An Introduction to Project Management, Seventh Edition

Predictive, Agile, and Hybrid Approaches

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Cover Photo: Dan Schwalbe, seven trumpeter swans on Clearwater Lake, MN

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Note: This is a sample chapter as of August 21, 2021. The final chapter may be slightly different.

Chapter 1

An Introduction to Project, Program, and Portfolio Management

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LEARNING OBJECTIVES

After reading this chapter, you will be able to:

- Understand the growing need for better project, program, and portfolio management
- Explain what a project is, provide examples of projects, list various attributes of projects, and describe project constraints
- Define project management and discuss key elements of project management using a process-oriented approach and a principle-based approach
- Discuss the relationship between project, program, and portfolio management and their contributions to enterprise success
- Understand important agile concepts
- Explain the differences between predictive, agile, and hybrid approaches to project management
- Describe the project management profession, including the role of project managers and suggested skills, the role of professional organizations, the importance of certification and ethics, project management careers, and the growth of project and portfolio management software

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OPENING CASE

Doug Milis, the Chief Executive Officer (CEO) of Global Construction, Inc., was summarizing annual corporate highlights to the board of directors. Like many other individuals and organizations, they had a very difficult year. The global pandemic forced them to deal with many unexpected changes. When one of the board members asked what he was most proud of that year, Doug thought for a few seconds, and then replied,

> "Excellent question. Honestly, I think the main reason we survived this year was because we embraced an agile mindset and were able to pivot quickly in addressing critical needs—health and safety, virtual work, skills shortages, pent-up demand, etc. We reprioritized our work to focus on projects to meet those needs, empowering our people to find solutions. We responded very quickly to internal needs as well as market changes, unlike many of our competitors. With our great culture and teamwork, I am very confident that we will have continued success in years to come."

INTRODUCTION

Many people and organizations today have a new or renewed interest in project management. In the past, project management primarily focused on providing schedule and resource data to top management in just a few industries, such as the military and construction. Agile project management (versus a predictive or waterwall approach) was used mostly in software development. Today, people in every industry and every country manage projects using predictive, agile, and hybrid approaches. The facts below demonstrate the significance of project management:

- Demand for projects continues to increase. GDP contributions from project-oriented industries are forecasted to reach US$34.5 trillion by 2030. Employers will need 25 million *new* individuals working in project management-oriented roles by 2030.[1]
- 2020 proved that projects matter now more than ever. The Project Management Institute (PMI) published a list of the 50 most influential projects in 2020, with the COVID-19 Therapeutics Accelerator ranked at the top.
- Agile organizations respond better to change. A 2020 McKinsey & Company report found that "Companies with agile practices embedded in their operating models have managed the impact of the COVID-19 crisis better than their peers...Agile organizations are designed to be fast, resilient, and adaptable."[2]
- Good project management helps the bottom line. An average 11.4 percent of investment is wasted due to poor project performance, according to PMI's 2020 Pulse of the Profession® report. "Organizations that undervalue project management as a strategic competency for driving change report an average of 67 percent more of their projects failing outright."[3]
- Project management salaries continue to grow. In 2019, the average salary for someone in the project management profession in U.S. dollars was $116,000 per year in the U.S.; $132,086 in Switzerland, (the highest-paid country); and $13,933 in Egypt (the lowest-paid country). These average salaries do not include bonuses. The average total compensation for project management workers in the U.S., for example, was $124,000.[4]

- Certification is a good investment. Of the 32,000 salary survey respondents from 42 countries, 82% had the Project Management Professional (PMP®) credential, and their salary was 22% higher on average than those without it.[5]

- Project management is also a vital skill for personal success. Managing a family budget, planning a wedding, remodeling a house, completing a college degree, and many other personal projects can benefit from good project management.

WHAT WENT WRONG?

