Chapter 1

Introducing the Project

THE COMPTIA PROJECT+ EXAM TOPICS COVERED IN THIS CHAPTER INCLUDE:

- ✓ 1.0 Project Management Concepts
- ✓ 1.1 Explain the basic characteristics of a project and various methodologies and frameworks used in IT projects
  - Characteristics of a project
- ✓ 2.0 Project Life Cycle Phases
- ✓ 2.1 Explain the value of artifacts in the discovery/concept preparation phase for a project
  - Business case or business objective
  - Prequalified vendor
  - Predetermined client
  - Preexisting contracts
  - Financial concepts

Your decision to take the CompTIA Project+ exam is an important step in your career aspirations. Certification is important for project managers because many employers look for this certification in addition to real-life experience and formal education from job applicants. This book is designed to provide you with the necessary concepts to prepare for the Project+ exam. Some of the material here will be based on information documented in *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide)* published by the Project Management Institute (PMI®) along with the Agile Practice Guide®. This book will include tips on how to prepare for the exam, as well as examples and real-world scenarios to illustrate the concepts.

This chapter will cover the definitions and characteristics of a project, provide a high-level overview of project management, describe the difference between a program and a portfolio, and explain the Discovery phase, the first phase in the project management life cycle.

Defining the Project

Projects exist to bring about or fulfill the goals of the organization. Most projects benefit from the application of a set of processes and standards known as *project management*. Let's start with some fundamental questions.

- What makes a new assignment a project?
- How do you know if you are working on a project?
- What distinguishes a project from an operational activity?

Projects involve a team of people, and so do day-to-day business activities. They both involve following a process or a plan, and they both result in activities that help reach a goal. So, what is so different about a project? Let's explore all of these questions in the following sections.

Identifying the Project

A *project* is a temporary endeavor that has definite beginning and ending dates, and it results in a unique product, service, or result. A project is considered a success when the goals it sets out to accomplish are fulfilled and the stakeholders are satisfied with the results.

Projects also bring about a product, service, or result that never existed before. This may include creating tangible goods, implementing software, writing a book, planning and

executing an employee appreciation event, constructing a building, and more. There is no limit to what can be considered a project as long as it fits the following criteria:

Unique A project is typically undertaken to meet a specific business objective. It involves doing something new, which means that the end result should be a unique product or service. These products may be marketed to others, may be used internally, may provide support for ongoing operations, and so on.

Temporary Projects have definite start and end dates. The time it takes to complete the work of the project can vary in overall length from a few weeks to several years, but there is always a start date and an end date.

Reason or Purpose A project comes about to fulfill a purpose. This might include introducing a new product, fulfilling a business objective or strategic goal, satisfying a social need, and any number of other reasons. It's important to document and communicate the purpose and reasons for the project so that team members remain focused on achieving the goals of the project.

Stakeholder Satisfaction A project starts once it's been identified, the objectives have been outlined in the project charter, and appropriate stakeholders have approved the project plan. A project ends when those goals have been met to the satisfaction of the stakeholders.

Once you've identified the project, you'll validate it and then write the project charter and obtain approval for the charter. We'll talk in more detail about the project charter in Chapter 3, "Creating the Project Charter."

Programs and Portfolios

Projects are sometimes managed as part of a program or portfolio. A *program* is a group of related projects that are managed together using coordinated processes and techniques. The collective management of a group of projects can bring about benefits that wouldn't be achievable if the projects were managed separately. Each project within the program has a project manager. The project managers report to a program manager, who is responsible for all the projects within their program.

Portfolios are collections of programs, subportfolios, and projects that support strategic business goals or objectives. Unlike programs, portfolios may consist of projects that are not related.

Here's an example to help clarify the difference between programs and portfolios. Let's say your company is in the construction business. The organization has several business units: retail construction, single-family residential buildings, and multifamily residential buildings. Individually, each of the business units may comprise a program. For example, retail construction is a program because all the projects within this program exist to create new retail-oriented buildings. This is not the same as single-family home construction (a different program), which is not the same as multifamily residential construction (a different

program). Collectively, the programs and projects within all of these business units make up the portfolio. Other projects and programs may exist within this portfolio as well, such as parking structures, landscaping, and so on.

Programs and projects within a portfolio are not necessarily related to one another in a direct way. And projects may independently exist within the portfolio (in other words, the project isn't related to a program but belongs to the portfolio). However, the overall objective of any program or project in a portfolio is to meet the strategic objectives of the portfolio, which in turn should meet the strategic objectives of the business unit or corporation.

Understanding Operations

Operations are ongoing and repetitive. They don't have a beginning date or an ending date, unless you're starting a new operation or retiring an old one. Operations typically involve ongoing functions that support the production of goods or services. Projects, on the other hand, come about to meet a specific, unique result and then conclude.

It's important to understand that projects and operations go hand in hand in many cases. For example, perhaps you've been assigned to research and implement state-of-the art equipment for a shoe manufacturing plant. Once the implementation of the equipment is complete, the project is concluded. A handoff to the operations team occurs, and the everyday tasks the equipment and staff perform become an ongoing operation.

Don't be confused by the term *service* regarding the definition of a project. Providing janitorial services on a contract is operations; providing contract Java programmers for 18 months to work on an IT project is a project.

Let's look at the definition of two more terms. *Project management* brings together a set of tools and techniques—performed by people—to describe, organize, and monitor the work of project activities. *Project managers* (PMs) are the people responsible for applying these tools to the various project activities. Their primary purpose is to integrate all the components of the project and bring it to a successful conclusion. Managing a project involves many skills, including dealing with competing needs for your resources, obtaining adequate budget dollars, identifying risks, managing to the project requirements, interacting with stakeholders, staying on schedule, and ensuring a quality product.

I'll spend the remainder of this book describing the tools and techniques you'll use to accomplish the goals of the project, including the key concepts you'll need to know for the exam. Many of the standards surrounding these techniques are documented in the *PMBOK® Guide*.

Using the *PMBOK® Guide*

Project management standards are documented in *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide*), published by the Project Management Institute (PMI®). PMI® is the de facto standard in project management worldwide. It's a large organization with nearly 700,000 members from multiple countries around the globe.

In addition to publishing the *PMBOK® Guide*, PMI® manages two certification exams for individual project managers: the Certified Associate in Project Management (CAPM)® and the Project Management Professional (PMP)®. The *PMBOK® Guide* is the primary basis for the exam portion of the CAPM® and PMP® certifications.

