166
Actual Cost (AC)	166
Cost Variance (CV)	166
Schedule Variance (SV)	166
Cost Performance Index (CPI)	166
Forecasting Final Project Costs	167
More Information About Earned Value Analysis	167

	The Planning Performance Domain	167
	Schedule Compression Factors and Techniques	168
	Scaling	169
	Summary	169
	Exam Preparation Tasks	170
	Review All Key Topics	170
	Define Key Terms	171
	Suggested Reading and Resources	171
Chapter 6	Project Work and Delivery	172
	“Do I Know This Already?” Quiz	173
	Foundation Topics	177
	Project Work Performance Domain	177
	Planning and Managing Procurement	178
	Bidding; Soliciting and Entering Bids	180
	Control Procurements	181
	Engaging Stakeholders	182
	Managing Project Communications	184
	Managing Risk	189
	Threats	190
	Opportunities	191
	Project Delivery Performance Domain	192
	Delivery of Value	193
	Quality Management	194
	Quality Management Tools	197
	Six Sigma	203
	Project Controls and Forecasting	203
	Project Integration	207
	Components of Project Integration	208
	Achieving Project Integration	209
	Summary	209
	Exam Preparation Tasks	210
	Review All Key Topics	210
	Define Key Terms	211
	Suggested Reading and Resources	211

Part III Adaptive Approach

Chapter 7 Planning, Project Work, and Delivery: Adaptive Approaches 212

- “Do I Know This Already?” Quiz 213
- Foundation Topics 217
- When to Use an Adaptive Approach 217
- Team Structure in Adaptive Projects 221
- Requirements for the Adaptive Project Environment 222
 - Adaptive Mindset 222
 - Servant Leadership 224
 - The Structure and Culture of Adaptive Teams 225
 - Value-Driven Delivery 227
 - Factors That Facilitate Adaptive Approaches: OPA and EEF 228
- Apparent Stages of Adaptive Projects 229
 - Stage 1: Concept 231
 - Stage 2: Construct and Deliver 233
 - Stage 3: Close 237
 - Work Groups for Adaptive Project Stages 238
- Agile Life Cycles 238
 - Case Study 7-1: Building a Website for a Conference 239
- Hybrid Project Approaches 251
 - Hybrid Approach Scenario 1: Revisiting the APC Conference 251
 - Hybrid Approach Scenario 2: Virtual Restaurant Business 252
 - Hybrid Approach Scenario 3: Specification for Tax Software 253
- Summary 254
- Exam Preparation Tasks 254
- Review All Key Topics 254
- Define Key Terms 255
- Suggested Reading and Resources 255

Chapter 8 Overview of Adaptive Frameworks 256

- “Do I Know This Already?” Quiz 259
- Foundation Topics 262
- Lean 262
 - Eliminating Waste 263
 - Value Streaming Using the Lean Approach 264
 - Case Study 8-1: Getting a Book from the Library 264
 - Iteration-Based Agile 267
 - Flow-Based Agile 267

Scrum	268
Roles	268
Processes and Artifacts	269
Scrum Core Values	270
Timeboxing	271
Challenges with Scrum	272
Kanban	272
Suitability of the Kanban Method	272
Limiting Work in Progress (WIP)	273
Workflow Focus	273
Comparing Kanban and Scrum	274
ScrumBan	274
Extreme Programming	275
Roles	275
Core Practices of XP	275
What Can We Learn from XP?	276
FDD, DSDM, and Crystal	277
Feature-Driven Development	277
Dynamic Systems Development Method	278
Crystal	279
Frameworks for Scale	279
Summary	283
Scrum of Scrums	284
Disciplined Agile®	284
Which Approach for Scale?	286
Summary	288
Exam Preparation Tasks	288
Review All Key Topics	288
Define Key Terms	289
Suggested Reading and Resources	289
Chapter 9 Measurement, Tracking, and Managing Uncertainty	290
“Do I Know This Already?” Quiz	291
Foundation Topics	294
Problem Detection and Resolution	294
The Measurement Performance Domain	295
Prioritization Techniques	295
What Gets Prioritized	298

Key Performance Indicators (KPIs) for Project Control	300
Progress Tracking	301
Decision Making	301
Communication of Adaptive Project KPIs	301
Who Makes the Estimates?	306
Throughput, Cycle Time, and Lead Time	306
The Uncertainty Performance Domain	311
Uncertainty	312
Strategies to Address Project Uncertainty	313
Risk	315
Strategies to Reduce the Likelihood of Uncertainty	316
Opportunities	316
Threats	316
Tracking and Managing Risk in Adaptive Projects	317
Team Workspace Design	318
Tracking Progress to Manage Risk in Adaptive Approaches	318
Summary	321
Exam Preparation Tasks	321
Review All Key Topics	322
Define Key Terms	322
Suggested Reading and Resources	322

Part IV Business Analysis

Chapter 10 Business Analysis Frameworks 324

“Do I Know This Already?” Quiz	325
Foundation Topics	328
The Importance of Business Analysis	328
The Role of a Business Analyst	329
Skills Needed to Perform Business Analysis	330
Comparing Business Analysis with Project Management	331
Requirements: The Focus of Business Analysis	332
Requirement Types	332
Case Study 10-1: Requirements for a Toll Collection System	333
Requirements Documentation	337
Requirements Management Plan	337
Stakeholders and the Business Analyst	338
Identify Stakeholders	338
Stakeholder Analysis	341

Business Analysis Planning	342
Transition to a Future State	343
Influence of Project Approaches on Business Analysis	343
Business Analysis in the Predictive Approach	343
Business Analysis in the Adaptive Approach	344
Summary	347
Exam Preparation Tasks	347
Review All Key Topics	347
Define Key Terms	348
Suggested Reading and Resources	348
Chapter 11 Business Analysis Domains	350
“Do I Know This Already?” Quiz	351
Foundation Topics	354
Domain 1: Needs Assessment	354
Why Perform Needs Assessments?	355
When Do Needs Assessments Occur?	355
Who Is Involved in Needs Assessment?	356
What Are the Key Business Analysis Tasks During Needs Assessment?	356
What Are the Needs Assessment Processes?	357
Domain Summary	365
Domain 2: Business Analysis Planning	366
Domain 3: Requirements Elicitation and Analysis	368
Elicit Requirements	369
Analyze Requirements	377
Document the Solution Requirements	398
Domain 4: Traceability and Monitoring	398
Trace Requirements	399
Monitor Requirements	401
Update Requirements and Communicate Requirements Status	402
Manage Changes to Requirements	403
Domain Summary	404
Domain 5: Solution Evaluation	405
Evaluate Solution Performance	406
Determine Solution Evaluation Approach	407
Evaluate Acceptance Results and Address Defects	409
Obtain Solution Acceptance for Release	410

Evaluate Deployed Solution	410
Domain Summary	410
Summary	411
Exam Preparation Tasks	411
Review All Key Topics	411
Define Key Terms	412
Suggested Reading and Resources	412

Chapter 12 Tailoring and Final Preparation 414

“Do I Know This Already?” Quiz: Tailoring Section	415
Foundation Topics	417
Tailoring	417
The Tailoring Process	418
Aspects of Projects That Can Be Tailored	419
How to Tailor the Project Approach	420
Case Study 12-1: Design and Introduction of Portable CT Scanner Products	421
Summary: Project Tailoring Concepts	422
Final Preparation	422
Scope and Key Concepts	422
Suggested Plan for Final Review and Study	427
Summary	428
Exam Preparation Tasks	428
Review All Key Topics	428
Define Key Terms: Tailoring Section	429
Suggested Reading and Resources	429

Part V Appendixes

Appendix A Answers to the “Do I Know This Already?” Quizzes	430
Appendix B PMI Project Management Process Groups and Processes	436
Appendix C PMBOK 7 Project Performance Domains and Project Management Principles	438
Appendix D <i>PMI Certified Associate in Project Management (CAPM)[®] Exam Official Cert Guide Updates</i>	442
Appendix E Business Analysis Models and Their Usages	444
Glossary	451
Index	468

Online Elements:

Appendix F Study Planner	
Glossary	

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Dedications

I want to dedicate this book to practitioners pursuing additional credentials, such as the CAPM[®]. It made a difference for me academically and professionally, and I am confident that it will accomplish the same for them. I would also like to dedicate this book to my wife, Dina; my father, Kalyandas; and my father-in-law, Prabhudas, who passed away recently but certainly cheered this project in spirit to its full successful completion.

—*Vijay Kanabar*

This book is dedicated to the people who have most influenced my work in project management over the years: my elite students, who helped me to shape my teaching and then went on to become project professionals in their own right; my faculty colleagues, who first influenced me to pursue this topic as a personal specialty; and my wife, Helen, who has instilled in me the personal confidence to make it all happen.

—*Art Thomas*

This book is dedicated to all my current and future students who are pursuing a career in managing projects. I hope it will make a difference to them and help them to better understand and address the many challenges in leading teams and managing projects. I would also like to dedicate this book to my wife, Ulrike, and my mother, who passed away just before the book was completed.

—*Thomas Lechler*

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About the Technical Reviewer

Roger Warburton taught Project Management (PM) at Boston University's Metropolitan College for more than a decade. He has taught both undergraduate and graduate students in the classroom as well as online. He designed and taught the primary graduate PM course, which was required for all master's degree students. MET College students were midcareer professionals pursuing career advancement or seeking a change to a project management career. Roger's course was one of MET College's highest rated by students. The online version won an award for its innovative content. Roger also designed and taught both classroom and online versions of the graduate Project Management Costs and Risks course.

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Introduction

Thank you for choosing this book. The Certified Associate in Project Management (CAPM)[®] is a professional certification offered by the Project Management Institute (PMI)[®]. The CAPM exam addresses the needs of professionals who want to understand the fundamental knowledge, terminology, and practice of effective project management. A CAPM[®] candidate must be familiar with concepts involving three areas of expertise:

- Traditional project management fundamentals, including the roles of project team members in planning, organizing, and executing projects
- Project life cycles and approaches to delivering project value using adaptive, predictive, and hybrid approaches
- The role of business analysis in project management, especially as it pertains to requirements definition and implementation

The CAPM[®] credential and this guide specifically address the needs of project management students and practitioners with up to 3 years of project work experience. Note that project work experience covers a range of backgrounds, from work as a project leader or team member on a traditional project to work experience in change management and operations management.

Students at colleges and universities are increasingly taking courses in project management. You may be pursuing a credential to differentiate yourself as you enter the workforce. The CAPM[®] curriculum is a good choice for you because it provides a well-rounded body of knowledge in project management. Mastering the content introduced in this guide will enable you to answer critical job interview questions, such as, “We need to implement a new project. Which project management approach method do you think is appropriate for the project? Agile? Waterfall? Why?” or “We need a team member to show leadership on this project. How would you lead? What competencies do you bring to the table?” After reading this book, you will be comfortable responding to such questions. You will be able to contrast the predictive approach with the adaptive approach. You also will be able to explain the importance of identifying and engaging stakeholders, motivating team members, and communicating effectively with the project team, and you will be able to describe the various tools and approaches for doing so.

Additionally, this book is a reference resource for foundational project management, including agile practice and business analysis. You can apply the knowledge gained here to on-the-job experiences and build your competence. For professionals keen to explore the discipline of project management and earn advanced credentials, this certification guide is a gateway to a complete range of certifications from PMI. Following the CAPM[®] certification and obtaining 3 years of professional experience, PMI offers three additional and relevant professional levels of certification:

- The Project Management Professional (PMP)[®] certification is a widely recognized and respected credential in project management. The PMP[®] certification is a natural follow-on to the CAPM[®] and is designed to recognize the knowledge and skills of project management professionals. It addresses traditional and adaptive approaches

to developing projects. To be eligible for the PMP certification, individuals must have completed a certain amount of education and training in project management, as well as have a certain amount of experience leading and directing projects.

- The PMI-ACP[®] is the Project Management Institute Agile Certified Practitioner certification. This certification is designed to recognize the knowledge and skills of professionals who use agile practices in their projects.
- PMI-PBA[®] is the Project Management Institute Business Analysis certification, which is designed to recognize the knowledge and skills of business analysis professionals, including identifying business needs and determining solutions to business problems.

These certifications will each validate your advanced standing in the field of project management. In addition, they provide an opportunity to dive deeply into specialty areas such as the agile approach and business analysis.

Book Features

To help you customize your study time using this book, the core chapters have several features that help you make the best use of your time:

- **Foundation Topics:** These are the core sections of each chapter. They explain the concepts for the topics in that chapter.
- **Exam Preparation Tasks:** This section lists a series of study activities that you should do at the end of the chapter:
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- **Web-based practice exam:** The companion website includes the Pearson Cert Practice Test engine, which allows you to take practice exam questions. Use it to prepare with a sample exam and to pinpoint topics where you need more study.

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Once you have the access code, to find instructions about both the PTP web app and the desktop app, follow these steps:

- Step 1.** Open this book's companion website, as described earlier in this Introduction, in the section "The Companion Website for Online Content Review."
- Step 2.** Click the Practice Exams button.

Step 3. Follow the instructions listed there both for installing the desktop app and for using the web app.

If you want to use the web app only at this point, navigate to www.pearsonestprep.com, establish a free login if you do not already have one, and register this book's practice tests using the access code you just found. The process should take only a couple minutes.

NOTE Amazon eBook (Kindle) customers: It is easy to miss Amazon's email that lists your PTP access code. Soon after you purchase the Kindle eBook, Amazon should send an email. However, the email uses very generic text and makes no specific mention of PTP or practice exams. To find your code, read every email from Amazon after you purchase the book. Also do the usual checks for ensuring that your email arrives, such as checking your spam folder.

NOTE Other eBook customers: As of the time of publication, only the publisher and Amazon supply PTP access codes when you purchase their eBook editions of this book.

Customizing Your Exams

From the exam settings screen, you can choose to take exams in one of three modes:

- **Study mode:** This mode allows you to fully customize your exams and review answers as you are taking the exam. This is typically the mode you use first to assess your knowledge and identify information gaps.
- **Practice Exam mode:** This mode locks certain customization options to present a realistic exam experience. Use this mode when you are preparing to test your exam readiness.
- **Flash Card mode:** This mode strips out the answers and presents you with only the question stem. This mode is great for late-stage preparation, when you really want to challenge yourself to provide answers without the benefit of seeing multiple-choice options. This mode does not provide the detailed score reports that the other two modes do, so you should not use it if you are trying to identify knowledge gaps.

In addition to these three modes, you can select the source of your questions. You can choose to take exams that cover all the chapters, or you can narrow your selection to just a single chapter or the chapters that make up specific parts in the book. All chapters are selected by default. If you want to narrow your focus to individual chapters, simply deselect all the chapters and then select only those you want to focus on in the Objectives area.

You can also select the exam banks to focus on. Each exam bank comes complete with a full exam of questions that cover topics in every chapter. You can have the test engine serve up exams from all banks or just from one individual bank by selecting the desired banks in the exam bank area.