In 1995, the Standish Group published an often-quoted study entitled "CHAOS." This prestigious consulting firm surveyed 365 information technology (IT) executives in the U.S. who managed more than 8,380 IT application projects. As the title of the study suggests, the projects were in a state of chaos with an overall success rate of only 16.2 percent. The surveyors defined success as meeting project goals on time and on budget. The study also found that more than 31 percent of IT projects were canceled before completion, costing U.S. companies and government agencies more than $81 billion. The authors of this study were adamant about the need for better project management in the IT industry. They explained, "Software development projects are in chaos, and we can no longer imitate the three monkeys—hear no failures, see no failures, speak no failures." [6]

In a 2019 study by three global associations (KPMG, AIPM, and IPMA) only 19% of organizations delivered successful projects (defined as meeting scope, time, cost, and stakeholder satisfaction goals) most of the time. Some key findings of their study: Organizations need to change the way they manage projects. More agility is needed to handle project complexity. Project Management Offices (PMOs) are not working well in their current form and need to change or be eliminated. Project managers need to improve their skills in leading change in their organizations, having difficult conversions, managing conflict, and delegating authority. Effective project management skills are more important now than ever.[7]

Although several researchers question the methodology of the CHAOS studies, their popularity prompted organizations throughout the world to examine their practices in managing projects. Managers are recognizing that to be successful, they need to be conversant with and use modern project management techniques. People from all types of disciplines— science, liberal arts, education, business, etc.—can benefit from basic project management principles. Individuals are realizing that to remain competitive, they must develop skills to effectively manage the professional and personal projects they undertake. They also realize that many of the concepts of project management, especially interpersonal skills, will help them as they work with people on a day-to-day basis.

Organizations claim that using project management provides advantages, such as:

- Better control of financial, physical, and human resources
- Improved customer relations
- Shorter development times
- Lower costs
- Higher quality and increased reliability
- Higher profit margins
- Improved productivity

- Better internal coordination
- Higher worker morale

In addition to project management, organizations are embracing program and portfolio management to address enterprise-level needs. They are also becoming more agile. This chapter introduces projects and project management (predictive, agile, and hybrid approaches), describes the differences between project, program, and portfolio management, discusses the role of the project manager, and provides important background information on this growing profession.

WHAT IS A PROJECT?

To discuss project management, it is important to understand the concept of a project. A **project** is "a temporary endeavor undertaken to create a unique product, service, or result."[8] Operations, on the other hand, is work done in organizations to sustain the business. Projects are different from operations in that they end when their objectives have been reached or the project has been terminated. It is important to note that although projects are temporary and often produce specific deliverables, the benefits of those deliverables may not be achieved until well after the project is completed. Project teams, therefore, must work with operations to ensure the desired outcomes of their projects provide value to the organization.

For example, your company might start a project to reduce employee turnover. The project might last 6 months and produce several deliverables like an employee satisfaction survey, new hiring and compensation guidelines, a new reward and recognition program, and so on. The desired outcome of reducing turnover might not be measurable until a year or more after the project ended.

Examples of Projects

Projects can be large or small and involve one person or thousands of people. They can be done in one day or take years to complete. Examples of projects include the following:

- A young couple hires a firm to design and build them a new house
- A retail store manager works with employees to display a new clothing line in the store and online to attract new customers
- A school district upgrades its technology infrastructure to provide wireless Internet access for all students in school and from home
- A medical technology firm develops a device that connects to smart phones
- Musicians starts a company to help children develop their musical talents
- A pharmaceutical company launches a new drug or vaccine
- A television network develops a system to allow viewers to vote for contestants and provide other feedback on programs via several devices
- A government group develops a program to track immunizations

VIDEO HIGHLIGHTS

PMI recognizes outstanding performance in project management by announcing a Project of the Year award winner. Their website lists winners since 1989, and videos summarize several award-winning projects, such as the following:

- 2020: The Trans Anatolian Natural Gas Pipeline (TANAP) Project
- 2019: Embraier E190-E2 Program Development
- 2018: Project Legacy – Southeast Louisiana Veterans Health Care System Replacement

You can also see how project management was used on much older projects. Mark Kozak-Holland wrote a book in 2011 called "The History of Project Management." In describing his book, the author states the following: "Think about the Giza Pyramid, the Parthenon, the Colosseum, the Gothic Cathedrals of Medieval Europe, the great voyages of exploration, the Taj Mahal, and the mega projects of the industrial revolutions. Was project management used on these projects? Were the concepts of project management even understood? Can we connect modern and ancient project management?" A 5-minute video does an excellent job of showing how project management was used in building the Giza Pyramid as viewers listen to music while seeing images and text on the screen. You can find this and other videos on the companion website for this text at http://intropm.com/.