CompTIA Project+ exam objectives borrow some concepts from the *PMBOK® Guide* and the *Agile Practice Guide*. Throughout this book, I'll reference these guides to explain well-known project management and agile practices.

The material you will study to prepare for the Project+ exam is an excellent foundation on which to build your project management knowledge. Once you've obtained your Project+ certification and gain some experience, you might decide to study and sit for the CAPM® or PMP® certification exams.

Project Life Cycle Phases

Project management is performed in a series of phases that are executed to apply knowledge, skills, tools, and techniques to the project activities to meet the project requirements. According to CompTIA, these processes have been organized into five phases: Discovery/Concept, Initiating, Planning, Executing, and Closing.

These phases are tightly linked. Outputs from one group usually become inputs to another group. The groups may overlap, or you may find that you have to repeat a set of processes within a phase. For example, as you begin executing the work of the project, you may find that changes need to be made to the project management plan. That means you may have to repeat some of the processes found in the Planning phase and then re-perform the Executing phase activities once the changes to the plan are made. This is known as an *iterative* approach.

These phases are the foundation of project management. You need to understand each phase, its characteristics, and how it contributes to delivering the final product, service, or result of the project.

I will reference a lot of new concepts in the phases described in this section. Rest assured I will cover each of these topics in more detail throughout the remainder of the book.

Discovery Phase

The *Discovery/Concept Preparation phase* is the first phase in in the project management life cycle. The purpose of this phase is to determine whether the project is worthwhile. This is where a business case is created. The *business case* is a written document or report that helps executive management and key stakeholders determine the benefits and rewards of the project. It documents the business need or justification for the project and will often include high-level details about estimated budgets and timelines for completing the project. We will talk more in depth about the business case later in this chapter.

The Discovery phase also examines several elements that could help speed up the execution of the project. These activities may include working with prequalified vendors, working with predetermined clients, taking advantage of preexisting contracts, and utilizing financial concepts.

Initiating Phase

Initiation is the formal authorization for a new project to begin or for an existing project to continue into the next phase.

The *Initiating* phase includes all the activities that lead up to the final authorization to begin the project. This process can be formal or informal, depending on the organization. The key activities in the Initiating phase according to the CompTIA Project+ objectives are as follows:

- Creating the preliminary scope statement
- Creating the project charter
- Identifying and assessing stakeholders
- Developing a responsibility assignment matrix (RAM)
- Establishing accepted communication channels
- Developing a records management plan
- Defining access requirements
- Reviewing existing artifacts
- Determining solution design
- Conducting the project kickoff

Make certain you understand the key activities of each of the project life cycle phases for the exam.

Planning Phase

In the *Planning* phase, the project goals, objectives, and deliverables are refined and broken down into manageable units of work. Project managers create time and cost estimates and determine resource requirements for each activity. Planning involves several other critical areas of project management, such as communication, risk, human resources, quality, and procurement.

Some of the key activities in the Planning process group are as follows:

- Develop a detailed project scope statement
- Develop a project schedule
- Determine budget considerations
- Develop a quality assurance plan
- Develop a communication plan
- Assess and assign project resources
- Perform an initial risk assessment
- Assess the resource pool and assign project resources
- Develop a project management plan
- Train project team members
- Define units of work
- Develop a transition plan/release plan

The Planning phase is unquestionably one of the most critical elements of managing a project. It's possible that a project manager will spend as much time planning the project as performing the work of the project (sometimes more).

The Planning phase contains many processes that all generally lead to the creation of plans or documents that are used throughout the project to ensure that goals of the project are being met. Table 1.1 shows many of the documents that CompTIA highlights in their objectives along with their purpose and the phase where they are typically produced. You will learn about each of the project management documents shown here, and more, throughout the remainder of the book.

TABLE 1.1 Project management documents

Document name	Document description	Phase
Business case	Justification for the project.	Discovery
Preliminary scope statement	Project objectives are defined; business problem the project will address is stated.	Initiating
Project charter	Authorizes the project to begin.	Initiating
Responsibility assignment matrix (RAM)	Defines stakeholder responsibilities. Incorporates the use of a RACI® chart.	Initiating
Communication plan	Documents the types of information needs the stakeholders have, when the information should be distributed, and how the information will be delivered.	Planning
Project schedule	Determines the start and finish dates for project activities and assigns resources to the activities.	Planning
Scope statement	Documents the product description, key deliverables, success and acceptance criteria, key performance indicators, exclusions, assumptions, and constraints.	Planning
Project management plan	Consists of all the project planning documents such as charter, scope statement, schedule, and more.	Planning
Issue log	A list of issues, containing list numbers, descriptions, and owners.	Executing
Change log	Describes change requests and their disposition for the project.	Executing
Risk register	A list of risks and their descriptions.	Executing
Status report	A report to stakeholders on the status of the project deliverables, schedule, risks, issues, and more.	Executing
Dashboard information	An electronic reporting tool that lets users choose elements of the project to monitor project health and status.	Executing
Meeting agenda/ meeting minutes	Meeting agendas describe the items to be discussed and addressed at upcoming meetings, and minutes recap what was discussed and the decisions made at the meeting.	Executing

Document name	Document description	Phase
Project closeout report	Reports on the final closeout of all phases of the project.	Closing

* RACI is a way to define responsibilities on the project and stands for responsible, accountable, consult, and inform.

All the documents in this table will be discussed throughout the remainder of this book.

The Executing Phase

The *Executing* phase is where the work of the project is performed and monitored for adherence to the project management plan. This includes coordinating all the project members and project resources assigned to the project, reporting on status, updating project documents, managing change, and more.

The key activities in the Executing process are as follows:

- Producing and verifying deliverables
- Implementing change management
- Managing vendors
- Tracking and reporting project results
- Updating project elements such as budget, risk, and timelines
- Managing conflict
- Monitoring the risks and issues log
- Performing quality assurance/governance activities such as coordinating phase gate reviews
- Monitoring the budget
- Conducting project meetings and updates

Deliverables are produced and verified during this process. If they do not conform to expectations, change requests are created or corrective actions are taken to ensure the deliverables adhere to specifications.

Resource management is important during the Executing processes. You'll build the project team during this process, make certain resources are utilized appropriately, and perform team building activities. This process also includes working with vendors and contractors who are external to the organization.