You can make several other customizations to your exam from the exam settings screen, such as the time allowed for taking the exam, the number of questions served up, whether to randomize questions and answers, whether to show the number of correct answers for multiple-answer questions, and whether to serve up only specific types of questions. You can also create custom test banks by selecting only questions that you have marked or questions on which you have added notes.

Updating Your Exams

If you are using the online version of the Pearson Test Prep software, you should always have access to the latest version of the software and the exam data. If you are using the Windows desktop version, every time you launch the software while connected to the Internet, it checks for any updates to your exam data and automatically downloads any changes made since the last time you used the software.

Sometimes, for many factors, the exam data may not fully download when you activate your exam. If you find that figures or exhibits are missing, you may need to manually update your exams. To update a particular exam that you have already activated and downloaded, simply click the **Tools** tab and click the **Update Products** button. Again, this is an issue only with the desktop Windows application.

If you want to check for updates to the Pearson Test Prep exam engine software, Windows desktop version, simply click the **Tools** tab and click the **Update Application** button. This ensures that you are running the latest version of the software engine.

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CHAPTER 4

Development Approach and Life Cycle Performance Domain

This chapter covers the following topics:

- **Fundamentals of the Project Life Cycle:** This section covers basic life cycle concepts and provides an introduction to how life cycles work.
- **Project Life Cycle vs. Product Life Cycle:** This section describes how products are managed and how the various components of a product's market life cycle can be similar to those of the project life cycle.
- **Development Approach and Life Cycle Performance Domain:** This section covers the typical activities associated with the Development Approach and Life Cycle Performance Domain.
- **Life Cycles in Practice:** This section provides examples of how practitioners think of life cycles in various contexts.
- **Considerations for Selecting a Development Approach:** This section describes key factors that help in making a decision about what development approach to use.
- **Project Activity, Deliverables, and Milestones:** This section describes some of the activities involved in various types of life cycles, defines what deliverables and milestones are, and explains why it is important to define what deliverables are in projects.

This chapter introduces the fundamental concepts involved in the Development Approach and Life Cycle Performance Domain. This domain involves the choices a project manager makes in terms of the order in which certain required tasks are done, to what extent the team can take different paths through those required steps, and how these factors influence the life cycle of the project. Several types of life cycles are described, including the typical considerations for choosing which type of life cycle is best for a given situation and project context. Finally, this chapter covers the important concepts related to deliverables and milestones to ensure that you know how to define them and use them in the planning and execution of a project.

CAUTION The project management information, templates, tools, and techniques in this chapter are provided for your education only. Use this knowledge prudently when applying it to projects at work. Also, while we have aligned the material with the Project Management Institute's (PMI's) Exam Content Outline, there is no assurance that successfully completing this book will result in students passing the Certified Associate in Project Management (CAPM)[®] exam.

By the time you reach the end of this chapter, within the context of the following domains and tasks, you should be able to:

- **Domain 1: Project Management Fundamentals and Core Concepts**
 - **Task 1-1: Demonstrate an understanding of the various project life cycles and process groups.**

Distinguish between predictive and adaptive approaches.
 - **Task 1-2: Demonstrate an understanding of project management planning.**

Distinguish between the different deliverables of a project plan vs. a product plan.

Distinguish the difference between a milestone and a task duration.
 - **Task 1-4: Determine how to follow and execute planned strategies or frameworks (e.g., communication, risks, etc.).**

Give examples of how it is appropriate to respond to a planned strategy or framework (e.g., communication, risk).
- **Domain 2: Predictive Plan-Based Methodologies**
 - **Task 2-1. Explain when it is appropriate to use a predictive plan-based approach.**

Identify the suitability of a predictive, plan-based approach for a particular organizational structure (e.g., virtual, co-location, matrix structure, hierarchical).

Determine the activities within each process.

Give examples of typical activities within each process.

Distinguish among various project components.
- **Domain 3: Adaptive Frameworks/Methodologies**
 - **Task 3-1: Explain when it is appropriate to use an adaptive approach.**

Compare the pros and cons of adaptive and predictive plan-based projects.

Identify organizational process assets and environmental factors that facilitate adaptive approaches.

“Do I Know This Already?” Quiz

The “Do I Know This Already?” quiz allows you to assess whether you should read this entire chapter thoroughly or jump to the “Exam Preparation Tasks” section. If you are in doubt about your answers to these questions or your own assessment of your knowledge of the topics, read the entire chapter. Table 4-1 lists the major headings in this chapter and their corresponding “Do I Know This Already?” quiz questions. You can find the answers in Appendix A, “Answers to the ‘Do I Know This Already?’ Quizzes.”

Table 4-1 “Do I Know This Already?” Section-to-Question Mapping

Foundation Topics Section	Questions
Fundamentals of the Project Life Cycle	2, 13
Project Life Cycle vs. Product Life Cycle	5
Development Approach and Life Cycle Performance Domain Concepts	3, 8, 10
Life Cycles in Practice	1, 7, 12
Considerations for Selecting a Development Approach	9, 11, 14
Project Activity, Deliverables, and Milestones	4, 6, 15

CAUTION The goal of self-assessment is to gauge your mastery of the topics in this chapter. If you do not know the answer to a question or are only partially sure of the answer, you should mark that question as wrong for purposes of the self-assessment. Giving yourself credit for an answer you correctly guess skews your self-assessment results and might provide you with a false sense of security.

1. If the requirements for software change in a minor way due to customer feedback or testing failure, the project team can revisit these minor changes through revised design, coding, and testing. The idea is to discover these issues as early as possible because the cost of changing the system can be greater as more of it is developed through the life cycle of the project. When you have this viewpoint, you are viewing software development as a(n) _____.
 - a. predictive approach
 - b. product approach
 - c. adaptive approach
 - d. hybrid approach
2. Which of the following is the term for a temporary endeavor to develop a unique outcome through a series of interrelated steps from initial concept to a completed state?
 - a. Phase
 - b. Product life cycle
 - c. Activity
 - d. Project life cycle
3. Your operations manager has tasked you with defining a development approach for the construction of a tool shed next to your manufacturing facility. The scope, schedule, cost, resource needs, and risks can be well defined in the early phases of the project life cycle, and they are relatively stable. Which approach should you take in this case?
 - a. Predictive
 - b. Product
 - c. Adaptive
 - d. Hybrid

4. Which of the following is the term for a scheduled step in a project plan that has a distinct beginning and end and may consist of several substeps?
 - a. Phase
 - b. Deliverable
 - c. Activity
 - d. Milestone
5. ABC Company has determined that its Widget 452 model is selling less briskly than it has during the past two years. Executives of the company determine that it is time to phase out Widget 452 and bring Widget 673 into production and sales. These factors would lead you to believe that the executives are discussing a(n) _____.
 - a. phase
 - b. product life cycle
 - c. activity
 - d. project life cycle
6. Which of the following is a tangible or intangible measurable output of one or more project activities?
 - a. Milestone
 - b. Deliverable
 - c. Phase
 - d. Objective
7. You are managing a software development project and have planned that the final deliverable will be brought into existence in successively refined stages at prototype, pilot, testing, and deployment stages. In this case, you are viewing software development as a(n) _____.
 - a. predictive approach
 - b. adaptive approach
 - c. hybrid approach
 - d. product approach
8. The product owner for a clothing manufacturer/retailer has tasked you with defining a development approach for a new line of children's clothing. This organization has never sold clothing for children, and no one on the team has had any experience with this type of product. One very rigid consideration is that this particular company wants a line of children's clothing that is unique in the market, so you cannot just import a line from another company and rebrand it. Which development approach should you use in this case?
 - a. Predictive
 - b. Product
 - c. Adaptive
 - d. Hybrid

- 9.** Scheduling constraints, the availability of funding, and the nature of the involved stakeholders are all factors that are part of which aspect of the model of considerations for selecting a development approach?
- a.** Product, service, or result
 - b.** Project
 - c.** Organization
 - d.** Competition
- 10.** You are the project manager for information systems in a major banking firm. This particular company has not had its own mobile application. The senior vice president for operations has asked you, along with others in the IT and operations groups, to define a project that will produce an initial mobile application. The vice president has been particularly emphatic about the fact that this application must meet all compliance requirements for consumer use; other than that, your teams have freedom in the design and operation of the app. These factors suggest that you probably want to use which development approach?
- a.** Predictive
 - b.** Product
 - c.** Adaptive
 - d.** Hybrid
- 11.** The project team size and location, the overall culture, and capability are all factors that are part of which aspect of the model of considerations for selecting a development approach?
- a.** Product, service, or result
 - b.** Project
 - c.** Organization
 - d.** Competition
- 12.** Certain aspects of your retail store project allow you to plan for a known outcome of the construction of your retail store location. Other aspects of the market development and product testing are less stable at the early stages because you want to establish a more unique approach to your store. To bring about the final operating store in your chosen location, which approach might you want to adopt?
- a.** Predictive
 - b.** Adaptive
 - c.** Hybrid
 - d.** Product
- 13.** A(n) _____ is a collection of logically related project activities that culminates in the completion of one or more deliverables.
- a.** phase
 - b.** product life cycle
 - c.** activity
 - d.** project life cycle

14. Degree of innovation, ease of change, requirements, and regulations are all factors that are part of which aspect of the model of considerations for selecting a development approach?
 - a. Product, service, or result
 - b. Project
 - c. Organization
 - d. Competition
15. Although a(n) _____ is scheduled in a project plan, it has no estimated duration and is used to provide information about progress through the major segments.
 - a. milestone
 - b. deliverable
 - c. phase
 - d. activity

Foundation Topics

Fundamentals of the Project Life Cycle

Life cycle is a term we use to describe the overall time of existence of something. We know that stars such as our sun have a certain predictable life cycle, from the time they form to the last point of their existence. Trees have a life cycle, from a seed, to a towering adult, to a fallen trunk on the ground in the forest. In fact, if you look around in a forest, you can usually see trees in many phases of their life cycle. The fact that these phases are similar for different kinds of trees suggests that the phases within a life cycle are true on a very broad, or high-level, basis for everything we might classify as a tree. Therefore, if we can recognize where a tree is in its life cycle, we can predict what will likely come next.

In fact, it was a typical forest that inspired early astronomers to realize that all the objects they were seeing through their telescopes out there in the universe were not different objects at all; instead, they began to realize that many of them were similar objects at varying phases of existence along their individual life cycles.

The Concept of a Project Life Cycle

Like stars and trees, all projects have noticeable high-level phases as they evolve from initial ideas to completion. People think of projects also evolving in a somewhat sequential fashion, although we know it is common for changes in project requirements or other issues to result in a need to repeat previous sequential steps to include revisions. In general, when we think of this high-level progression from an initial state to a completed state, we can refer to it as a project life cycle. We can see many types of projects go through this sort of progression, even though the end goals, deliverables, or even application domains of the project (such as construction, software, or event management) might be very different from one another.

People use various terms when discussing the overall life cycle of a project, including *stage*, *step*, and *phase*. The various points in the life cycles of projects are described using terms such as *prototype* and *final rollout*. In Section 2.3 of the *PMBOK® Guide – Seventh Edition*, PMI has formalized two terms that are important foundational concepts for this chapter:

- **Project phase:** A collection of logically related project activities that culminates in the completion of one or more deliverables.
- **Project life cycle:** The series of phases that a project passes through, from its start to its completion.

You can think of a project phase as a “chunk” of the project—a lower-level concept that involves logically related activities and the completion of specific deliverables or types of deliverables. These chunks make up the general project life cycle, which is an overall arc of existence for a project as it takes various shapes while evolving from start to finish.

Visualizing a Project Life Cycle

Figure 4-1 shows a project life cycle going through six phases:

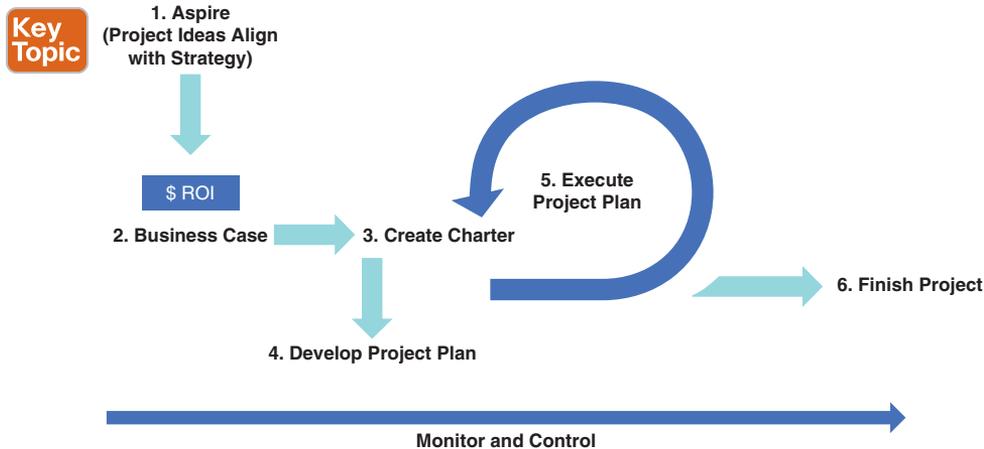


Figure 4-1 A Typical Project Life Cycle

1. **Aspire:** This is the project aspiration and ideation phase, the origin for projects. Here a project portfolio is created to address problems or opportunities in an organization. In this pre-project phase, you need to ensure that any proposed project idea is aligned with the organization’s mission.
2. **Business case analysis:** The proposed project idea needs to be justified based on evidence and details; this is where the business case comes into play. The objective of the business case is to assess the project benefit and value that the proposed project brings to stakeholders. This life cycle phase involves documenting, among other things, a profit-and-loss investment analysis.

3. **Create charter:** The project sponsor formally authorizes the existence of a project after considering the business case and organizational needs. The project charter is an official document that identifies the project manager and grants authority to apply organizational resources to project activities.
4. **Develop the project management plan:** This phase looks at the activities that need to be completed to deliver the project successfully. It considers both project- and product-related activities. From a project manager's perspective, this is a very important phase, and much effort is expended to plan and organize the project in detail.
5. **Execute the project management plan:** In this phase, the project management plan is executed. The project team must be motivated and led successfully to produce the project deliverables. There is also a monitoring and controlling aspect to the execution phase; milestones must be attained within the targeted project schedule, cost, and quality constraints.
6. **Finish:** Here the project is completed and closed. The project manager handles administrative closure and lessons learned, and communicates project results.

The aspire and business case phases are often considered to be pre-project phases. Most project management practice and foundational project management standards focus on the remaining phases—from developing the charter to closing the project.

One of the reasons for this focus on the last four phases is that different vendors and organizations have unique proprietary activities for the pre-project phases: aspire and business case analysis.