Project Attributes

As you can see, projects come in all shapes and sizes. The following attributes help to further define a project:

- *A project has a unique purpose.* Every project should have a well-defined objective. For example, many people hire firms to design and build a new house, but each house, like each person, is unique.
- *A project is temporary.* A project has a definite beginning and a definite end. For a home construction project, owners usually have a date in mind when they'd like to move into their new home.
- *A project drives change and enables value creation.* A project is initiated to bring about a change to meet a need or desire. Its purpose is to achieve a specific objective which changes the context (a living situation, in this house project example) from a current state to a more desired or valued future state.
- *A project is developed using progressive elaboration or in an iterative fashion.* Projects are often defined broadly when they begin, and as time passes, the specific details of the project become clearer. For example, there are many decisions that must be made in planning and building a new house. It works best to draft preliminary plans for owners to approve before more detailed plans are developed.
- *A project requires resources, often from various areas.* Resources include people, hardware, software, or other assets. Many different types of people, skill sets, and resources are needed to build a home.
- *A project should have a primary customer or sponsor.* Most projects have many interested parties or stakeholders, but someone must take the primary role of sponsorship. The **project sponsor** usually provides the direction and funding for the project.

- *A project involves uncertainty.* Because every project is unique, it is sometimes difficult to define the project's objectives clearly, estimate exactly how long it will take to complete, or determine how much it will cost. External factors also cause uncertainty, such as a supplier going out of business or a project team member needing unplanned time off. Uncertainty is one of the main reasons project management is so challenging, because uncertainty invokes risk.

A good project manager contributes to a project's success. **Project managers** work with the project sponsors, the project team, and the other people involved in a project to define, communicate, and meet project goals.

Project Constraints

Every project is constrained in different ways. Some project managers focus on scope, schedule, and cost constraints. These limitations are sometimes referred to in project management as the **triple constraint**. To create a successful project, project managers must consider scope, schedule, and cost and balance these three often-competing goals. They must consider the following:

- *Scope*: What work will be done as part of the project? What unique product, service, or result does the customer or sponsor expect from the project?
- *Schedule:* How long should it take to complete the project? What is the timeline?
- *Cost*: What should it cost to complete the project? What is the project's budget? What resources are needed?

Other people focus on the quadruple constraint, which adds quality as a fourth constraint.

- *Quality*: How good does the quality of the products or services need to be? What do we need to do to satisfy the customer?

The *PMBOK® Guide - Sixth Edition* suggests these four constraints *plus* risk and resources, but states that there may be others as well, depending on the project. Figure 1-1 shows these six constraints. The triple constraint goals—scope, schedule, and cost—often have a specific target at the beginning of the project. For example, a couple might initially plan to move into their new 2,000 square foot home in six months and spend $300,000 on the entire project. The couple will have to make many decisions along the way that may affect meeting those goals. They might need to increase the budget to meet scope and time goals or decrease the scope to meet time and budget goals. The other three constraints—quality, risk, and resources—affect the ability to meet scope, schedule, and cost goals. Projects, by definition, involve uncertainty and resources, and the customer defines quality. No one can predict with one hundred percent accuracy what risks might occur on a project. Resources (people) working on the house might produce different results at different quality levels, and material resources may vary as well. Customers cannot define their quality expectations in detail for a project on day one. These three constraints often affect each other as well as the scope, schedule, and cost goals of a project.
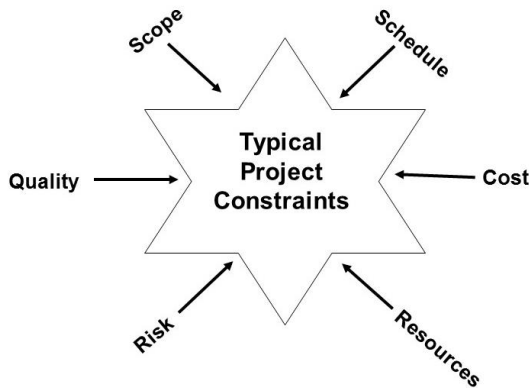
Figure 1-1. Typical project constraints

For example, the couple may have picked out a certain type of flooring for most of their home early in the design process, but that supplier may have run out of stock, forcing them to choose a different flooring to meet the schedule goal. This issue may affect the cost of the project. Projects rarely finish according to the discrete scope, schedule, and cost goals originally planned. Instead of discrete target goals for scope, schedule, and cost, it is often more realistic to set a range of goals that allow for uncertainties, such as spending between $275,000 and $325,000 and having the home completed within five to seven months. These goals allow for inevitable changes due to risk, resources, and quality considerations.