The Closing Phase

The primary purpose of the *Closing* phase is to validate deliverables and document the formal acceptance of the project work. Once that's complete, a handoff occurs whereby the completed product or result of the project is turned over to the organization for ongoing maintenance and support.

The Closing phase includes validating deliverables, signing off on the project, archiving project documents, handing off the product to the organization, releasing project team members, and reviewing lessons learned.

The key activities in the Closing process are as follows:

- Validating deliverables
- Closing contracts
- Removing access
- Releasing resources
- Holding the project closure meeting
- Writing the project closeout report
- Obtaining feedback and lesson learned
- Project sign-off
- Handing off the product to the organization
- Evaluating the project
- Archiving project documents
- Rewards and celebration

Closing is the phase that is most often skipped in project management. Although some of these activities may seem fairly straightforward, several elements of this process group deserve close attention, and we will cover them in Chapter 10, "Managing Quality and Closing Out the Project."

Performing the Discovery/Concept Preparation Phase

The Discovery/Concept Preparation phase is the first phase in the project management life cycle. This phase entails preparing a business case to determine the merits of the project. You'll also examine existing contracts, vendors, and clients to help prepare future project documents, and/or to kick-start the work of the project.

Before we dive into the business case specifics, let's cover some of the needs and demands that bring about projects.

How Projects Come About

Projects come about for many reasons. Some organizations exist to generate profits and may create projects specifically designed to meet this goal. Other organizations exist to provide services to others with no regard for profits. They may bring about projects to enhance their ability to meet the demand for their services. No matter what the reason for bringing about a project, most of them will fall into one of the seven needs or demands described next:

Market Demand The demands of the marketplace can drive the need for a project. For example, the pandemic of 2020-2021 changed the way consumers purchased goods. This in turn changed the way many organizations do business and brought about the need for changes to delivery logistics, new vehicles, new equipment, updated technology, and a host of other changes that each would qualify as a project.

Organizational Need Organizational needs often bring about projects that involve technology solutions. For example, your organization's accounting system may be outdated and its reporting functions too complicated for the average user. A request is made for a new system to help the organization become more efficient and give all users the ability to easily create reports.

Customer Request Customer requests can generate an endless supply of potential projects. For example, perhaps the discussions at a recent customer focus group brought about the idea for a new product offering.

Technological Advance Technology needs are sometimes a chicken-and-egg scenario. Is it the technology that drives the business to think it needs a new product or service, or does the business need drive the development of the new technology? Both scenarios exist, and both bring about the need for new projects. For example, your CEO reads an article on their recent flight about all the benefits of a new, modern customer relationship management platform. They decide they want this new platform that's capable of tracking all customer interactions, including monitoring social media posts about the organization, and thus a project is born.

Legal Requirement Local, state, and federal regulations change during every legislative session and may drive the need for a new project. For example, a city may pass an ordinance allowing photos of red-light violations at busy intersections. The new equipment must then be procured and installed. Federal regulations requiring the encryption and secure storage of private data may bring about the need for a project to fulfill these requirements.

Real World Scenario

Assessing the Impact of Regulations and Legal Requirements

Projects often have legislative, regulatory, or other third-party restrictions imposed upon their processes or project outputs. For example, suppose you are managing a project that will create a new technology system for a company managing stock portfolios. You can imagine that this company is heavily regulated by the Securities and Exchange Commission (SEC) and that your new system, in turn, will encounter several regulatory guidelines that you must follow. The security aspect of your new system is especially pertinent. You must be able to assure the SEC and your shareholders that the system is secure.

It's important that project managers recognize the need to investigate specific industry regulations and requirements and to communicate these requirements and their associated impacts on the project scope and project plan to the stakeholders. Here are a few examples of the many external considerations you need to account for when implementing a technology-based project:

Legal and Regulatory Conditions Know the statutes covering the type of activity your deliverable involves. For example, if you collect information about customers, make certain you are complying with privacy laws. Also, you may face government reporting and documentation requirements or public-disclosure rules.

Licensing Terms Understand when trademark, copyright, and intellectual property issues should be considered.

Industry Standards Industry standards exist in almost every aspect of business. Pharmaceutical companies, car manufacturers, food services, and so on all have industry standards that describe best practices for preparing, manufacturing, shipping, and any number of other elements of their business.

Considerations for industry standards in your organization must be accounted for in the project plan and budget.

Ecological Impacts Many organizations today are actively involved in mitigating the ecological impacts of their business. They may implement ecologically friendly equipment, adopt new processes, and follow mandates and guidelines designed to protect the environment. Each of these scenarios can bring about the need for a project.

Social Need Social needs or demands can bring about projects in a variety of ways. For example, a small developing country may have the need for safe, clean drinking water, so a project is initiated to purchase and install a filtering system. Another example may include bringing about a project to develop a vaccine for a new flu virus that's predicted to hit the nation.

The needs or demands that bring about a project are usually documented in the business case.

Creating the Business Case and Selecting Projects

Organizations have many reasons for bringing about a project. Most don't have the resources or time to execute every project that's requested. Typically, there is a formal process for requesting projects and that happens during the Discovery phase of a project life cycle. Validating a project is a two-step process. The first step in validating a project and in the Discovery phase is creating a business case explaining the justification for the project. The second step is analyzing the project stakeholders. Let's dive into the business case next.

Writing and Validating the Business Case

The purpose of the business case is to document the business need for the project and determine whether the investment in the project is worthwhile. It is a written document that describes the justification for the project, it includes financial analysis that will help determine the benefits and rewards of performing the project, and it will often include high-level details regarding estimated budgets and timelines for completing the project. Ideally, the project requestor should create the business case. They have a vested interest in implementing the project and can best articulate why the project is important to the organization. In reality, the project manager or business analyst might assist in creating this document. Once the business case is written, the first step in validating the project is complete. Let's take a look at the elements of the business case:

Description This section describes the project, including the business need or demand that's driving the project. This should include a list of high-level deliverables and desired outcomes. This section should also include the impacts to the organization if the project is not implemented.

Justification The justification section describes the benefits to the organization for undertaking the project. These may include tangible and intangible benefits. An example of a tangible benefit is increasing revenues or decreasing expenses. An intangible benefit could be a boost in the organization's reputation or social media standing.