For example, a life cycle could have just the phases of analysis, design, development, acceptance, and implementation. These five phases outline a methodical, step-by-step process for managing any project. With this approach, phases before analysis are considered pre-project activities; any phases after implementation are considered post-implementation phases. Post-implementation work might include such activities as project benefits tracking, in which the original concepts of the business case are measured and validated as being either achieved or not. The separations of pre- and post-implementation phases in these organizations can sometimes be due to the fact that other teams besides the “performing organization” (that is, the project team) are given charge of these front- and back-end phases. In contrast, the project team concentrates only on the five phases of work in between.

Stage Gates



Progressive elaboration takes place as a project progresses from one phase to another. The increasing amount of detail available as a project moves along provides opportunities to review whether there is any value in continuing to invest in the project. As illustrated in Figure 4-2, a **stage gate** is a point for deciding whether a project should be continued or terminated. Stopping a project early on can result in substantial cost savings. Steering committee members review the project progress, value, and business environment and decide whether to continue, suspend, or cancel the project completely. In other words, a stage gate is a gate that blocks further progress down the path of the project until some authority allows it to be opened after an appropriate review of the progress to this point. Stage gates are also known as phase review points or kill points.

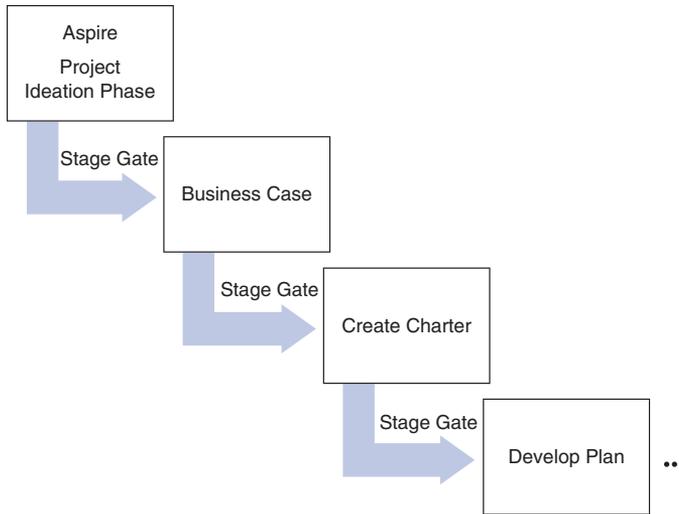


Figure 4-2 *Life Cycle Phases with Stage Gate Checkpoints*

Project Life Cycle vs. Project Management Process Groups

How do the Project Management Process Groups, a hallmark of previous editions of the *PMBOK[®] Guide*, relate to a project life cycle? This is a common question and concern even among experienced practitioners. The *PMIstandards+[™]* online guide defines 49 processes that are associated with project management process groups. While references to the Process Groups can be found in the current edition, details of project processes can be found now in *Process Groups: A Practice Guide*. We have also reproduced them in summary form for your reference in Appendix B, “*PMBOK[®] Guide* Process Groups and Processes.”

The five Project Management Process Groups—Initiating, Planning, Executing, Monitoring and Controlling, and Closing—are illustrated in Figure 4-3. There is some symmetry between a project life cycle and the Project Management Process Groups. The Initiating Process Group consists of processes such as Identify Stakeholders, Develop Project Charter; the Planning Process Group consists of processes such as Collect Requirements, Define Scope, and Create a Work Breakdown Structure (WBS). Similar processes are associated with Executing, Monitoring and Controlling, and Closing. We provide details of these processes in Chapter 5, “Planning, Project Work, and Delivery: Predictive Methodologies.”

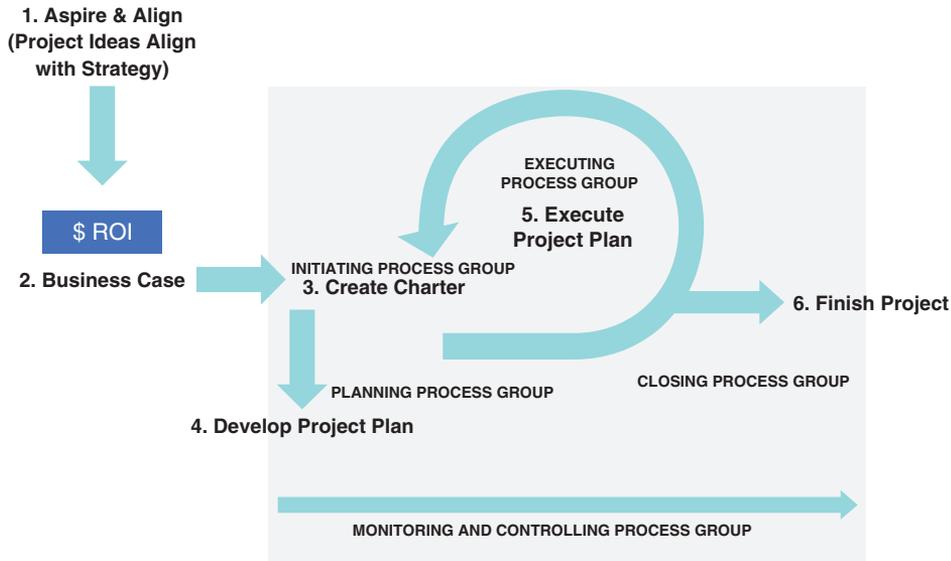


Figure 4-3 *Life Cycle Phases vs. PMBOK® Process Groups*

Key Topic

Whereas a life cycle is more like a linear flow, the Project Management Process Groups can iterate at each life cycle phase. For example, consider a project that involves creating a charter document for the Olympics, as illustrated in Figure 4-4. The Olympics is such a massive event that creating a charter and getting all stakeholders onboard is a significant undertaking. This single complex project would involve all five process groups.

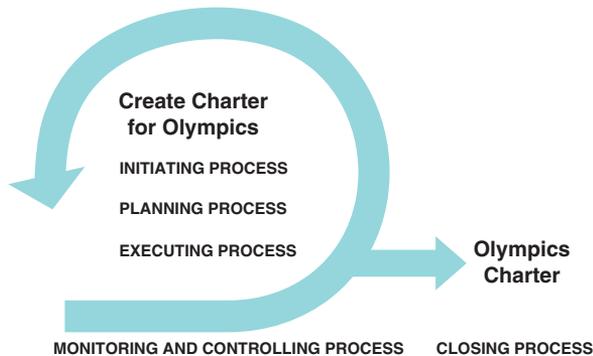


Figure 4-4 *PMBOK Process Groups Can Apply at Each Phase of the Life Cycle*

Figure 4-5 illustrates how the Project Management Process Groups iterate in large projects in each phase. Notice that it is possible to implement some or all of the processes associated with the project during each iteration.

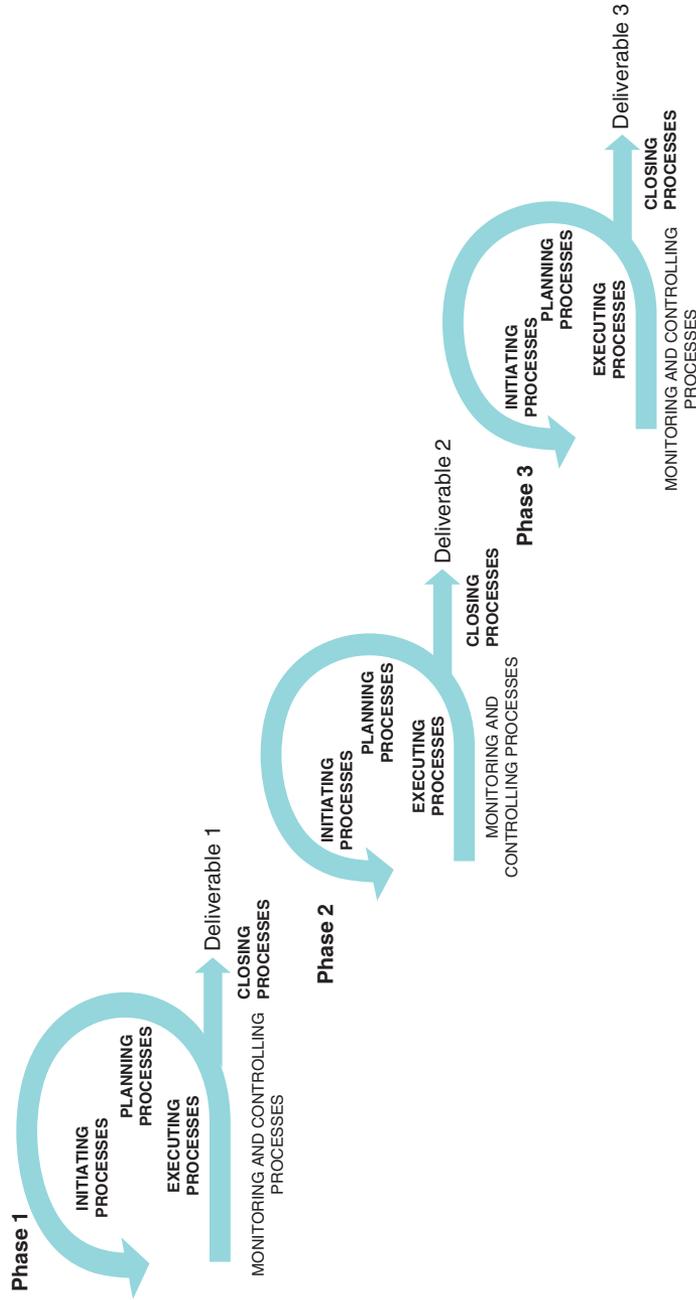


Figure 4-5 Repeating Project Process Groups in a Project

Project Life Cycle vs. Product Life Cycle

The Standard for Project Management defines a **product** as an artifact that is produced, is quantifiable, and is either an end item or a component item. A product life cycle begins when a product is conceived and development is started. It is then introduced to the market. This is followed by a growth in sales, a sales peak, and often a gradual decline, after which the product is typically withdrawn from the market. At this point, a new version or a new product concept takes its place in another product cycle. Figure 4-6 illustrates a typical product life cycle. After development, a product typically goes through the introduction, growth, maturity, and decline phases.

Key
Topic

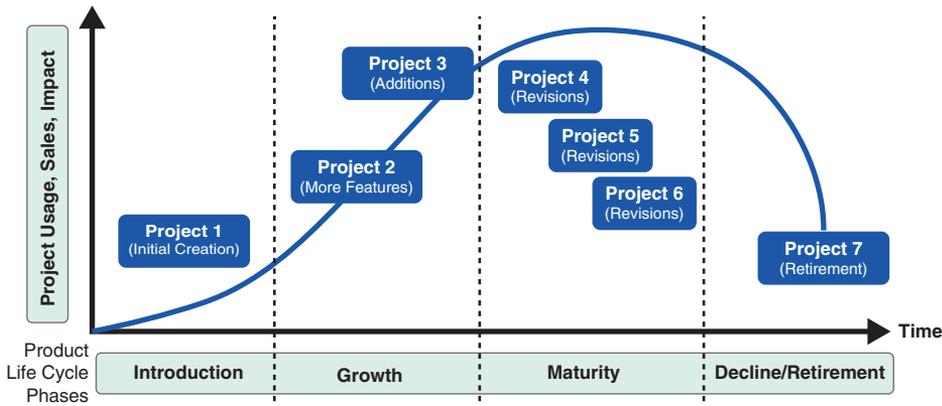


Figure 4-6 Product Management Life Cycle

Profits follow a different curve. There is an early investment when the product is in development, so profits do not accrue instantly with the first sales; they are offset in time until the product has been in the marketplace long enough to have paid back the investments of development and for sales to have scaled up sufficiently for the product to become profitable. If the product is successful, there is a reasonable period of profitability during the product's maturity stage. Inevitably, product yields decline in sales or interest and are superseded by newer or better product versions, or they are withdrawn from the marketplace.

Consider the case of a smartphone. After Release 1, a newer product version emerges as Release 2. If you consider each release as a project, you have multiple projects, as illustrated in Figure 4-6.

NOTE When a product or service is introduced to the market, it is no longer a project. Product management is a complex discipline, but this chapter's introduction to product management should give you sufficient knowledge to pass the CAPM® exam.

Development Approach and Life Cycle Performance Domain Concepts

Different approaches can be used for deployment, depending on the project goals and desired outcomes, as well as the risk or uncertainty associated with a project's environment.

The *PMBOK® Guide – Seventh Edition* considers this an important topic and has articulated this as a performance domain in Section 2.3, Figure 2-6. Figure 4-7 shows the key outcomes that should result from the successful execution of this domain.

**Key
Topic**

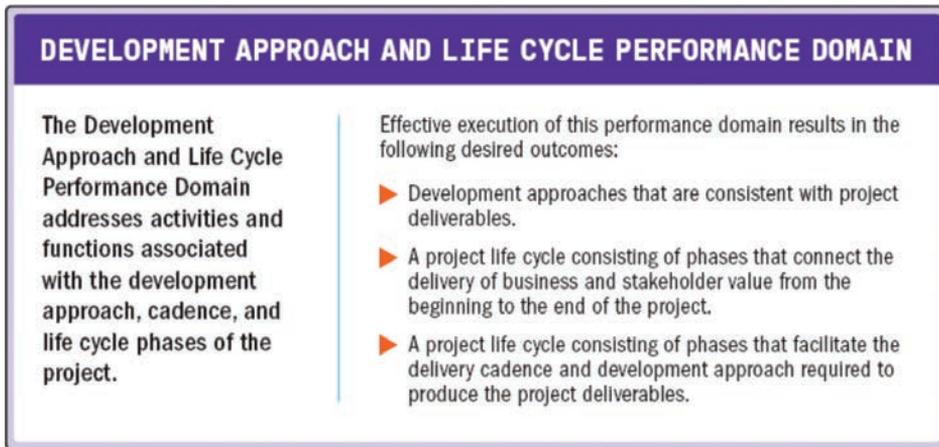


Figure 4-7 *Development Approach and Life Cycle Performance Domain*
(Source: Figure 2-6, *PMBOK® Guide – Seventh Edition*)

Terms Relevant to the Development Approach and Life Cycle Performance Domain

In addition to the terms *project phase* and *project life cycle*, this performance domain focuses on some other key terms:

- **Deliverable:** Any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.
- **Development approach:** A method used to create and evolve a product, service, or result during the project life cycle, such as a predictive, adaptive, or hybrid method. The development approach can demonstrate specific characteristics, such as being iterative or incremental.

Development approaches can be broadly seen as two extremes in terms of goals and implementation. Figure 4-8 shows the predictive and adaptive extremes, as well as a blended development approach that uses some of both, known as a hybrid approach.