Experienced project managers know that you must decide which constraints are most important on each project. If time is most important, you must often change the initial scope and/or cost goals to meet the schedule. You might have to accept more risk and lower quality expectations. If scope goals are most important, you may need to adjust schedule and/or cost goals, decrease risk, and increase quality expectations. If communication is most important, you must focus on that. If there are set procurement goals or constraints, that knowledge might be key to the project. In any case, sponsors must provide some type of target goals for a project's scope, schedule, and cost and define other key constraints for a project. The project manager should be communicating with the sponsor throughout the project to make sure the project meets his or her expectations.

How can you avoid the problems that occur when you meet scope, schedule, and cost goals, but lose sight of customer satisfaction? The answer is *good project management, which includes more than meeting project constraints*.

WHAT IS PROJECT MANAGEMENT?

Project management is "the application of knowledge, skills, tools and techniques to project activities to meet the project requirements."[9] Project managers must not only strive to meet specific scope, schedule, cost, resource, risk, and quality requirements of projects, they must also facilitate the entire process to meet the needs and expectations of the people involved in or affected by project activities.

Project Management Framework (PMBOK® Guide - Sixth Edition)

Figure 1-2 illustrates a framework to help you understand project management. Key elements of this framework include the project stakeholders, project management process groups, knowledge areas, tools and techniques, project success, and the contribution of a portfolio of projects to the success of the entire enterprise. Each of these elements of project management is discussed in more detail in the following sections. Note that this framework is based on the Project Management Body of Knowledge (*PMBOK®) Guide -Sixth Edition* (published in 2017), and it focuses on a process-oriented approach.

Figure 1-2. Project management framework based on the *PMBOK® Guide - Sixth Edition*

PMI did not change the definition of a project or project management in the *PMBOK® Guide - Seventh Edition* (published in 2021), but they did change the focus from a process-oriented approach to a principle-centered approach. Unlike previous *PMBOK® Guide* updates which replaced older editions, PMI recognizes the continued value of the more detailed sixth edition (537 versus 196 pages excluding appendices) and includes the entire sixth edition and other PMI standards and information in their new PMIstandards+™ digital content platform. This text includes content from both editions of PMI's *PMBOK® Guide*, other PMI sources, as well as hundreds of other sources.

Project Stakeholders

Stakeholders are the people involved in or affected by project activities and include the project sponsor, project team, support staff, customers, users, suppliers, and even opponents to the project. These stakeholders often have very different needs and expectations. For example, there are several stakeholders involved in a home construction project.

- The project sponsors would be the potential new homeowners. They would be the people paying for the house and could be on a very tight budget, so they would expect the contractor to provide accurate estimates of the costs involved in building the house. They would also need a realistic idea of when they could move in and what type of house they could afford given their budget constraints.
- The project manager (sometimes called the project leader) in this example would normally be the general contractor responsible for building the house. He or she needs to work with all the project stakeholders to meet their needs and expectations.
- The project team for building the house would include several construction workers, electricians, carpenters, and so on. These stakeholders would need to know exactly what work they must do and when they need to do it. They would need to know if the required materials and equipment will be at the construction site or if they are expected to provide the materials and equipment. Their work would need to be coordinated since there are many interrelated factors involved.
- Support staff might include the employers of the homeowners, the general contractor's administrative assistant, and other people who support other stakeholders. The employers of the homeowners might expect their employees to complete their work but allow some flexibility so they can visit the building site or take phone calls related to building the house. The contractor's administrative assistant would support the project by coordinating meetings between the buyers, the contractor, suppliers, and other stakeholders.
- Building a house requires many suppliers. The suppliers would provide the wood, windows, flooring materials, appliances, and other items. Suppliers would expect exact details on what items they need to provide, where and when to deliver those items, and similar information.
- Additional stakeholders would include several city employees, who would be interested in following city ordinances as well as increasing revenues. They might have certain guidelines for the construction of houses in the area and regulations to ensure the safety of the public near the construction site. The local housing inspector would also be a stakeholder, concerned with ensuring that everything meets specific codes and regulations.
- There may or may not be opponents to a project. In this example, there might be a neighbor who opposes the project because the workers are making so much noise that she cannot concentrate on her work at home, or the noise might awaken her sleeping children. She might interrupt the workers to voice her complaints or even file a formal complaint. Alternatively, the neighborhood might have association rules concerning new home design and construction. If the homeowners did not follow these rules, they might have to halt construction due to legal issues.