Alignment to the Strategic Plan Alignment to the strategic plan describes how the project and its outcomes will align to the organization's overall strategic plan. If the reason for the project doesn't support the strategic plan, there's really no reason to undertake the project.

Stakeholders *Stakeholders* are anyone who has a vested interest in the project. Stakeholders can include individuals as well as organizations.

Analysis of the Problem or Opportunity This section describes the problem or opportunity the project presents. This section can also include a gap analysis describing how this problem or opportunity currently impacts the organization and how the project might bring about different results once it's implemented.

High-Level Risk Analysis Known risks and a description of the risks should be documented in the business case. As the project progresses, more risks will be identified and managed during the course of the project.

Alternative Solutions This should include a high-level description of costs, the feasibility of implementing each alternative, the expected results of each alternative solution, and a description of any impacts to the organization as a result of this solution. (Cost-benefit, payback, and other financial analyses are generally included in this section of the business case.) It's best to limit alternative analysis to the top two or three solutions. Otherwise, the alternatives can become watered down and it becomes difficult to distinguish significant differences among the solutions.

Recommended Solution This section details the recommended solution. This should include a summary of the analysis performed to determine the solution, a description of the high-level risks associated with the solution, a description of the constraints and assumptions, and a high-level plan documenting the major milestones, high-level timeline, and project dependencies. A brief description of the roles and responsibilities of key stakeholders should be noted here as well.

Feasibility Study Results A *feasibility study* is undertaken before the business case is written and may come about for several reasons. Feasibility studies can determine whether the project is doable and likely to succeed. They examine the viability of the product, service, or result of the project. They may also examine technical issues related to the project and determine whether it's feasible, reliable, and easily assimilated into the organization's existing infrastructure. Not all business cases will or should include a feasibility study. Feasibility studies are usually conducted when the proposed project is highly complex, has a high potential for risk, or is a new type of project the organization has never undertaken before. Feasibility studies may be conducted as separate projects or as a pre-project phase. It's best to treat this activity as a project when the outcome is uncertain.

Identifying and Analyzing Stakeholders

Stakeholders are anyone who has a vested interest in the project. Stakeholders can include individuals as well as organizations, and both the project sponsor and the project manager are considered stakeholders. The project sponsor is the executive in the organization who authorizes the project to begin and is someone who has the ability and authority to assign funds and resources to the project. Stakeholder roles should be identified and analyzed. This is step 2 in validating a project. We will discuss this more in depth in Chapter 3.

Determining Benefits and Rewards

Alternative solutions, as described in the previous section, should include an analysis of the benefits and rewards of the varying solutions. This is typically done using financial analysis.

These financial methods are also used in selecting among competing projects and determining which projects should move forward and which should be deferred.

Financial and Performance Analysis

Financial analysis is a means to compare the benefits obtained from project requests by evaluating them using the same criteria. There are several financial and performance methods that evaluate benefits and rewards that we will look at next.

Cost-Benefit Analysis

A *cost-benefit analysis* compares the cost to produce the product or service to the financial gain (or benefit) the organization stands to make as a result of executing the project. You should include development costs of the product or service, marketing costs, technology costs, and ongoing support, if applicable, when calculating total costs.

Let's say your proposed project involves developing and marketing a new product. The total costs are projected at $3 million. Based on market research, it appears the demand for this product will be high and that projected revenues will exceed the developing and marketing costs and continue to produce revenues into the future. In this case, the cost-benefit analysis is positive and is a strong indicator you should select this project provided the business case justifies it as well.

The cost-benefit model is a good choice if the project selection decision is based on how quickly the project investment will be recouped from either decreased expenses or increased revenue. The weakness of using a cost-benefit analysis is that it does not account for other important factors, such as strategic value. The project that pays for itself in the shortest time is not necessarily the project that is most critical to the organization.

Scoring Model

A *scoring model* has a predefined list of criteria against which each alternative solution or project is rated. Each criterion is given both a scoring range and a weighting factor. The weighting factor accounts for the difference in importance of the various criteria. Weights are determined by the organization. In the example shown in Table 1.2, I've used a range from 1 to 5, where 5 is the most important.

Scoring models can include financial data, as well as items such as market value, organizational expertise to complete the project, innovation, and fit with corporate culture. Scoring models have a combination of objective and subjective criteria. The final score for an individual project request is obtained by calculating the rating and weighting factor of each criterion. Some companies have a minimum standard for the scoring model. If this minimum standard is not obtained, the project will be eliminated from the selection process. A benefit of the scoring model is that you can place a heavier weight on a criterion that is of more importance. Using a high weighting factor for innovation may produce an outcome where a project with a two-year time frame to pay back the cost of the project may be selected over a project that will recoup all costs in six months. The weakness of a scoring model is that the ranking it produces is only as valuable as the criteria and weighting system the ranking is based on. Developing a good scoring model is a complex process that requires a lot of interdepartmental input at the executive level. Table 1.2 shows an example weighted scoring model to determine between alternative solution 1 and 2 presented in the business case.

TABLE 1.2 Weighted scoring model

Criteria	Weight	Alt 1 score	Alt 1 total	Alt 2 score	Alt 2 total
Profit potential	5	4	20	3	15
Decrease in time to produce	2	5	10	4	8
Marketability	3	5	15	4	12
Weighted score	-	-	45	-	35

Alternative 1 has the highest score and should become the recommended solution. This model can be used to choose among projects as well. Instead of alternatives, you would evaluate projects. The project with the highest score should be chosen to move forward.

Payback Period

The *payback period* is a cash flow technique that identifies the length of time it takes for the organization to recover all the costs of producing the project. It compares the initial investment to the expected cash inflows over the life of the project and determines how many time periods elapse before the project pays for itself. Payback period is the least precise of all the cash flow techniques discussed in this section.

You can also use payback period for projects that don't have expected cash inflows. For example, you might install a new call-handling system that generates efficiencies in your call center operations by allowing the call center to grow over the next few years without having to add staff. The cost avoidance of hiring additional staff can be used in place of the expected cash inflows to calculate payback period.