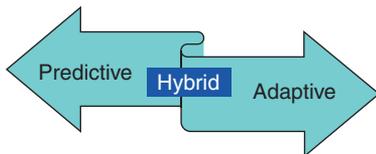


Figure 4-8 *Types of Development Approaches*

**Key
Topic**

The hybrid development approach combines two or more predictive and adaptive elements. For example, within a generally linear step-by-step project flow, you could have one of the steps refer to the development of a mobile app. This particular step might be adaptive until its completion, to account for the need to carefully iterate user input until a final, finished

app has been delivered. After its completion, the remaining linear steps of the predictive approach take over until the completion of the project. Therefore, the hybrid development approach is seen as applying the best of both extremes in a combination that is most appropriate for the specific project outcomes that are needed.

Terms used to describe these approaches have varied over the years. Table 4-2 shows some different expressions related to predictive and adaptive approaches that are available in the literature and used in practice.

Table 4-2 Terms in Use Referring to the Predictive and Adaptive Approaches

Approach	Alternative Terms
Predictive	Waterfall, linear, structured, plan based, stable, traditional
Adaptive	Agile, iterative, incremental, spiral, extreme, evolutionary

Choosing the Predictive Approach

A predictive development approach can be considered when the project and product requirements can be defined, collected, and analyzed at the start of the project. This approach is widely referred to as a “waterfall” or “traditional” approach to project management. With the **predictive development approach**, you design and implement a project in a life cycle sequenced in distinct phases, from the initial conceptual and feasibility phase to the deployment of the final product or service. The predictive approach is more structured, predictable, and stable than the adaptive approach. Next, we review additional aspects of the predictive approach, as you will be tested extensively on this topic on the CAPM® exam.

The *PMBOK® Guide* – Seventh Edition, Section 2.3.3 indicates that the predictive approach is best used in the following situations:

Key Topic

- When there is a significant investment involved and a high level of risk that may require frequent reviews and replanning between development phases
- When the scope, schedule, cost, resource needs, and risks can be well defined in the early phases of the project life cycle and are relatively stable
- When the project team wants to reduce the level of uncertainty early in the project and do much of the planning up front
- When the project work can follow plans that were developed near the start of the project
- When templates from previous similar projects are available

Choosing the Adaptive Approach

An **adaptive development approach** is practical when requirements are subject to a high level of uncertainty and volatility and are likely to change throughout the project. In such an environment, you can proceed with an adaptive life cycle for project implementation. This life cycle is designed around iterations that repeat project phases. The project can move to the next phase only after customer or product stakeholder feedback is available. It suggests that a particular stage of development has reached a point at which it is appropriate to move on. Different expressions related to the adaptive approach can be found in the literature, but the most common terms are *iterative*, *incremental*, and *agile*.

The *PMBOK® Guide – Seventh Edition*, Section 2.3.3 indicates that the adaptive approach is best used in the following situations:

Key Topic

- When a clear vision of an end state is available at the start of the project but very little is known about the details of the requirements that make up that end state
- When there is flexibility to refine, change, and replace requirements
- When there is an opportunity to receive frequent user and product owner feedback
- When there is uncertainty or when high risks are associated with the project or business environment (In other words, the final deliverables have to be right, but all factors may not be fully articulated in advance.)
- When an empowered team is given a prioritized backlog of desired deliverables, as well as the freedom to determine what scope is achievable within a given iteration, and the team is permitted to work through the backlog over multiple iterations until the requirements are fully delivered

Choosing a Hybrid Approach

A **hybrid development approach** is a combination of adaptive and predictive approaches. This means that some elements from a predictive approach are used along with some elements from an adaptive approach. The project professionals must determine which elements are best for a particular aspect of a project and how to blend the different elements into an overall plan of action.

The *PMBOK® Guide – Seventh Edition*, Section 2.3.3 indicates that the hybrid approach is best used in the following situations:

Key Topic

- When an organization has both an opportunity and a need to leverage the strengths of the adaptive and predictive approaches. (For example, when very little might be known about a product or service, a front-end adaptive approach might be used to gather requirements and prototype a solution for feedback. Subsequently, when the general approach has been learned through the iterative prototyping steps and a final solution is clear, a known project implementation template is more appropriate; the project could be completed using the predictive model to deliver that solution.)
- When compliance requirements indicate that certain aspects of the deliverable must be implemented in a very predictable way, but the core nature of the solution may need to be entirely determined through iteration in a simulated environment
- When there is project management maturity in the organization and the project team is familiar with both approaches and can thus fuse together the two approaches to develop a new model for project delivery that is suitable for the organizational needs

NOTE The *Agile Practice Guide* (see Appendix X3) introduces an Agile Suitability Filter tool to help project professionals evaluate criteria, facilitate discussions, and make an informed selection of recommended development approaches. Please review the various attributes of this useful tool.

Life Cycles in Practice

Summarizing the relevant definitions so far:

- **Predictive life cycle:** A project life cycle that is structured to execute sequentially along a linear path
- **Adaptive life cycle:** A project life cycle that is *iterative* or *incremental* as it provides for proving less understood concepts or requirements over a series of repeated steps
- **Hybrid life cycle:** A project life cycle that contains elements of both predictive and adaptive approaches in which each is used to achieve greater overall effectiveness than could be achieved by using either approach alone

The project management development approach and delivery cadence can impact the phases of a project life cycle. If a project team adopts a predictive life cycle, then the project life cycle will likely be a traditional waterfall-like linear sequence of phases. However, if the team selects an adaptive development approach, the project life cycle will be made up of cyclical loops. These loops gradually produce the needed project outcomes as the deliverables of each loop are subjected to stakeholder feedback.

To aid in learning these often subtle differences, it is appropriate to take a look at some sample life cycles in practice from industry applications.

Industry Application: Predictive Life Cycle

Predictive life cycles are associated with clear phases; the project is constrained to develop requirements early and to stay with the original requirements and design plans that were created at the start of the project. The *PMBOK® Guide – Sixth Edition*, now part of the PMStandards+™ online guide, states the following in Appendix X-3:

- Define requirements up front, before development begins.
- Deliver plans to develop the eventual deliverable, and then deliver only a single final product at the end of the project timeline.
- Constrain change as much as possible and as early as possible.
- Involve key stakeholders at specific milestones and stage gate reviews.
- Control risk and cost through detailed planning of mostly knowable considerations.

Each sector has its own typical version of a predictive project life cycle. Because both the terminology and importance of deliverables are different across domains, each sector has naturally evolved its own detailed approach.

Predictive Life Cycle Example 1

For this example, we consider the construction industry. This example leverages a predictive life cycle, as shown in Figure 4-9.



Figure 4-9 Construction Example Using a Predictive Life Cycle

The key phases in a construction life cycle could be:

- **Feasibility:** Evaluating the feasibility of the construction project
- **Design:** Involving architects and designing a schematic definition of the project
- **Permits:** Ensuring that the project is approved by the jurisdictional authorities either before or after construction, as appropriate
- **Site work:** Clearing the ground, installing temporary power and utilities, and inspecting
- **Foundation:** Excavating, pouring concrete, creating basement walls, waterproofing, and insulating
- **Framing and utilities:** Installing joists, framing walls, and installing plumbing, electrical, HVAC
- **Sheathing:** Installing roof decking, shingles, doors, and windows
- **Finishing:** Installing insulation, drywall, paint and wallpaper, cabinets, tile, and appliances
- **Acceptance:** Conducting a walk-through and inspection, developing and completing the final punch list, obtaining final acceptance, and getting local government final approval for occupancy

Predictive Life Cycle Example 2

Software development is increasingly associated with an adaptive approach because software is more often delivered through modules of code that accomplish a specific task. However, not all software can or should be delivered this way. Historically, many well-known systems development life cycles have used a sequential, phased approach to deliver software. Therefore, it is very important to show how a software project might use the predictive life cycle.

Representative key phases in a software development life cycle (also known as a systems development life cycle, or SDLC), as illustrated in Figure 4-10, are:

- **Feasibility:** During this phase, the customer's problems are defined and a business analyst elicits high-level requirements. Feasibility and preliminary project scope are completed.
- **Analysis:** The business analyst works with the software development team to design an acceptable solution for the customer. The deliverable is the design document. Additionally, the project manager finalizes the baseline cost and schedule, secures resources, and establishes a timeline and budget.
- **Requirements gathering:** The business or systems analyst conducts a detailed needs analysis and documents software and functional specifications.
- **Design:** Software designers use the documentation to establish the initial concepts of the system architecture, including interfaces between modules and where certain functions will take place.

- **Detailed design:** The technical team creates a complete detailed design to meet all requirements, obtain approval, and hand over documentation to programmers for coding.
- **Coding:** Programmers code software and conduct some unit testing. They hand over the software to the quality assurance department for testing.
- **Testing:** The quality assurance staff conducts comprehensive unit testing.
- **System integration:** The team assembles the entire set of modules so that they can be tested according to how they perform with each other and integrate with other related systems.
- **Acceptance testing:** The team conducts final testing of the completed system in an environment that matches the production environment as closely as possible. The customer analyzes the acceptance test results and, if satisfactory, signs the acceptance agreement.
- **Deployment:** The operation phase begins after customer acceptance. The project manager and appropriate team members determine a deployment strategy, complete documentation, train staff, and deploy the software.

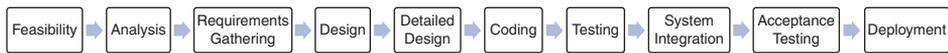


Figure 4-10 *Software/Systems Development Life Cycle Example Using a Predictive Life Cycle*

The process shown in Figure 4-10 is characterized as a predictive life cycle because the completed steps are generally not revisited again. For example, when the requirements are firmed up, they are not changed during the detailed design, coding, and testing steps. If the software development life cycle shown in Figure 4-10 is to succeed using this predictive life cycle approach, the business/system analysts must have fully complete requirements. Likewise, the coding team must have the final software architecture and detailed design documentation before software construction begins. A wide array of specialized staff is involved in this predictive life cycle.

The sequential nature of the SDLC approach does not preclude some level of iteration. If the requirements change in a minor way based on customer feedback or testing failure, the project team can certainly revisit these minor changes through revised design, coding, and testing. The idea is to discover these issues as early as possible because the cost of changing a system can increase as more of it is developed through the project's life cycle.

However, if significant changes tend to be required frequently, or even if new requirements are injected into the project at later stages, this can have a significant impact on the prior design or coding stages, making it necessary to revisit these stages; in such situations, the predictive software development life cycle is not appropriate. Because modern software development projects tend to accommodate changes that have greater impact regularly, software development project teams are likely to consider an adaptive life cycle today for many such projects.

Industry Application: Adaptive Life Cycle

Adaptive life cycles are associated with the iteration and gradual delivery of working components over several iterations. As such, a project is less constrained to develop requirements early and, therefore, allows modifications as the deliverables are finally reviewed; this often makes the end product very different from what might have been articulated at the start of the project. The *PMBOK® Guide – Sixth Edition*, now part of the *PMIStandards+™* online guide, states the following in Appendix X-3:

- Requirements can be elaborated during delivery.
- Key users or stakeholders are regularly involved in the life cycle to improve the outcome.
- Input from stakeholders often requires repetition of the previous phase.

According to the *PMBOK® Guide – Seventh Edition*, adaptive life cycles have some distinct characteristics:

- **Iterative life cycle:** An adaptive life cycle in which development occurs through continuous refinement over the life of the project
- **Incremental life cycle:** An adaptive life cycle in which development occurs in small increments, gradually forming the end deliverable through segments
- **Cadence:** A rhythm of activities conducted throughout a project
- **Delivery cadence:** The timing and frequency of project deliverables

Adaptive Life Cycle Example: Adaptive Software Development

Figure 4-11 illustrates a software life cycle example as an adaptive life cycle. It includes some typical elements of an iterative adaptive software development life cycle. When the business analysis step is complete and requirements are captured (generally in writing), a prototype is implemented to demonstrate to the end user the product's overall features. This prototype is not necessarily fully functional but is developed to give the stakeholders a concept of how the requirements can be implemented. You can see that a fully functional pilot is being demonstrated to the stakeholders at the end of the coding step. In each step, the goal is to gather insights and rework the outcomes of the previous step in the life cycle.

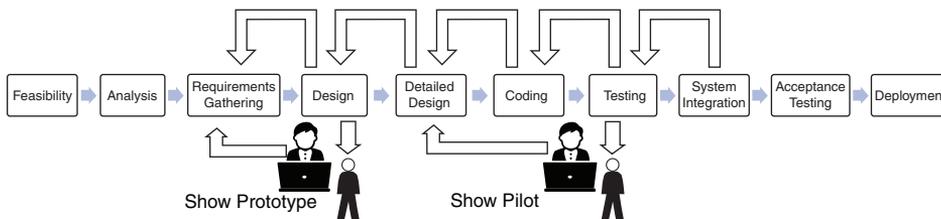


Figure 4-11 *Iterative Adaptive Software Development Life Cycle*

This life cycle derives benefits from stakeholder feedback and team insights. Critical risks are mitigated in this approach. The requirements might not have been clear in the beginning, but a prototype can clarify the requirements. Where complexity is high, you can see that a fully functional pilot can likely ensure that the deployment will be successful. A vital characteristic of the adaptive life cycle is cadence—how often a prototype, pilot, or deliverable is ready for review. In adaptive software development, the project is understood to involve a frequent cadence of incorporating stakeholder feedback early. Therefore, Figure 4-11 shows that the final deliverable appears in successively refined stages at the prototype, pilot, testing, and deployment stages.

Industry Application: Hybrid Life Cycle

As mentioned earlier in this chapter, in a hybrid development approach, some elements of a predictive approach are used along with some elements of an adaptive approach. Consider the following characteristics of a hybrid life cycle:

- There is both an opportunity and a need to leverage the strengths of both approaches.
- This approach is practical when compliance requirements demand that certain aspects of the deliverable be implemented in a very predictable way. Still, the core nature of the solution may need to be determined entirely through iteration in a simulated environment.
- This approach is practical when there is project management maturity in the organization and when the project team is familiar with both approaches. The team then can bring together the two approaches to develop a new model for project delivery that is suitable for the organizational needs.

It is helpful at this point to look at an industry example of the implementation of a hybrid life cycle.

Hybrid Life Cycle Example: Small Restaurant Business

Sam and Mary Oduwa are talented chefs. Recent changes in the restaurant business environment and their professional careers prompted them to consider starting a restaurant. Working with their daughter, Myra, who is adept in technical matters, they focused on a two-step process: First, they want to create a virtual restaurant to understand their customers better and refine their menu. Second, they want to move to a physical restaurant near their hometown.

Due to the relatively stable technology and flexible options for food delivery, Sam and Mary believe they can get going quickly. Their supportive local bank successfully approved their business proposal for funding to start their virtual restaurant business, and they obtained the needed permits from their local government office.

Sam and Mary visualized three stages through which their business could progress and created a timeline consisting of a one-month period for each stage (see Figure 4-12).