Let's look at an example. One alternative solution in the business case has an initial investment of $425,00. The project is expected to generate cash inflows of $175,000 in year 1 and $250,000 in year 2. Payback period is calculated this way:

$$\text{Initial investment} = \$425,000$$

$$\text{Cash inflows} = \$175,000 \text{ year 1}, \$250,000 \text{ year 2}$$

$$\$425,000\ (\text{initial investment}) - \$175,000\ (\text{year 1 inflows}) = \$250,000 \text{ remaining balance}$$

$$\$250,000\ (\text{year 1 remaining balance}) - \$250,000\ (\text{year 2 inflows}) = \$0$$

Payback in this example is reached in two years. You will generally have to do a few more calculations than I've shown here to determine payback. You may find that you need to divide the yearly inflows by 12 to calculate the number of months it will take for payback. You will compare this payback period to other alternatives or projects and generally choose the one with the shortest payback period.

Gustave Eiffel

The extraordinary engineer Gustave Eiffel put up the majority of the money required to build the Eiffel tower, nearly $2 million, himself. This was quite a sum in 1889, and his investment paid off. Tourism revenues exceeded the cost of constructing the tower in a little more than one year. That's a payback period any project manager would love to see. And Eiffel didn't stop there. He was wise enough to negotiate a contract for tourism revenues from the tower for the next 20 years.

Cash Flow Techniques

Cash flow techniques provide data on the overall financials of the alternative solutions or projects. Each of these techniques rely on the concept of the time value of money. Money received in the future is worth less than money received today, so the lender needs to account for this loss. For example, if I asked to borrow $5,000 from you today and promised to pay you back two years from now, you would likely expect me to pay interest in addition to the principal. The reason is that inflation will eat away at the value of the $5,000 over time and it won't have the buying power two years from today that it has now. You also don't have the use of the money during that time. The interest charge attempts to make up for the devaluing of the money over time and your inability to use the funds. This can have significant paybacks for an investor if the returns are high and/or the funds are invested over a long period of time.

If you charged me 5 percent interest to borrow the money, we can determine what the $5,000 is worth in today's dollars by using the future value formula:

$$FV = PV(1 + i)^n$$

This says that the future value equals the present value multiplied by 1 plus the interest rate raised to the power of the payback/investment period.

Let's plug in our numbers:

$$FV = 5{,}000(1.05)^2$$

$$FV = 5{,}000(1.1025)$$

$$FV = \$5512.50$$

The $5,000 I borrowed from you is worth $5,512.50 in today's dollars.

Entire books have been dedicated to financial evaluation, so here you'll get a brief overview of some of the common cash flow techniques: discounted cash flow, net present value, ROI, and internal rate of return.

Cost of Capital

The *cost of capital* can be used interchangeably with interest rates in any of these formulas. The cost of capital is the rate of return the organization might earn if they chose to invest in something other than the project. The alternative investment must have risk that is similar to that of the project.

Discounted Cash Flow

The *discounted cash flow* technique compares the value of the future worth of the project's expected cash flows to today's dollars, known as present value. Present value is the opposite of future value. In our example previously, you might ask, how much is $5,512.50 two years from now worth today using a 5 percent interest rate? The answer is $5,000. Here is the formula:

$$PV = FV / (1 + i)^n$$

This says present value equals the future value divided by 1 plus the cost of capital raised to the power of the investment period.

Table 1.3 shows an example of two projects with their expected inflows and the PV for each year. Sum the total of the years to come up with net present value (NPV) and then choose the one with the highest NPV.

TABLE 1.3 Discounted cash flow

Project A year	Inflows	PV	Project B year	Inflows	PV
1	25,000	26,250	1	30,000	31,500
2	55,000	60,638	2	35,000	38,588
3	40,000	46,304	3	52,000	60,195
Discounted cash flow		$133,192			$130,283

Typically, alternative solutions or projects with the highest discounted cash flows are chosen over those with lower discounted cash flows.

Net Present Value

Net present value (NPV) is a cash flow technique that takes into account the differences in the value of money over time by calculating the revenues or cash flows the organization expects to receive over the life of the project in today's dollars. You will use the PV formula to calculate each year of revenues as shown in Table 1.3 and compare them to other alternatives or projects. Each period's resulting sum in present-day dollars is added together, and that sum is then subtracted from the initial investment to come up with an overall value for the project. The rule for NPV is that if NPV is greater than 0, you should accept the project. If it's less than 0, you should reject the project.

Table 1.4 compares Project A to Project B. Project A's initial investment is $72,000. Project B's initial investment is $83,000. I'm using a 5 percent cost of capital and rounding up the PV results.

TABLE 1.4 Net present value

Project A year	Inflows	PV	Project B year	Inflows	PV
1	25,000	26,250	1	30,000	31,500
2	55,000	60,638	2	35,000	38,588
3	40,000	46,304	3	52,000	60,195
Total		$133,192			$130,283
Less investment		72,000			83,000
NPV		61,192			47,283

In this example, Project A should be chosen because it has the highest NPV.

The difference between NPV and discounted cash flows is that NPV subtracts the total cash flow in today's dollars from the initial project investment. Discounted cash flow totals the value of each period's expected cash flow to come up with a total value for the project in today's terms.

Return on Investment (ROI)

Return on investment (ROI) measures the profitability of an investment and is often used to compare one investment to another. It measures the expected returns of the investment as compared to its costs and is displayed as a percentage.

ROI is calculated this way:

$$\text{ROI} = (\text{Current Value or Gain from the Investment} - \text{Cost of Investment}) / \text{Cost of the Investment}$$

Current value of the investment is the worth or value of the investment in today's dollars. Let's assume the current value of our investment is $75,000, our cost was $55,000.

$$75{,}000(\text{value}) - 55{,}000(\text{cost}) = 20{,}000$$

$$20{,}000 / 55{,}000 = .36$$

If you multiply the fraction times 100, you'll see that ROI is 36 percent.

ROI does not take timeframes into account. When comparing one ROI to another, you'll need to annualize the returns so that you can compare them accurately. ROI in the formula above is over a one-year investment period. Perhaps the second alternative we are comparing to has an ROI of 52 percent over a two-year time period. You would need to divide 52 by the two-year investment period to come up with an annualized ROI of 26 percent per year. This alternative when annualized has a lower ROI than the first. You should choose the first alternative with a 36 percent ROI.

Higher ROI values produce more benefits than lower ROI values. However, higher values typically come with greater risk. The risks should be taken into account when choosing among alternative solutions or projects. Some organizations may have a high tolerance for risk and will jump in without thinking twice. Other organizations may have a low tolerance and while the ROI value is appealing, they may not be willing to risk other losses or consequences if the project does not produce the expected results. Projects with negative ROI values should not proceed.

Internal Rate of Return

Internal rate of return (IRR) is the discount rate when the present value of the cash inflows equals the original investment. IRR states the profitability of an investment as an average percent over the life of the investment. The general rule is that projects with higher IRR values are considered better than projects with lower IRR values.

Current State vs. Future State

Current state versus future state is a form of performance analysis that examines business processes, compares alternative projects, helps diagram change, and much more. This analysis is not necessarily based on financial analysis. It compares the organization today to the anticipated future state if the project/change/business process is undertaken. This can include a host of ideas too numerous to list. Perhaps the organization is considering automating a process that is currently performed manually. The first step is to document the current state: what do we do, how do we do it, what are the pain points, what are the processes, how are we performing this function, and so on. The next step is to imagine the future state: what are the opportunities if we automate, what efficiencies will come about, what are the benefits and improvements the organization might realize, what problem will be solved, and so on.

Current state vs. future state is also known as "as is—to be."

You'll want to engage key team members and subject matter experts in this activity. That includes those who have a solid understanding of the current state and the pain points they are causing. In my experience, the people experiencing the pain generally have the best ideas for improvements. They have a vested interest in the outcome because their work life will be easier as a result.

Each of these states should be documented in detail. For example, start by documenting each step of the manual process and describe the problem, issue, or opportunity. Use techniques such as interviewing subject matter experts and observing the process, focus group meetings, surveys, and so on to gather information and document the current state. You could use flowcharts, mind maps, sticky notes on a whiteboard, and other tools to perform this activity.

Next examine the pain points, bottlenecks, and gaps in the process. What is causing the bottleneck? Are there steps missing in the process, or perhaps too many steps? Answers to these questions and more will help you prepare the future state.

Now that you understand the current state, including bottlenecks, gaps, and pain points, get your subject matter experts together again to define the future state. What opportunities are there to improve these bottlenecks? How can we eliminate or reduce gaps and pain points? What new goals and experiences can we define that will improve the process? This part of the exercise is free flowing and more subjective than documenting the current state. You want your team members to think outside the box. Again, you could use several tools to help you in this process. Let the creativity flow and don't shut down ideas out of hand. One seemingly goofy idea may lead to a brilliant solution.

Examining Existing Artifacts

There are any number of existing artifacts that can assist with writing the business case, the project charter, and many other project documents. Artifacts in project management are

typically documents that are created during the life of the project such as project charter, scope statement, risk log, schedule, budget, lessons learned, and so on. They may also include evidence, physical elements, and information. These artifacts can also be referred to as historical data. Examining these artifacts before embarking on the project can save you time and alert you to risks or other situations that you might not think about this early in the project. The idea is to review a previous project of similar scope and complexity and see if there were issues that surfaced during the project, or if there were contentious stakeholders, if the project finished on schedule, if unexpected expenses came up, and so on. If you know this information before getting too far into the Planning phase of the project, you can prepare yourself and the project team for the unexpected.

Make certain you are examining artifacts from previous projects that are similar in scope and complexity to the project you are undertaking.

Real World Scenario

The Data Center Upgrade

Long ago I worked on a project upgrading our organization's data center. The upgrades were completed, and the project was closed successfully. A couple of weeks later, bright and early on a Monday morning, my deputy walked down to the data center to check on things and saw water coming out from under the locked door of the room. I immediately got a phone call and joined him in the basement. The entire room was flooded. Fortunately, the equipment was on raised flooring and the water hadn't reached that far yet. After much investigation, we found the source of the problem. One of the racks was placed too close to a copper water pipe. Vibration from the rack rubbed a small hole in the pipe, which leaked water onto the floor all weekend. When the plumber finished splicing the pipe, I kept the small piece with the hole in it as an artifact to remind me to account for risks and out-of-the-ordinary situations on future projects.

According to the CompTIA exam objectives, artifacts may also include a prequalified vendor list, predetermined clients, and preexisting contracts. These documents are also beneficial in preparing for your project. For example, if you know that you'll need contract resources with specific skills to assist with the project work, you can examine your organization's *prequalified vendor list* to find a contractor with these skills. Prequalified vendor lists are prepared by the contract and procurement department in your organization. This is a list of vendors that have already been vetted by the organization, and it includes the vendor, the goods and materials, and services they offer and the pricing for each. The vendors typically need to complete a review process, defined by the procurement department, to be included

on this list. Once the procurement department approves the information and certifies the vendor, they are added to the prequalified list. Then, you are able to work with the vendors rather than having to go through the normal procurement processes. We'll look more in depth at the procurement process in Chapter 6, "Resource Planning and Management."

Predetermined clients are typically partner companies that have been certified by a large organization to work with their product or service. For example, Workday® is an enterprise finance, human resource, and planning system based in the cloud. Workday engages with certified partners who are able to implement their system in your organization and configure the system for your needs. Much like a prequalified vendor, you will choose from among the software company's predetermined client list (the vendor's certified partners) to assist you with the project work.

Preexisting contracts are active contracts in place in the organization that you can utilize to procure resources for your project. These can range from services contracts to materials contracts and much more. As stated earlier, rather than having to complete a sometimes lengthy procurement process, you can use an existing contract and save a good deal of time and effort. We will talk more in depth about specific contract types in Chapter 6.

Project Selection Methods

After the business case is created, you'll need some method to decide how you or the project selection committee will choose among competing projects.

Project selection methods are used to determine which proposed projects should receive approval and move forward. Project selection may take place using formal documented guidelines, or it may be informal, requiring only the approval of a certain level of management.

Typically, a selection board or committee made up of senior members of the organization will perform project selection. Large organizations may have selection committees at the division or department level. Committees should include representatives from all departments such as information technology, sales, marketing, finance, and customer service.

A project selection committee uses a set of criteria to evaluate and select proposed projects such as the weighted scoring model and/or financial analysis we discussed in the "Determining Benefits and Rewards" section of this chapter. The selection method needs to be applied consistently across all projects to ensure the company is making the best decision in terms of strategic fit as well as the best use of limited resources.

Selection criteria should always consider the alignment of project goals to the organization's mission, vision, and values.