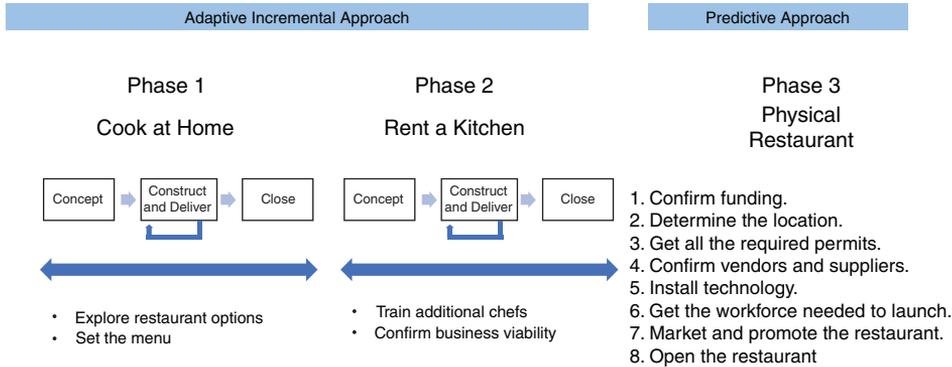


Figure 4-12 A Hybrid Project to Open a Small Restaurant

In an adaptive life cycle, these short, repetitive timelines can be referred to as *sprints*. Each sprint typically lasts one to four weeks. Sam and Mary considered the following phases as incremental approaches toward their final restaurant opening:

1. Cook at home.
2. Rent a kitchen near their home.
3. Open a restaurant in a single location.

Sam and Mary also recognized that, although they could be very flexible with the first two phases, the third phase would require a more detailed plan, and the physical restaurant would need to be fully functional upon opening. Therefore, although they could use an adaptive approach for the first two phases (involving concept, construct/deliver, and close steps for each phase), they would need to develop a sequential plan to successfully implement the final restaurant location. Food menus and customer reputation could be iteratively built through the adaptive phases so they would be ready to implement in phase 3. However, the physical location would require a step-by-step development approach to be ready to serve customers.

Knowing that the third phase would likely take longer than the previous two phases, and knowing that it would have very defined dependencies, Sam and Mary started the predictive plan for phase 3 in parallel with the first two adaptive phases. This allowed them to select the location, get permits, design the renovation, sign construction contracts, and procure the necessary equipment and furniture, all while perfecting their menus at home and serving their first customers using equipment in their rented kitchen. When all these preliminary steps were complete, they could quickly move into their new location and be ready for their restaurant's grand opening.

This restaurant business development example demonstrates combined characteristics of adaptive and predictive approaches—a hybrid life cycle.

Considerations for Selecting a Development Approach

Several factors influence the selection of a development approach. The *PMBOK® Guide – Seventh Edition*, Section 2.3.4 outlines these factors, as shown in Figure 4-13. The criteria can be divided into three categories: product, service, or result; project; and organization. It is important to review the meanings of each of these components.

Key Topic

Product, Service, or Result	Project	Organization
<ul style="list-style-type: none"> • Degree of Innovation • Requirements Uncertainty • Scope Stability • Ease of Change • Delivery Options • Risk • Requirements and Regulations 	<ul style="list-style-type: none"> • Stakeholders • Schedule Constraints • Funding Availability 	<ul style="list-style-type: none"> • Organizational Structure • Culture • Organizational Capability • Project Team Size and Location

Figure 4-13 Considerations for Selecting a Development Approach

Product, Service, or Result

The factors influencing the product, service, or result consideration all have to do with the nature of a project's outcome, whether it is a product, a service, or another type of result.

Degree of Innovation

Deliverables that have a well-understood scope and requirements, that the project team has worked with before, and that allow for planning up front are well suited to the predictive approach. Deliverables involving a high degree of innovation or those with which the project team does not have experience are better suited to a more adaptive approach.

Requirements Certainty

A predictive approach works well when the requirements are well known and easy to define. When requirements are uncertain, volatile, or complex and are expected to evolve throughout the project, a more adaptive approach is a better fit.

Scope Stability

If the scope of the deliverable is stable and not likely to change, a predictive approach is practical. If the scope is expected to undergo many changes, an approach that is closer to the spectrum's adaptive side can be helpful.

Ease of Change

Related to requirements certainty and scope stability, if the nature of the deliverable makes it challenging to manage and incorporate changes, then a predictive approach is best. Deliverables that can quickly adapt to change can use an adaptive approach.

Delivery Options and Cadence

The nature of the deliverable, such as whether it can be delivered in components, influences the development approach. Products, services, or results that can be developed and delivered in pieces are aligned with incremental, iterative, or adaptive approaches.

Risk

You can reduce risk by building products modularly and adapting the design and development based on learning to take advantage of emerging opportunities or reduce the exposure to threats. Adaptive approaches frequently mitigate high-risk requirements by addressing their viability first.

Safety Requirements and Regulations

Products that have rigorous safety requirements often use a predictive approach because significant up-front planning is needed to ensure that all the safety requirements are identified, planned for, created, integrated, and tested. Likewise, environments that are subject to significant regulatory oversight may need a predictive approach due to the required process, documentation, and demonstration needs.

Project

The factors in the project consideration column all have to do with aspects of the project, such as how it is structured, constrained, and funded.

Stakeholders

Specific stakeholders, such as product owners, play a substantial role in establishing requirements from the customer's perspective and prioritizing work. If such dedicated project team staff are available to support project work, adaptive methods are preferred.

Schedule Constraints

If there is a need to deliver something early, even if it is not a finished product, an adaptive approach is beneficial.

Funding Availability

Projects that work in an environment of funding uncertainty can benefit from an adaptive approach. A minimum viable product can be released with less investment than an elaborate product. This allows for market testing or market capture with minimum investment.

Organization

The factors in the organization consideration column all have to do with the organizational environment of the project, including the culture, structure, and complexity.

Organizational Structure

An organizational structure with many levels, a rigid reporting structure, and substantial bureaucracy is likely to use a predictive approach. In contrast, projects that use adaptive techniques are associated with a flat structure.

Culture

A predictive approach fits better in an organization with a culture of managing and directing. Here the work is planned out and progress is measured against baselines. Adaptive approaches fit better within an organization that emphasizes project team self-management.

Organizational Capability

If organizational policies embrace attitudes and beliefs that support an agile mindset, then adaptive methods are likely to succeed.

Project Team Size and Location

Adaptive approaches often work best with project teams of five to nine individuals. Adaptive approaches also favor project teams that are located in the same physical space.

Project Activity, Deliverables, and Milestones

Now that you have an understanding of project phases and life cycles, you are ready for a description of some common elements that are present in all types of approaches. In this final section, we introduce project activities, deliverables (including their measurement), and project milestones.

Project Activities

Key Topic

An *activity*—or task, story, work package, or use case—is a scheduled step in a project plan that has a distinct beginning and end. An activity usually involves several substeps; when those substeps are completed, the whole activity can be regarded as completed. Several related activities can be combined to form a summary activity.

Let's work through an example of a party where food, games, and entertainment are being planned. We might list several activities, such as these:

- Prepare a proposal for the party and a budget.
- Identify potential locations.
- Obtain permission for a venue.
- Arrange logistics and notify the security personnel and custodians.
- Identify the food vendor and the menu.
- Identify the music entertainment vendor.
- Finalize contracts with vendors.
- Create the party event committee.
- Design invitations.
- Email the invitations and personally invite stakeholders.
- Conduct a dry run before the event.
- Execute the party.
- Come to administrative closure and list lessons learned.
- Send out a survey.

Deliverables

Key Topic

Project *deliverables* are measurable outputs of activities. They can be tangible or intangible. You can imagine handing off (delivering) something to the project sponsor or stakeholders at the conclusion of an activity. For the party project example, the following sample list shows activities and the deliverable associated with each activity:

- **Prepare a proposal for the party and a budget:** Statement of work or charter
- **Plan for the party and select a final party location:** Approved permit or reservation with location, day, date, and time
- **Select the food vendor:** Signed contract with the food vendor
- **Collect survey responses:** Post-party survey results from participants

It is important to recognize that the overall project itself is associated with a deliverable. The overall product or service being delivered by the project as a whole can be regarded as an end deliverable.

Intermediary deliverables also are present, such as the design and delivery of various project components. The project management process results in specific process deliverables, such as documentation and managerial reports. Examples of intermediary deliverables include:

- **Scope:** This might consist of several separate deliverables as the project proceeds, including preliminary requirements, conceptual design, and detailed design.
- **Cost and schedule estimates:** These are required at major milestones to report on the status of the project.
- **Intermediate project components:** These might include early prototypes and partial project deliverables.
- **Project management reports:** These include monthly reports, containing cost and schedule data, project status, risk updates, stakeholder issues, and so on.

Measuring Deliverables

Key Topic

Every deliverable must be checked for compliance with the scope, schedule, and budget. The outcomes hinge on assessing or measuring the quality and acceptability of the deliverable. Therefore, when the deliverables are proposed, the project manager must consider how they are to be assessed and measured; this is a necessary step in defining a deliverable. Examples of measurable deliverables include miles of roadway completed, pages of document completed, and square meters of wall painted. Even deliverables such as software can be measurable if they are described correctly according to their functions (for example, “A new customer can register a new account successfully by using the customer account registration function”).

Let’s get into a bit more detail. When you propose a document as a deliverable, for example, someone knowledgeable about the deliverable should be able to provide an expected outline and maybe even an expected page count. Besides helping to better describe the deliverable, these measures are essential because they provide a foundation for cost and schedule estimation, especially if the organization has a good idea of how many units per hour, day, or week a typical employee can produce. If a road construction crew can pave 3 kilometers of roadway per day, and the total crew typically is paid a certain overall set of wages per day, then knowing the total length of roadway defined by the end deliverable will assist the project manager in estimating the time to completion and the total labor cost estimate for this deliverable.

When a deliverable is defined and then assigned to a given resource, these measures can communicate what level of effort is expected. At any given elapsed point in time, you can then reasonably measure the progress against expectations estimated for that elapsed time. If actual deliverables are only half of what was expected, for example, then you immediately know that you have a problem and should investigate how to get the progress back on track.

Milestones

A **milestone** is a significant point or event in the project. The term originated from the ancient Roman Empire. The Romans were famous for building roadways across thousands

of miles, and many of them remain visible today. Figure 4-14 shows an example of a Roman milestone—a marker made of stone that was placed along a roadway and engraved with the distance from the milestone to specific destinations in the Roman Empire. These milestones enabled the Roman army generals to calculate how long it would take to move troops from one area of the empire to another. Merchants and travelers also used these milestones to determine where they were on a given roadway that could be correlated to a map. In other words, the milestones were markers providing specific geolocation information that could be used to predict the time and cost in getting from one place to another. Highway construction engineers use similar markers on our roads today, although they are no longer made of stone; they are usually small signposts set at regular intervals along a highway, each with a code that corresponds to the distance from the start of the highway.



Figure 4-14 A Milestone from the Ancient Roman Empire

Just as milestones informed the ancient Romans—and still inform today’s land travelers—milestones are used in project management to allow a project manager to track progress along the timeline of a project. Milestones can be used to designate the completion of certain segments or deliverables for a project. Complex projects may have many milestones in the timeline, and they are helpful in determining how much work has been completed and how much remains to be done.

**Key
Topic**

Like the markers of stone in ancient Rome, a project milestone is an event that marks either the beginning or the end of activities. A milestone has no duration or resources assigned; it is simply a marker for reference. Project software tools can typically show views of milestone completion, comparisons of estimates with actual progress, and so on.

At the point of project planning and estimating, each milestone should have a target date associated with it that shows the expected point at which all the activities before that milestone will be completed. During project planning, the date associated with the milestone is the planned milestone completion date; after successful execution, it becomes the actual milestone completion date.

For example, completing the definition of project scope is typically a major milestone for projects. Completing project planning is another major milestone; it marks the completion of the project management plan deliverable and the customer’s acceptance of the plan. This type of milestone might be called Project Planning Complete and is first given a planned date of completion and then given the actual date when the customer accepts the plan.

In this final section, we have introduced the idea of using project activities as a way to define the steps needed for project completion; project deliverables (including their measurement) as the means through which we can determine that a project has met its expectations of scope; and project milestones, which provide markers along the project timeline that can be used to measure estimated and actual progress. These concepts are universal with regard to project approach: They are integral in helping a project manager ensure successful project completion, no matter which development approach is chosen.

Summary

This chapter addresses the basics of project life cycles and project phases. It compares project life cycles with product life cycles, showing common concepts as well as differences in the management of each type of life cycle. It also explores the foundational concepts of predictive, adaptive, and hybrid approaches and illustrates sample industry life cycles. Finally, this chapter addresses the nature of project activities, deliverables, and milestones, all of which can be found in any type of project life cycle approach. This chapter is intended to give you foundational information that will be helpful as you explore more detailed considerations of these approaches in future chapters.

Exam Preparation Tasks

As mentioned in the section “How This Book Is Organized” in Chapter 1, you have a couple choices for exam preparation: the exercises here; Chapter 12, “Tailoring and Final Preparation”; and the exam simulation questions in the Pearson Test Prep Software Online.

Review All Key Topics

Review the most important topics in this chapter, noted with the Key Topics icon in the outer margin of the page. Table 4-3 lists these key topics and the page number on which each is found.



Table 4-3 Key Topics for Chapter 4

Key Topic Element	Description	Page Number
Figure 4-1	A Typical Project Life Cycle	98
Paragraph	Stage gates	99
Paragraph	Life cycle phases vs. Process Groups	101
Figure 4-6	Product Management Life Cycle	103
Figure 4-7	Development Approach and Life Cycle Performance Domain	104
Paragraph	The hybrid development approach	104
List	Choosing the predictive approach	105
List	Choosing the adaptive approach	106
List	Choosing the hybrid approach	106
Figure 4-13	Considerations for Selecting a Development Approach	113
Paragraph	Project activities	115
Paragraph	Deliverables	115
Paragraph	Measuring deliverables	116
Paragraphs	Milestones	118

Define Key Terms

Define the following key terms from this chapter and check your answers in the glossary:

project phase, project life cycle, progressive elaboration, stage gate, product, deliverable, development approach, predictive development approach, adaptive development approach, hybrid development approach, iterative, incremental, milestone

Suggested Reading and Resources

Project Management Institute. PMIstandards+™ (online repository). <https://standardsplus.pmi.org/home#>.

Project Management Institute. (2023). *Process Groups: A Practice Guide*.

Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017. (PMBOK® Guide – Sixth Edition is approved by ANSI.)*

Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK Guide) – Seventh Edition, 2021. (PMBOK® Guide – Seventh Edition is approved by ANSI.)*



Index

A

- absolute estimation, 235, 451
- AC (actual cost), 166, 451
- acceptance
 - criteria, 407–408
 - test-driven development, 407
 - testing, 109
- accountabilities, 267
- activity/ies, 115, 144–149
 - backward pass, 154–155
 - business analysis, 355–356, 367
 - deliverables, 115–116
 - dependencies, 146
 - float, 155–156
 - forward pass, 152–153
 - merge, 153
 - milestone, 116–118
 - network diagram, 151, 451
 - Planning performance domain, 234
 - collect and decompose requirements*, 234
 - create a product backlog*, 235
 - develop a release plan*, 234–235
 - estimate effort with story points*, 235
 - plan iterations*, 236–237
 - Project Work and Delivery performance domains, 236–237
 - sequencing, 148–149
 - value- and non-value-adding, 265, 266
 - work package, 144–146
- adaptive development approach, 10, 105–106, 110, 451
- agile
 - Disciplined*, 284–286
 - flow-based*, 267–268
 - iteration-based*, 267
 - Scrum*, 268–272
- building a website for a conference, 239–240
- business analysis, 344–347
- Close stage, 237, 251
- Concept stage, 231, 241
 - exiting*, 233
 - product roadmap*, 232–233, 244–245
 - vision statement*, 231–232, 241–242
- Construct and Deliver stage, 233–234, 247–249, 250
 - collect and decompose requirements*, 245–247
 - create release plan*, 247
 - delivery of release 1*, 250
 - exiting*, 237
 - Planning performance domain*, 234–236
 - Project Work and Delivery performance domains*, 236–237
 - release plan*, 249
- Crystal, 279

DSDM (Dynamic Systems Development Method), 278
 constraint-driven delivery, 278–279
 principles, 278

FDD (Feature-Driven Development), 277
 advantages, 278
 project life cycle, 277–278

frameworks, 10

Kanban, 272
 limiting work in progress, 273
 versus Scrum, 274
 suitability for an organization, 272
 workflow focus, 273

Lean, 262, 263
 eliminating waste, 263
 features, 262
 value streaming, 264–267

progress tracking, 318–321

project management, 41

requirements, 222

risk and risk management, 317

SAFe® (Scaled Agile Framework), 282–283

Scrum of Scrums, 284, 287–288

ScrumBan, 274

software development, 110–111

stages, 229–231

team culture, 225–227

team/s, 221

uncertainty factors, 220

value/s, 194
 customer collaboration over contract negotiation, 224
 individuals and interactions over processes and tools, 223
 responding to change, 224
 working software over comprehensive documentation, 223–224

when to use, 217–221

work groups, 238

XP (Extreme Programming), 275
 core practices, 275–276
 roles, 275
 takeaways, 276–277

adjournment, team, 80

affinity diagram, 203, 451

agenda, meeting, 81

agile, 451. See also Kanban; SAFe® (Scaled Agile Framework); Scrum

Disciplined, 284–286, 454

flow-based, 267–268, 456

iteration-based, 267

KPIs (key performance indicators), 301–304

life cycle, 238–239

project scaling competencies, 280–282

Scrum, 268
 events and artifacts, 269–270
 versus Kanban, 274
 roles, 268–269
 of Scrums, 284
 sprint, 267

ScrumBan, 274

Agile Manifesto, 222–223, 257

Agile Practice Guide, 219

agriculture, project management, 34–35

alignment model, 360, 451

ambiguity, 313

analogous estimation, 149, 451

analysis

business. *See* business analysis

cost-benefit, 362

document, 359, 371–372, 455

earned value, 165–166
 gap, 361
 impact, 403, 457
 job, 341
 Pareto, 198–199
 persona, 341
 requirements, 377
 stakeholder, 54–55, 341–342
applications, CAPM exam, 12
appraisal costs, 195, 451
approval, 402–403
ART (Agile Release Team), 280, 451
artifact, 128, 269–270, 425–426, 451.
See also documentation
aspire phase, life cycle, 98
assessment
 matrix, 183–184
 needs, 354–355
assemble the business case, 364–365
assess current state and determine future state, 359–361
determine viable options and recommend solution, 361–362
drafting a situation statement, 358–359
facilitate product roadmap development, 363–364
identify problem or opportunity, 358
reasons for performing, 355
seek approval from stakeholders, 359
support charter development, 365
tasks, 356–357
when they occur, 355–356
who is involved, 356
 performance, 407–408

assumption, 37, 39–40, 451
 attitude, stakeholder, 54. *See also*
 mindset
 authority, project manager, 73–74

B

backlog, 452
 prioritization, 298–299
 product, 235, 269, 299
 sprint, 299
 task, 250
backward pass, 154–155
baseline, 137
 requirements, 403
 scope, 162
behavior-driven development, 407
belief, stakeholder, 54
benchmarking, 358, 362, 452
bid
 conference, 181, 452
 submission, 180–181, 452
 walk-through, 181, 452
brainstorming, 371
budget, limit, 38
building, team, 66, 242–244
burndown chart, 301–304, 321, 452, 464
burnup chart, 304, 452
business acumen, 61–63
business analysis, 10–11, 41, 350–351, 452. *See also model/s; requirement/s*
 cadence, 347
 feasibility study results, 362
 importance of, 328–329
 life cycle phase, 98
 models, 377–380
data, 391–395
interface, 396–398

- process*, 384–390, 445–446
 - rule*, 390–393
 - scope*, 380–384, 444–445
 - needs assessment, 354–355
 - assemble the business case*, 364–365
 - assess current state and determine future state*, 359–361
 - conduct and confirm elicitation results*, 340
 - determine viable options and recommend solution*, 361–362
 - drafting a situation statement*, 358–359
 - examine enterprise organization*, 340
 - facilitate product roadmap development*, 363–364
 - identify problem or opportunity*, 358
 - reasons for performing*, 355
 - seek approval from stakeholders*, 359
 - support charter development*, 365
 - tasks*, 356–357
 - when they occur*, 355–356
 - who is involved*, 356
 - planning, 342, 366–368
 - project approaches, 343
 - adaptive*, 344–347
 - predictive*, 343–344
 - versus project management, 328, 331–332, 365–366
 - requirement types, 332–333
 - requirements analysis, 377
 - requirements elicitation, 368–371
 - brainstorming*, 371
 - considerations for adaptive and predictive approaches*, 374–375
 - document analysis*, 371–372
 - focus groups*, 372
 - interviews*, 372
 - observation*, 372–373
 - prototyping*, 373–374
 - results*, 377
 - surveys*, 373
 - telemedicine app*, 375–376
 - workshops*, 372
 - role of the business analyst, 329–330
 - situation statement, 340
 - skills, 330–331
 - solution evaluation, 405–406, 409
 - determine approach*, 407–408
 - evaluate acceptance results and address defects*, 409–410
 - evaluate deployed solution*, 410
 - identify who will conduct*, 409
 - obtain solution acceptance for release*, 410
 - performance evaluation*, 406–407
 - performance measurement*, 407–408
 - stakeholder/s, 338
 - identifying*, 338–340
 - register*, 340
 - traceability and monitoring, 398–399, 404–405
 - monitor requirements*, 401–402
 - trace requirements*, 399–401
 - update requirements and communicate requirements status*, 402–403
- Business Analysis for Practitioners: A Practical Guide*, 367, 400

C

- cadence, 110, 111, 113, 227, 347, 454**
- CAPM (Certified Associate in Project Management)®**
- eligibility, 11–12
 - exam, 3–4, 10–11. *See also* final preparation
 - applications, 12*
 - domain/task breakdown, 4–8*
 - mapping exam content outline to chapters in this book, 8–9*
 - preparation, 13*
 - scheduling, 12–13*
 - scope and key concepts, 422–423*
 - updates, 442–443*
- cause-and-effect diagram, 197–198**
- CFD (cumulative flow diagram), 308–310**
- challenges**
- project management, 36–37
 - assumptions, 37*
 - constraints, 37–38*
 - issues, 37*
 - risk, 37*
 - Scrum, 272
- change and change management, 41**
- approval, 402–403
 - control board, 76
 - cost of, 196–197
 - ease of, 113
 - requests, 160–162
 - requirements, 403–404
 - responding to, 224
- chart**
- burndown, 301–304, 321, 452, 464
 - burnup, 304, 452
 - control, 199–200, 202, 307, 453
 - CL (centerline), 200*
 - rules, 201–202*
 - UCL (upper control limit), 200*
 - Gantt, 138, 156, 458
 - Pareto, 199, 459
- charter, 454**
- development, 365
 - life cycle phase, 98
 - project, 35, 134–136
- CL (centerline), 200**
- claims management, 181–182, 452**
- closing, 36**
- processes, 453
 - projects, 163–165, 237, 251
- code of ethics, PMI (Project Management Institute), 86–88**
- coding, 109**
- collaboration**
- co-location, 133
 - customer, 224
- collective code ownership, 277**
- co-location, 133, 453**
- communication/s**
- barrier, 186, 453
 - blocker, 186, 453
 - channel, 186–187, 453
 - filter, 186, 453
 - management plan, 138, 188–189, 453
 - methods, 187–188
 - model, 185–186, 453
 - stakeholder, 55
 - verbal, 55*
 - written, 55*
 - team, 76
- complexity, 182, 313**
- compression, schedule, 168–169**

- Concept stage, 231, 241**
 - exiting, 233
 - product roadmap, 232–233, 244–245
 - stakeholders performance domain, 233*
 - team performance domain, 233*
 - vision statement, 231–232, 241–242
- conduct procurements, 182**
- conflict management, 69–70**
- constraint/s, 34, 37–38, 221, 453**
 - driven delivery, 278–279
 - event planning, 39–40
- Construct and Deliver stage, 233–234, 245, 247–249, 250**
 - collect and decompose requirements, 245–247
 - create release plan, 247, 249
 - delivery of release 1, 250
 - exiting, 237
 - Planning performance domain, 234–236
 - Project Work and Delivery performance domains, 236–237
- construction industry**
 - predictive development approach, 107–108
 - WBS (work breakdown structure), 164–165
- consulting, 24**
- context diagram, 444**
- continuous integration, 277**
- contract**
 - fixed-price, 456
 - procurement, 178, 460
 - cost-plus, 179*
 - fixed-price, 179*
 - time and materials, 179–180*
 - solicitation document, 180, 181
 - RFI (request for information), 180*
 - RFP (request for proposal), 180*
 - RFQ (request for quotation), 180–181*
 - SOW (statement of work), 178
- control account, 143**
- control chart, 199–200, 202, 307, 453**
 - CL (centerline), 200
 - rules, 201–202
 - UCL (upper control limit), 200
- control procurements process, 181–182**
- core values, Scrum, 270–271**
- cost/s, 163**
 - actual, 166, 451
 - appraisal, 195, 451
 - benefit analysis, 362
 - external failure, 196, 456
 - internal failure, 195–196
 - management plan, 138, 453
 - performance index, 166–167, 453
 - plus contract, 179, 453
 - prevention, 195, 460
 - of quality, 195–196, 453
 - variance, 166, 453
- COVID-19 pandemic, 26**
- CPI (cost performance index), 166–167**
- crashing, 168, 453**
- creating**
 - project management plan
 - activities, 144–149*
 - collect requirements and define scope statement, 139–141*
 - WBS (work breakdown structure), 141–144*
 - value, 26–28, 454
- critical path, 151, 454**
 - backward pass, 154–155
 - float, 155–156
 - forward pass, 152–153
- Crystal, 279, 454**

culture

- adaptive team, 225–227
- continuous learning, 282
- organization, 114
- team, 77, 84–85

cumulative flow diagram, 454**current state, 359, 454****customer, 246**

- collaboration, 224
- valued prioritization, 296

CV (cost variance), 166**cycle time, 306–308, 454****D****DA (Disciplined Agile®), 284–286, 454****daily scrum, 270, 455****DAR (display-action-response) model, 396–397****dashboard, 310, 454****data**

- collection, 359
- dictionary, 395
- flow diagram, 395
- model
 - data dictionary, 447*
 - data flow diagram, 447*
 - ERD (entity relationship diagram), 393–395*
 - state table, 447*

decision table, 446**decision tree, 392, 446****decision-making, 69**

- criteria for choosing development approach, 217–221
- KPIs (key performance indicators), 301
- real options, 362
- team, 69
- value-based, 193–194

defects, 196–197

- addressing, 409–410
- software, 200–202

definition

- of done, 236, 270, 303, 388, 454
- of ready, 388

deliverables and delivery, 51, 104, 115–116, 250, 454. See also agile; Construct and Deliver stage

- cadence, 110, 113, 227, 454
- innovation, 113
- intermediary, 116
- measurement, 116
- value, 193–194, 425
- value-driven, 227

dependency, 112

- activity, 146
- discretionary, 169, 454
- external, 169, 456
- finish-to-finish, 147
- finish-to-start, 147
- internal, 169
- mandatory, 169, 459
- start-to-finish, 147
- start-to-start, 147
- team, 77

developers, 268–269**development approach, 9, 51, 92, 103–104, 107, 454. See also adaptive development approach; hybrid development approach; predictive development approach**

- adaptive, 10, 105–106, 110, 451
 - business analysis, 344–347*
 - requirements, 222*
 - software development, 110–111*
 - team culture, 225–227*
- hybrid, 104–105, 106, 111–112
- incremental, 234–235

- iterative, 234–235
 - predictive, 3–4, 9–10, 105
 - business analysis*, 343–344
 - construction industry*, 107–108
 - life cycle*, 107–109
 - selecting*, 127
 - software development*, 108–109
 - tailoring*, 132–134
 - selecting, 112–114, 217–221
 - organizational consideration*, 114
 - project considerations*, 114
 - tailoring, 130, 131
 - DevOps**, 283, 286
 - diagram**
 - activity network, 151, 451
 - affinity, 203, 451
 - cause-and-effect, 197–198
 - context, 444
 - cumulative flow, 308–310, 454
 - data flow, 447
 - entity relationship, 393–395, 446–447
 - flowchart, 203
 - Ishikawa, 198, 456
 - RACI, 83–84
 - scatter, 203
 - state, 447
 - use case, 383–384, 385–386, 445
 - Direct and Manage Project Work**, 157–159
 - discretionary dependency**, 169, 454
 - display-action-response model**, 448
 - DITL (day-in-the-life) testing**, 410
 - diverge/converge pattern**, 69
 - document analysis**, 371–372, 455
 - documentation**, 223–224. *See also*
 - contract; management plan**
 - business case, 194
 - project charter, 134–136
 - project management plan, 137–139
 - requirements, 337
 - solution requirements, 398
 - vision statement, 231–232
 - domain**, 9. *See also* **performance**
 - business analysis. *See* **business analysis**
 - knowledge, 61–62
 - dot voting scheme**, 297
 - drafting a situation statement**, 358–359
 - Drexler and Sibbet model**, 80
 - DSDM (Dynamic Systems Development Method)**, 278, 455
 - constraint-driven delivery, 278–279
 - principles, 278
 - duration**, 150–151, 455
- ## E
-
- EAC (estimate at completion)**, 167, 203, 455
 - ECO (Exam Content Outline)**, 3
 - EEF (enterprise environmental factors)**, 228, 455
 - external environment, 228–229
 - internal environment, 228
 - efficiency**, 29, 32, 265, 266
 - effort**, 150, 455
 - EI (emotional intelligence)**, 67–68, 455
 - elapsed time**, 150–151, 455
 - elevator statement**, 232
 - elicitation techniques**, 362, 371
 - brainstorming, 371
 - choosing, 374
 - considerations for adaptive and predictive approaches, 374–375
 - document analysis, 371–372
 - focus groups, 372
 - interviews, 372
 - observation, 372–373

- prototyping, 373–374
- surveys, 373
- workshops, 372
- eligibility, CAPM exam, 11–12
- empiricism, 270
- endeavor, 21, 23, 57
- engagement
 - assessment matrix, 183–184
 - stakeholder, 182–183
 - tailoring, 421, 455
- enterprise solution, 281
- epic, 234, 387, 455
- ERD (entity relationship diagram), 393–395, 446–447
- estimation. *See also* forecasting
 - absolute, 235, 451
 - analogous, 149, 451
 - parametric, 149
 - relative, 235, 463
 - resource, 149–151
 - story points, 305–306
 - three-point, 149–150
 - time, 149–151
- ETC (estimate to complete), 167, 203, 455
- ethics, project management, 87–88
- EV (earned value), 166, 456
- evaluation, 405, 455
- evaporation, 30–31
- event/s
 - management, 40–41
 - planning, 39–40
 - Scrum, 269–270
- EVM (earned value management), 162, 165–166, 203–207
- evolutionary prototype, 373
- execution, 36
 - phase, 157
 - process, 129, 455

- expectations, stakeholder, 54
- experimentation, 314
- expertise, 62, 243
- external dependency, 169, 456
- external environment factors, 228–229
- external failure costs, 196, 456
- extrinsic motivation, 64, 456

F

- fast prototyping, 314
- fast tracking, 168, 456
- FDD (Feature-Driven Development), 277, 456
 - advantages, 278
 - project life cycle, 277–278
- feasibility study results, 362
- feature/s, 234, 236. *See also* FDD (Feature-Driven Development)
 - injection, 362
 - Lean, 262
 - mind map, 382–383
 - model, 360, 363, 445, 456
 - MVP (minimum viable product), 234–235
 - product, 232, 233, 249–250
- Fibonacci series, 247
- final preparation, 422
 - scope and key concepts, 422–423
 - artifacts, methods, and models*, 425–426
 - principles of project management*, 423–425
 - process groups and processes*, 426–427
 - project performance domains*, 425
 - value delivery*, 425
 - suggest plan for final review and study, 427–428

- final project costs, forecasting
 - EAC (estimate at completion), 167
 - ETC (estimate to complete), 167
 - final report, 163–164
 - finish-to-finish dependency, 147
 - finish-to-start dependency, 147
 - fishbone diagram, 456
 - fishbowl window, 318
 - float, 155–156
 - flow-based agile, 267–268, 456
 - flowchart, 203
 - focus groups, 372
 - forecasting
 - EVM (earned value management), 203–207
 - final project costs
 - EAC (*estimate at completion*), 167
 - ETC (*estimate to complete*), 167
 - iterations needed, 306
 - formal communication, 55
 - forward pass, 152–153
 - FP (fixed-price) contract, 179, 456
 - framework/s
 - adaptive, 10
 - agile, 451
 - Disciplined*, 284–286
 - flow-based*, 267–268
 - iteration-based*, 267
 - Scrum*, 268–272
 - Crystal, 279
 - DSDM (Dynamic Systems Development Method), 278
 - constraint-driven delivery*, 278–279
 - principles*, 278
 - FDD (Feature-Driven Development), 277
 - advantages*, 278
 - project life cycle*, 277–278
 - Kanban, 272
 - limiting work in progress*, 273
 - suitability for an organization*, 272
 - workflow focus*, 273
 - Lean, 262, 263
 - eliminating waste*, 263
 - features*, 262
 - value streaming*, 264–267
 - SAFe® (Scaled Agile Framework), 282–283
 - Scrum of Scrums, 284, 287–288
 - ScrumBan, 274
 - XP (Extreme Programming), 275
 - core practices*, 275–276
 - roles*, 275
 - takeaways*, 276–277
 - free float, 155
 - functional manager, 57, 72
 - functional project organization, 70–71, 456
 - functional requirements, 335, 456
 - funding, 114
 - future state, 343, 359, 456
- ## G
-
- Gantt chart, 138, 156, 458
 - gap analysis, 360, 361, 457
 - generalizing specialist, 243
- ## H
-
- Herzberg’s two-factor theory, 66–67, 457
 - high-fidelity prototype, 373
 - high-performing teams, 78, 226–227
 - hybrid development approach, 104–105, 106, 111, 457
 - small restaurant business, 111–112

specification for tax software, 253
virtual restaurant business, 252
website delivery, 251–252

I

identifying, stakeholders, 52–53,
338–340

impact

analysis, 403, 457
stakeholder, 54

impediments list, 318–319, 457

incremental development, 234–235, 457

incremental life cycle, 110

influence, stakeholder, 55

informal communication, 55

information radiator, 310, 457

initiation, process, 36, 128–129

innovation, 113

inspection, 33, 197, 409

integrity, 85

intelligence, emotional, 67–68

interest, stakeholder, 55

interface model

display-action-response, 448
report table, 397–398
state table, 447
system interface table, 448
user interface flow, 397, 448
wireframe, 396–397, 448

intermediary deliverables, 116

internal dependency, 169, 457

internal environment factors, 228

internal failure costs, 195–196, 457

interpersonal skills, 63–64

interview, 372, 457

intrinsic motivation, 64–65, 457

INVEST (independent, negotiable, valuable, estimable, small, testable), 387

IRR (internal rate of return), 362

Ishikawa diagram, 198, 456

issue/s, 37, 38, 457

management, 159–160

resolving, 294

IT (information technology), 24

iteration, 457–458

-based agile, 267

planning, 236–237

review, 236

iterative

development, 234–235

life cycle, 110

ITTO (inputs, outputs, tools, and techniques), 128

J

job

analysis, 341

satisfaction, 66–67

security, 66

K

Kanban, 267, 458

board, 310

limiting work in progress, 273

versus Scrum, 274

suitability for an organization, 272

workflow focus, 273

Kano model, 298, 360, 458

Knight, H. F., *Risk, Uncertainty, and Profit*, 315

knowledge

area, 461

business analysis, requirements,
330–331

domain, 61–62

known-unknowns, 315
 KPA (key process area), 286
 KPI (key performance indicator),
 300–301, 458. *See also* metric
 burndown chart, 301–304, 321
 burnup chart, 304
 CFD (cumulative flow diagram),
 308–310
 dashboard, 310
 decision-making, 301
 information radiator, 310
 progress tracking, 301

L

lagging indicator, 300, 458
 land claim, 52
 lead time, 306–307, 458
 leadership, 282
 interpersonal skills, 63–64
 servant, 224–225, 465
 skills, 64
 team building, 66
 leading indicator, 300
 Lean, 262, 263, 458
 eliminating waste, 263
 features, 262
 value streaming, 264–267
 lessons learned, 163
 life cycle, 9, 22, 51, 92, 107. *See also*
 development approach
 adaptive, 110
 agile, 238–239
 FDD project, 277–278
 incremental, 110
 iterative, 110
 phase, 98–99
 predictive, 107–109, 130
 product, 103

project, 97–98
 progressive elaboration, 99–100
 stage gate, 99–100
 tailoring, 131
 low-fidelity prototype, 373

M

management
 conflict, 69–70
 issues, 159–160
 matrix, 73
 review, 197
 self-, 68
 skills, 64
 management plan
 change, 403
 communications, 188–189, 453
 cost, 453
 procurement, 460
 project, 137–139
 activities, 144–149
 communications, 461
 critical path, 151–156
 requirements and scope, 139–141
 time and resource estimation,
 149–151
 WBS (*work breakdown*
 structure), 141–144
 requirements, 337
 resource, 463
 risk, 464
 mandatory dependency, 169, 459
 manufacturing, 23
 maple syrup production, 28–35
 evaporation, 30–31
 RO (reverse osmosis) filtering, 28–29
 tapping, 34

- Maslow's hierarchy of needs, 65–66, 458**
- matrix**
 - assessment, 183–184
 - organization, 72–73
 - project organization structure, 458
 - RACI, 341–342
 - responsibility assignment, 83–84
 - solution capability, 360
 - traceability, 400, 401–402, 466
- measurement, 10**
 - deliverable, 116
 - KPI. *See* KPI (key performance indicator)
 - metric, 300
 - performance domain, 295
 - progress tracking, 301
 - solution performance, 408
- meeting/s**
 - agenda, 81
 - bid conference, 181, 452
 - conducting, 80
 - managing distractions, 82–83
 - minutes, 82
 - planning, 80, 81–82
 - remote pairing, 318
 - tips for effective, 83
 - types, 81
- merge activity, 153**
- metric, 27, 300, 459**
 - throughput, 306
 - velocity, 304–306
- milestone, 116–118, 139, 459**
- mindset**
 - adaptive, 222–223, 451
 - customer collaboration over contract negotiation, 224*
 - individuals and interactions over processes and tools, 223*
 - responding to change, 224*
 - working software over comprehensive documentation, 223–224*
- agile, 238
- minutes, meeting, 82**
- MMF (minimum marketable features), 389**
- model/s, 425–426, 459**
 - alignment, 360, 451
 - business analysis, 377–380
 - communication, 185–186, 453
 - DAR (display-action-response), 396–397
 - data
 - data dictionary, 447*
 - data flow diagram, 447*
 - ERD (entity relationship diagram), 393–395, 446–447*
 - state diagram, 447*
 - state table, 447*
 - feature, 360, 363, 456
 - interface
 - display-action-response, 448*
 - report table, 397–398, 447*
 - system interface table, 448*
 - user interface flow, 397, 448*
 - wireframe, 396–397, 448*
- Kano, 298, 360
- process
 - process flow, 384–385*
 - use case diagram depicting process flow, 385–386*
- rule
 - business rules catalog, 391, 446*
 - decision table, 392–393, 446*
 - decision tree, 392, 446*
- scope, 380–381

feature mind map, 382–383
use case diagram, 383–384
monitoring and controlling, 34, 36, 459
 processes, 129
 project
 cost and schedule, 162–163
 work, 159
 requirements, 401–402
Monopoly money scheme, 298
MoSCoW prioritization scheme, 296–297
motivation
 extrinsic, 64, 456
 Herzberg’s two-factor theory, 66–67
 intrinsic, 64–65, 457
 Maslow’s hierarchy of needs, 65–66
multivoting scheme, 297
MVP (minimum viable product), 234–235, 389, 459

N

needs
 assessment, 354–355
 assemble the business case, 364–365
 assess current state and determine future state, 359–361
 determine viable options and recommend solution, 361–362
 drafting a situation statement, 358–359
 facilitate product roadmap development, 363–364
 identify problem or opportunity, 358
 reasons for performing, 355

seek approval from stakeholders, 359
 support charter development, 365
 tasks, 356–357
 when they occur, 355–356
 who is involved, 356

Maslow’s hierarchy of, 65–66

nonfunctional requirements, 336, 459

norming, 79

NPV (net present value), 362

O

observation, 359, 372–373, 459

OPA (organizational process assets), 228, 459

operations, 27, 459

 manager, 57

 maple syrup production, 28–35

 project-based, 24–25

 versus projects, 23–24

 role of projects in, 24

opportunity, 191–192, 315, 316

 identifying, 358

 situation statement, 358–359

organization

 culture, 114

 development approach, selecting, 114

 PMO (project management office), 74–75

 project, 70

functional, 70–71

matrix, 72–73

projectized, 73, 462

 steering committee, 75–76

outcomes

 stakeholder performance domain, 56

 team performance domain, 78, 86

P

- pair programming, 277
- parametric estimation, 149, 462
- Pareto analysis, 198–199
- pattern, diverge/converge, 69
- PBP (payback period), 362
- peer review, 409
- performance, 9, 10
 - domain, 132, 438. *See also* deliverables and delivery; development approach; life cycle; planning; project/s; stakeholder/s; team/s; uncertainty
 - Close Project or Phase*, 163–165
 - Create Project Plan*, 137–139
 - Develop Project Team*, 136
 - Direct and Manage Project Work*, 157–159
 - measurement*, 295
 - Monitor and Control Project Work*, 159
 - Planning*, 167–169, 234–236
 - Project Delivery*, 192–193
 - Project Work*, 177–178
 - Uncertainty*, 311–312
 - KPI, 300–301
 - solution, 406–407, 408
 - team, 76–77
- persona analysis, 341
- PERT (program evaluation and review technique), 149–150
- phase/s. *See also* stage
 - closing, 163–165
 - execution, 157
 - life cycle, 98–99
 - predictive development approach, 107
 - project, 98
 - software development, 108–109
- planning, 36, 51, 167–168, 460
 - business analysis, 342, 366–368
 - event, 39
 - assumptions and constraints*, 39–40
 - iteration, 236–237
 - meeting, 80, 81–82
 - processes, 129
- PMBOK® Guide, 9, 98, 100
- PMI (Project Management Institute), 3
 - Agile Practice Guide*, 319
 - Code of Ethics and Professional Conduct, 86–88, 460
 - GPA (global practice analysis), 8
 - JTA (job task analysis), 8
 - The Standard for Project Management*, 3, 21, 22, 27, 228
 - Talent Triangle®, 9, 59, 460
 - Task Force on Project Management Curricula, 60
- PMIstandards+, 100
- PMO (project management office), 56, 74–75, 461
- portfolio, 25, 27, 280
- power
 - project manager, 73–74
 - skills, 63–67
 - stakeholder, 54
- predictive development approach, 3–4, 9–10, 105, 460
 - business analysis, 343–344
 - choosing, 127
 - construction industry, 107–108
 - life cycle, 107–109
 - process groups, 128
 - project value, 194
 - software development, 108–109
 - tailoring, 130, 131, 132–134
 - uncertainty factors, 220