Project selection methods will vary depending on the mission of the organization, the people serving on the selection committee, the criteria used, and the project itself. These methods could also include examining factors such as market share, financial benefits, return on

investment, customer satisfaction, and public perception. The exact criteria vary, but selection methods usually involve a combination of decision models and expert judgment.

Decision Models

A *decision model* is a formal method of project selection that helps selection committees decide among competing projects. Requests for projects can span a large spectrum of needs, and it can be difficult to determine a priority without a means of comparison. Is an online order entry application for the sales team more important than the addition of online help for the customer-support team? While both of these projects could benefit the organization, there may not be adequate budget or staffing to complete both requests, so a decision must be made to approve one request and deny the other. Your committee must make an "apples-to-apples" comparison of the two requests or the decision will be subjective and they may not choose the most beneficial project. A decision model uses a fixed set of criteria agreed on by the project selection committee to evaluate the project requests. By using the same model to evaluate each project request, the selection committee has a common ground on which to compare the projects and make the most objective decision. You can use a variety of decision models that range from a basic ranking matrix, such as the weighted scoring model shown in Table 1.2, to elaborate mathematical models.

There are two primary categories of decision models: benefit measurement methods and constrained-optimization models. We discussed the benefit measurement methods in the earlier section "Determining Benefits and Rewards." You may recall these methods include the following:

- Cost-benefit analysis
- Scoring models
- Payback period
- Discounted cash flow
- Net present value
- Internal rate of return
- Return on investment

Any of these methods may be used as selection criteria by the committee for choosing and ranking competing projects.

Constrained optimization models are the second type of decision model. They are mathematical models, some of which are very complicated. They are typically used when comparing highly complex projects and require a detailed understanding of statistics and other mathematical concepts. A discussion of these models is beyond the scope of this book.

Benefit measurement methods are the most commonly used decision model.

Expert Judgment

Expert judgment relies on the expertise of stakeholders, subject matter experts, or those who have previous experience to help reach a decision regarding project selection. Typically, expert judgment is used in conjunction with one of the decision models discussed previously.

Companies with an informal project selection process may use expert judgment to make project selection decisions and not consider financial analysis. Although using only expert judgment can simplify the project selection process, there are dangers in relying on this single technique. It is not likely that the project selection committee members are authorities on each of the proposed projects. Without access to comparative data or financial analysis, a project approval decision may be made based solely on who has the best slide presentation or who is the best speaker.

Political influence is a part of expert judgment. An executive with a great deal of influence may convince the selection committee to approve a particular project (generally one in which they have a vested interest). (Did I say that out loud?)

Let's not forget one of the most important selection factors: the CEO said so! You might be snickering a little at this one, but I can tell you from first-hand experience there is no amount of financial analysis that can dissuade a CEO who has made up their mind that their pet project is moving forward.

Once your selection committee has selected and approved a project or projects, the project manager will move forward with the initiating phase of the project. We'll cover this in Chapter 3.

Summary

A project is a temporary endeavor that produces a unique product service or result. It has definitive start and finish dates. Project management is the application of tools and techniques to organize the project activities to successfully meet the project goals. A project manager is responsible for project integration and applying the tools and techniques of project management to bring about a successful conclusion to the project.

Programs are a collection or group of related projects that are managed together using coordinated processes and techniques. The collective management of a group of projects can bring about benefits that wouldn't be achievable if the projects were managed separately.

Portfolios are collections of programs, subportfolios, and projects that support strategic business goals or objectives. Portfolios may consist of projects that are not related.

The project life cycle phases are Discovery/Concept, Initiating, Planning, Executing, and Closing. Discovery is where the business case is created, and the project is justified. Initiating

is where the preliminary scope statement and project charter are created. Planning consists of preparing for the work of the project. Executing is where the work of the project is performed, monitored, and tracked. Closing is the most often skipped process. This is where project closeout occurs and contracts are closed, team members released, and more.

A project comes about as a result of needs or demands, including market demand, organizational need, customer request, technological advance, legal requirement, ecological impact, and social need.

The business case documents the business need for the project and determines whether the investment in the project is worthwhile. There are several financial analysis techniques you can use to determine the benefits and rewards of the project, including cost-benefit analysis, scoring model, payback period, discounted cash flow, net present value, return on investment, internal rate of return, and current state versus future state.

Existing artifacts can assist you with writing the business case and other project documents and can alert you to risks or issues that may occur during the project.

Project selection methods involve the use of decision models, such as the financial analysis used in the business case, weighted scoring models, current state versus future state, and expert judgment.

Exam Essentials

Be able to define a project. A project brings about a unique product, service, or result and has definite beginning and ending dates.

Be able to identify the difference between a project and ongoing operations. A project is a temporary endeavor to create a unique product or service. Operational work is ongoing and repetitive.

Be able to define a program and a portfolio. A program is a group of related projects managed to gain benefits that couldn't be realized if they were managed independently. Portfolios are collections of programs and projects that support strategic business goals or objectives. Programs and projects within the portfolio may not be related to one another.

Be able to name the life cycle phases of a project and their primary purpose. The phases are Discovery/Concept, Initiating, Planning, Executing, and Closing. Discovery is where the business case is created and the project is justified. Initiating is where the preliminary scope statement and project charter are created. Planning consists of preparing for the work of the project. Executing is where the work of the project is performed, monitored, and tracked. Closing is where project closeout occurs and contracts are closed, team members released, and more.

Understand the needs and demands that bring about a project. The needs and demands that bring about a project include market demand, organizational need, customer request, technological advance, legal requirement, ecological impacts, and social need.

Understand the purpose of a business case. A business case documents the business need for the project and determines whether the investment in the project is worthwhile.

Be able to describe the two steps involved in validating a project. Validating a project involves writing and reviewing the business case and analyzing the stakeholders.

Be able to identify commonly used business case justification and project selection methods. The most common project selection methods are cost-benefit analysis, scoring model, payback period, discounted cash flow, net present value, return on investment, internal rate of return, and current state versus future state Understand what skills are needed to manage a project beyond technical knowledge of the product.