- press release vision statement, 232
- prevention, costs, 195, 460
- principles
 - Agile Manifesto, 257–258
 - DA (Disciplined Agile®), 285
 - project management, 22, 42, 423–425, 438–440
 - value-driven, 227
- prioritization, 295
 - customer-valued, 296
 - dot voting, 297
 - Kano model, 298
 - Monopoly money scheme, 298
 - MoSCoW, 296–297
 - multivoting, 297
 - owners, 300
 - product backlog, 299
 - simple scheme, 296
 - stack scheme, 297
- problem solving, 294
- procedures, 76
 - Process Groups: A Practical Guide*, 128
- process/es, 460
 - blade, 286
 - closing, 129
 - cycle efficiency, 265, 266
 - executing, 129
 - flow, 360, 384–385
 - groups, 35–36, 128, 129, 426–427
 - versus project life cycle*, 100–102
 - project management*, 35–36
 - initiating, 128–129
 - model, 445
 - process flow*, 445
 - use case*, 385–386, 445–446
 - monitoring and controlling, 129
 - needs assessment, 357
 - planning, 129
 - risk management, 35
 - tailoring, 420
- procurement, 178, 460
 - bid conference, 181
 - conduct, 182
 - contract, 178
 - cost-plus*, 179
 - fixed-price*, 179
 - SOW (statement of work)*, 178
 - time and materials*, 179–180
 - control, 181–182, 453
 - management plan, 138
 - solicitation document, 180, 181
 - RFI (request for information)*, 180
 - RFP (request for proposal)*, 180
 - RFQ (request for quotation)*, 180–181
- product/s, 27, 460
 - backlog, 235, 269, 299, 460
 - CT scanner, 421–422
 - defects, 196–197
 - feature, 249
 - features, 233, 249–250
 - life cycle, versus project life cycle, 103
 - minimum viable, 234–235, 389
 - owner, 223, 246, 269, 461
 - roadmap, 232–233, 244–245, 363–364, 461
 - stakeholders performance domain*, 233
 - team performance domain*, 233
 - vision board, 232
 - visioning, 363, 461
- profit, 103
- program, 25, 27, 461
 - increment, 280–281
 - portfolio, 25

- progress tracking, 301, 318–321
- progressive elaboration, 99–100, 404, 461
- project management, 3, 22, 461
 - adaptive, 41, 451
 - agriculture, 34–35
 - benefits, 26
 - versus business analysis, 328, 331–332, 365–366
 - business analysis, 41
 - challenges, 36–37
 - assumptions*, 37
 - constraints*, 37–38
 - issues*, 37
 - risk*, 37
 - definition, 22
 - event, 40–41
 - knowledge area, 461
 - principles, 22, 42, 423–425, 438–440
 - process groups, 35–36
 - program, 25
 - roles and responsibilities, 58
 - skills, 67–68
 - team, 77, 462
 - value, creating, 26–28
- Project Management Curriculum and Resources, 60**
- project manager, 22, 66–67, 462
 - organizational authority, 73–74
 - roles and responsibilities, 56–58
 - servant leadership, 224–225
 - skills, 57–59
 - business acumen*, 61–63
 - conflict management*, 69–70
 - decision-making*, 69
 - motivation*, 64–67
 - power*, 63–64
 - social*, 68
 - ways of working*, 60
- projectized organization, 73, 462
- project/s, 3, 9, 20–21, 51, 461
 - activity, 115
 - adaptive. *See also* adaptive development approach
 - closing*, 237
 - requirements*, 222
 - team structure*, 221
 - based operations, 24–25
 - baseline, 137
 - charter, 35, 134–136
 - closing, 163–165
 - communications, 184–185. *See also* communication/s
 - cost, 162–163
 - definition, 21
 - deliverables, 115–116
 - delivery, 461
 - integration, 57, 207, 461
 - achieving*, 209
 - components*, 208–209
 - lessons learned, 163
 - life cycle, 97–98, 461
 - phase*, 98–99
 - versus product life cycle*, 103
 - progressive elaboration*, 99–100
 - versus project management process groups*, 100–102
 - stage gate*, 99–100
 - management plan, 137–139
 - activities*, 144–149
 - critical path*, 151–156
 - requirements and scope*, 139–141
 - time and resource estimation*, 149–151
 - WBS (*work breakdown structure*), 141–144

milestone, 116–118, 139
 model, user story, 446
 versus operations, 23–24
 organization, 70
 functional, 70–71
 matrix, 72–73
 projectized, 73
 performance domain, 4–8, 50–51.
 See also deliverables and delivery;
 development approach; life cycle;
 planning; stakeholder/s; team/s;
 uncertainty
 phase, 98, 462
 portfolio, 25, 462
 program, 25
 requirements, 336–337
 risk, 315
 role in operations, 24
 scaling, 169
 schedule, 156–157, 162–163
 services-sector, 132
 stakeholder/s. *See* stakeholder/s
 tailoring, 130, 131, 132–134, 347,
 414–415, 417–420
 engagement, 421
 process, 420
 team, 77, 462
 culture, 84–85
 high-performing, 78, 226–227
 time, 150
 uncertainty, 313–315
 value, 193, 462
prototyping, 110–111, 373–374
pull, 55
purchase order, 179
push, 55
PV (planned value), 166, 460

Q

quality and quality management,
 194–195, 462
 cause-and-effect diagram, 197–198
 control chart, 199–202
 cost of, 195–196, 453
 defects, 196–197
 diagrams, 203
 inspection, 197
 management plan, 138, 462
 Pareto analysis, 198–199
 requirements, 336–337, 462
 Six Sigma, 203, 466
 walk-throughs, 197
questionnaire, 359, 462
questions, CAPM exam, 4

R

RACI
 diagram, 83–84, 464
 matrix, 341–342
**RAM (responsibility assignment
 matrix)**, 83–84, 463
ready, definition of, 388
real options, 362
reducing, uncertainty, 316
refactoring, 277
relative estimation, 235, 463
release
 obtain solution acceptance, 410
 plan, 234–235, 247, 249
 roadmap, 390
remote pairing, 318
report
 analyst, 246–247
 final, 163–164

status, 75

table, 397–398

report table, 447

requirement/s, 113, 332, 463

adaptive project, 222

analysis, 377

approval, 402–403

baseline, 403

business, 334, 452

collecting, 245–247

documentation, 337

elicitation, 368–371

brainstorming, 371

*considerations for adaptive
and predictive approaches,
374–375*

document analysis, 371–372

focus groups, 372

interviews, 372

observation, 372–373

prototyping, 373–374

results, 377

selecting the best method, 374

surveys, 373

telemedicine app, 375–376

workshops, 372

functional, 335, 456

management plan, 337

managing changes, 403–404

monitoring, 401–402

nonfunctional, 336

project, 336–337

project management plan, 139–141

quality, 336–337

safety, 114

solution, 335, 398

stakeholder, 335

toll collection, 333–334

trace, 399–401

traceability matrix, 140

transition, 336

types, 332–333

updating and communicating status,
402–403

validation, 409

resource/s, 34

estimating, 149–151

management plan, 138, 463

response

opportunity, 191–192

threat, 190–191

RFI (request for information), 180, 463

RFP (request for proposal), 180, 463

**RFQ (request for quotation), 180–181,
463**

**risk and risk management, 34, 35,
37, 113, 189–191, 315. *See also*
uncertainty**

in adaptive projects, 317–318

burndown chart, 321, 464

management plan, 138, 464

opportunities, 191–192

threats, 190–191, 316–317

tracking, 320

RO (reverse osmosis) filtering, 28–29

ROI (return on investment), 362

role/s

business analyst, 329–330

ECO (Exam Content Outline), 3

project manager, 56–58

Scrum, 268–269

XP (Extreme Programming), 275

rule/s

control chart, 201–202

models

business rules catalog, 391, 446

decision table, 392–393, 446

decision tree, 392, 446

S

- SAFe® (Scaled Agile Framework), 282–283, 465
- safety, requirements, 114
- scaling
 - agile projects, competencies, 280–282
 - choosing the best framework, 286–287
 - projects, 169
- scatter diagram, 203, 464
- schedule, 464
 - compression, 168–169
 - developing, 146–147, 148
 - project, 142–143, 156–157
 - variance, 166
- scheduling, CAPM exam, 12–13
- Schwaber, K., *Scrum Guide*, 268
- scope
 - baseline, 162, 464
 - creep, 139, 140, 272
 - management plan, 138
 - models, 380–381
 - feature mind map*, 382–383
 - use case diagram*, 383–384
 - project management plan, 139–141
 - stability, 113
- Scrum, 268, 464
 - burndown chart, 303
 - challenges, 272
 - core values, 270–271
 - daily, 455
 - events and artifacts, 269–270
 - versus Kanban, 274
 - master, 60, 269
 - roles, 268–269
 - of Scrums, 284, 287–288
 - timeboxing, 271
- ScrumBan, 274, 464
- security, job, 66
- selection, development approach, 112–114
 - organizational consideration, 114
 - predictive, 127
 - project considerations, 114
- self
 - awareness, 67–68
 - management, 68
- sequencing, activity, 148–149
- servant leadership, 224–225, 465
- services-sector project, 132
- set-based design, 314
- simple scheme, 296
- situation statement, 340, 358–359
- Six Sigma, 203, 466
- skill/s
 - agile project scaling, 280–282
 - business analysis, 330–331
 - EI (emotional intelligence), 67–68
 - generalizing specialist, 243
 - interpersonal, 63–64
 - leadership, 64
 - management, 64
 - project manager, 57–59
 - business acumen*, 61–63
 - conflict management*, 69–70
 - decision-making*, 69
 - motivation*, 64–67
 - power*, 63–64
 - ways of working*, 60
 - social, 68
 - team, 77
- SMART (specific, measurable, action oriented, realistic, time limited), 135, 300, 465
- SME (subject matter expert), 62

- social awareness, 68
- social skill, 68
- software development
 - adaptive development approach, 110–111
 - predictive development approach, 108–109
 - testing, 200–202
- solicitation document, 180, 181
 - RFI (request for information), 180
 - RFP (request for proposal), 180
 - RFQ (request for quotation), 180–181
- solution
 - capability matrix, 360
 - evaluation, 405–406
 - determine approach*, 407–408
 - identify who will conduct*, 409
 - performance evaluation*, 406–407
 - performance measurement*, 407–408
 - performance, 406–407
 - requirements, 335, 398
- SOW (statement of work), 178, 466
- sprint, 112, 267, 465. *See also* Scrum
 - backlog, 299
 - planning, 270
 - retrospective, 270
 - review, 270
- stack scheme, 297
- stage
 - adaptive project, 229–231
 - Close*, 237
 - Concept*, 231–233
 - Construct and Deliver*, 233–237
 - gate, 99–100, 465
- stakeholder/s, 27, 41, 52, 114
 - analysis, 54–55, 341–342, 465
 - business analysis and, 338
 - communication, 55
 - push*, 55
 - verbal*, 55
 - written*, 55
 - engagement, 182–183
 - assessment matrix*, 183–184
 - levels*, 183
 - identifying, 52–53, 338–340
 - land claim, 52
 - register, 340
 - requirements, 335
 - seeking approval, 359
 - types, 53–54
- Standard for Project Management, The*, 3, 21, 22, 27, 228. *See also* PMI (Project Management Institute)
- start
 - to-finish dependency, 147
 - to-start dependency, 147
- state diagram, 447
- state table, 447
- status report, 75
- steering committee, 75–76, 466
- storming, 79
- story mapping, 363, 389, 466
- story point, 235, 305–306, 466
- storyboarding, 374
- strategy, implementing, 62–63
- success, celebrating, 85
- supply chain, 27
- survey, 373, 462
- sustainability, 34
- Sutherland, J., *Scrum Guide*, 268
- system interface table, 448

T

- T&M (time and materials) contract**, 179–180, 466
- Taiichi, O.**, 263
- tailoring**, 130, 131, 132–134, 347, 414–415, 422, 467
- aspects of projects that can be tailored, 419–420
 - CT scanner products, 421–422
 - engagement, 421, 455
 - process, 420
- Talent Triangle®**, 59. *See also* skill/s tasks, 466
- CAPM exam, 4–8
 - needs assessment, 356–357
- team/s**, 50
- adaptive, culture, 225–227
 - adjourning, 80
 - building, 66, 242–244
 - culture, 77, 84–85, 462
 - decision-making, 69
 - development, 136, 246
 - forming, 79
 - high-performing, 78, 226–227
 - norming, 79
 - performance, 76–77
 - performing, 79
 - project management, 77
 - RAM (responsibility assignment matrix), 83–84
 - storming, 79
 - T-shaped, 221, 243
 - workspace, 318
- technology**, 41
- telemedicine app, requirements elicitation**, 375–376
- template**
- final report, 163–164
 - project charter, 135–136
- test-driven development**, 407, 466
- testing**, 109
- DITL (day-in-the-life), 410
 - software, 200–202
- theory**
- Herzerg’s two-factor, 66–67
 - Maslow’s hierarchy of needs, 65–66
- threat**, 190–191, 316–317, 466
- three-point estimation**, 149–150, 466
- throughput**, 306, 466
- throwaway prototype**, 373
- time**
- boxing, 227, 271, 466
 - cycle, 306–308, 454
 - elapsed, 150–151, 455
 - estimating, 149–151
 - lead, 306–307, 458
 - project, 150
 - work, 150, 455
- tools**
- quality management
 - cause-and-effect diagram*, 197–198
 - control chart*, 199–200
 - Pareto analysis*, 198–199
 - walk-throughs*, 197
 - state assessment, 359–360
- Toyota Production System**, 263
- traceability**, 399–402, 466
- tracking**
- progress, 301, 318–319
 - risk, 320
- transition requirements**, 336

transparency, 85
 T-shaped teams, 221, 243
 Tuckman, B., 79

U

UCL (upper control limit), 200
 uncertainty, 10, 51, 312, 467

- ambiguity, 313
- complexity, 313
- factors associated with adaptive and predictive approaches, 220
- opportunity, 315, 316
- project, 313–315
- reducing, 316
- threats, 316–317
- volatility, 313

 unilateral decision, 69
 use case diagram, 383–384, 385–386, 445
 user interface flow, 397, 448
 user story, 234, 246–247, 386–390, 467, 446

- assigning points, 247–249
- epic, 387
- story map, 389
- task backlog, 250

V

VAC (variance at completion), 203, 467
 validation, 409, 467
 value/s, 362

- adaptive
 - customer collaboration over contract negotiation, 224*
 - individuals and interactions over processes and tools, 223*

responding to change, 224
working software over comprehensive documentation, 223–224

core, 270–271
 creating, 26–28, 454
 delivery, 193–194, 425

- driven delivery, 227

 earned, 162, 165–166, 204–207, 456
 net present, 362
 planned, 166
 project, 193
 streaming, 264–267, 286, 467

variance

- at completion, 203, 467
- cost, 166, 453
- schedule, 166

velocity, 304–306, 467
 verbal communication, 55
 verification, 409
 vision statement, 231–232, 241–242
 volatility, 313
 voting, dot/multi, 297

W

walk-throughs, 197
 waste, eliminating, 263
 ways of working skills, 60
 WBS (work breakdown structure), 40, 137–138, 141–144, 467

- codes, 142
- construction industry, 164–165
- development process, 142
- work package, 141, 144

 WIP (work in progress), 262, 307, 467
 wireframe, 396–397, 448

work

groups, 238

milestone, 116–118

package, 141, 144–146, 467

in progress, 262, 273, 307

time, 150, 455

workshop, 372**written communication, 55****X-Y-Z**

XP (Extreme Programming),

275, 456

core practices, 275–276

roles, 275

takeaways, 276–277