Key Terms

Before you take the exam, be certain you are familiar with the following terms:

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)
business case
Closing
constrained optimization models
cost of capital
cost-benefit analysis
decision model
discounted cash flow
Discovery/concept preparation phase
Executing
expert judgment
feasibility study
Initiating
internal rate of return (IRR)
Iterative
net present value (NPV)
operations
payback period
Planning
portfolio
predetermined clients
prequalified vendor list
program
project
project management
Project Management Institute (PMI®)
project manager
project selection methods
return on investment (ROI)
scoring model
stakeholder

Review Questions

1. What is the definition of a project? (Choose two.)
   - **A.** A group of interrelated activities that create a unique benefit to the organization
   - **B.** A set of processes repeated multiple times to produce the same result
   - **C.** A temporary endeavor undertaken to create a unique product, service, or result
   - **D.** A process used to generate profit, improve market share, or adhere to legal requirements
   - **E.** A time-constrained activity used to bring about unique results that align with the organization's goals
2. What is the definition of operations?
   - **A.** Activities that have a definitive start and end date
   - **B.** Activities that are ongoing that support the organization's business
   - **C.** Activities that are unique to the organization and are temporary in nature
   - **D.** Activities that are time bound
3. What is the term for a group of related projects managed in a coordinated fashion?
   - **A.** Life cycle
   - **B.** Phase
   - **C.** Process group
   - **D.** Program
4. Which of the following are true regarding project portfolios? (Choose two.)
   - **A.** The independent projects in the portfolio may not have anything in common.
   - **B.** The programs in the portfolio are related to one another.
   - **C.** The programs and projects within the portfolio support the strategic goals of the portfolio.
   - **D.** An organization has only one portfolio.
   - **E.** Portfolios consist of programs and do not contain stand-alone projects.
5. Which of the following make up the life cycle phases according to the CompTIA exam objectives?
   - **A.** Initiating, Planning, Executing, Closing
   - **B.** Discovery/Concept, Initiating, Planning, Executing, Closing
   - **C.** Discovery/Concept, Planning, Executing, Monitoring and Controlling, Closing
   - **D.** Initiating, Planning, Executing, Monitoring and Controlling, Closing

6. You receive a request from customer service to purchase and implement a customer management system for the service-support staff. What type of need or demand does this describe?
   - **A.** Organizational need
   - **B.** Market demand
   - **C.** Legal requirement
   - **D.** Technological advance

7. Your project stakeholder is working on the business case. They ask you for some assistance. You suggest to them that the business case should include which of the following?
   - **A.** Feasibility study
   - **B.** Alignment to the strategic plan
   - **C.** Justification
   - **D.** Alternative solutions
   - **E.** All of the above

8. Preexisting contracts, prequalified vendors, and project documents such as the scope statement, schedule, risk log, and lessons learned are known as which of the following? (Choose two.)
   - **A.** Vestige
   - **B.** Relic
   - **C.** Historical information
   - **D.** Artifacts

9. Your project has expected cash inflows of $1.2 million in year 1, $2 million in year 2, and $4.4 million in year 3, for a total of $7.6 million in today's dollars. Which technique was used to determine this?
   - **A.** Discounted cash flow
   - **B.** IRR
   - **C.** NPV
   - **D.** Cost-benefit analysis

10. Your selection committee wants to compare the profitability of three projects against each other to determine which should move forward. The projects do not have equal timelines. You are using this formula:

    (Current Value or Gain from the Investment – Cost of Investment) / (Cost of the Investment)

    Which of the following are true regarding this question? (Choose two.)
    - **A.** This is the formula for discounted cash flows.
    - **B.** This is the formula for ROI.
    - **C.** You'll need to annualize the returns since each project has a different time period.
    - **D.** This is the formula for NPV.
    - **E.** The returns are calculated by year and the total return for each project should be used for comparison.

11. The idea behind most cash flow techniques is that money today is worth more than money in the future. What is this known as?

A. Present value of money

B. Future value of money

C. Time value of money

D. Discounted value of future money

12. Federico, the director of the marketing department, has approached you with an idea for a project. He has prepared a draft business case and included two alternative solutions. What should this section of the business case contain?

A. High-level description of the costs

B. Feasibility of implementing each alternative

C. Expected results of each solution

D. Description of the impacts of the alternative to the organization

E. A, B, C

F. A, B, C, D

13. Your project has projected revenues of $500,000 in year 1 and $700,000 in year 2. Your initial investment was $850,000. What is the payback period?

A. 21 months

B. 20 months

C. 2 years

D. 18 months

14. You've been given an idea for a project by an executive in your organization. After writing the business case, you submit it to the executive for review. After reading the business case, they determine that the project poses a significant amount of risk to the organization. What do you recommend next?

A. Proceed to the project selection committee.

B. Reject the project based on the analysis.

C. Proceed to writing the project plan.

D. Perform a feasibility study.

15. Your selection committee has approved a project that requires specialized skills that are not available in the organization. This project has a tight timeline and you are looking for ways to get resources on board as quickly as possible. Which of the following will help you speed up the procurement of resources? (Choose two.)

A. Preexisting contract

B. Predetermined clients

C. Prequalified vendor list

D. Predetermined selection process

16. Which of the following are used as project selection methods?

A. Cash flow techniques

B. Constrained optimization models

C. Expert judgment

D. Decision models

E. A, D

F. A, B, D

G. A, B, C, D

17. Your project involves implementing a software platform to manage the organization's general ledger, budget, and financial information. The company you have engaged with recommended three implementation firms for you to choose from in helping to configure the system. What is this known as?

A. Predetermined clients

B. Predetermined vendor list

C. Prequalified clients

D. Prequalified vendor list

18. Your project has expected cash inflows of $7.8 million in today's dollars. The project's initial investment is $9.2 million. Which of the following is true?

A. The discounted cash flows are lower than the initial investment, so this project should be rejected.

B. The discounted cash flows are lower than the initial investment, so this project should be accepted.

C. NPV is less than 0, so this project should be rejected.

D. NPV is greater than 0, so this project should be accepted.

19. Which of the following are the steps required to validate a project? (Choose two.)

A. Analyze the feasibility.

B. Justify the project.

C. Align it to the strategic plan.

D. Create the business case.

E. Identify and analyze stakeholders.

20. Your selection committee is reviewing two projects that will attempt to improve the efficiency of your current procurement process. They have engaged key team members and subject matter experts to compare two projects. This team is charged with analyzing the current process and determining how this might change or improve, and how it will change, if the project were implemented. What is this technique called? (Choose three.)

A. As is—to be

B. Current state versus future state

C. Project selection methodology

D. Alignment to the strategic plan

E. Justification

F. Performance analysis