As you can see from this example, there are many different stakeholders on projects, and they all have different interests. Stakeholders' needs and expectations are important in the beginning and throughout the life of a project. Successful project managers develop good relationships with project stakeholders to understand and meet their needs and expectations.

Project Management Process Groups and Knowledge Areas

The five **project management process groups** include initiating, planning, executing, monitoring and controlling, and closing activities. Chapter 3 provides more information on the process groups and how they relate to the ten project management knowledge areas. **Project management knowledge areas** describe the key competencies that project managers must develop. Project managers must have knowledge and skills in all ten of these areas, briefly described as follows:

- Project integration management is an overarching function that coordinates the work of all other knowledge areas. It affects and is affected by all other knowledge areas.
- Project scope management involves working with all appropriate stakeholders to define, gain written agreement for, and manage all the work required to complete the project successfully.
- Project schedule management includes estimating how long it will take to complete the work, developing an acceptable project schedule given cost-effective use of available resources, and ensuring timely completion of the project.
- Project cost management consists of preparing and managing the budget for the project.
- Project quality management ensures that the project will satisfy the stated or implied needs for which it was undertaken.
- Project resource management is concerned with making effective use of the people and physical resources needed for the project.
- Project communications management involves generating, collecting, disseminating, and storing project information.
- Project risk management includes identifying, analyzing, and responding to risks related to the project.
- Project procurement management involves acquiring or procuring goods and services for a project from outside the performing organization.
- Project stakeholder management focuses on identifying project stakeholders, understanding their needs and expectations, and engaging them appropriately throughout the project.

Project Management Tools and Techniques

Thomas Carlyle, a famous historian and author, stated, "Man is a tool-using animal. Without tools he is nothing, with tools he is all." As the world continues to become more complex, it is even more important for people to develop and use tools, especially for managing important projects. **Project management tools and techniques** assist project managers and their teams in carrying out work in all ten knowledge areas. For example, many predictive projects require project charters, scope statements, Gantt charts, kick-off meetings, progress reports, and so on. Agile projects often require product roadmaps, backlogs, burndown charts, retrospectives, etc. You will learn more about these and other tools and techniques throughout this text.

Despite its advantages, project management is not a silver bullet that guarantees success on all projects. Project management is a very broad, often complex discipline. What

works on one project may not work on another, so it is essential for project managers to continue to develop their knowledge and skills in managing projects. It is also important to learn from the mistakes and successes of past projects.

Project Success

How do you define the success or failure of a project? There are several ways to define project success. The list that follows outlines a few common criteria for measuring project success as applied to the example project of building a new 2,000 square foot home within six months for $300,000:

- The project provided value. **Value** is "the worth, importance, or usefulness of something."[10]. Sometimes the value of a project is easy to measure, but sometimes it is not. It is important to clarify the intended outcomes of projects. For example, a project to build a house might have several intended outcomes. Tangible outcomes might include making a certain amount of money for the builder or providing a good return on investment for the buyers, if their intent was to sell the house at a gain in the near future. Intangible outcomes might include a good customer satisfaction rating for the builder or the buyers simply being happy in their house in the future. If the couple liked their new home and neighborhood after they lived there for a while, even if it cost more or took longer to build or the project manager was rude to them, it would be a successful project based on the intended outcome of happy buyers. However, the builder would have received a poor customer satisfaction rating soon after the house was completed.
- The project met scope, schedule, and cost goals. If the home was 2,000 square feet and met other scope requirements, was completed in six months, and cost $300,000, we could call it a successful project based on these criteria. Note that the CHAOS studies mentioned in the What Went Right? and What Went Wrong? examples used this definition of success.
- The project satisfied the customer/sponsor. Even if the project met initial scope, schedule, and cost goals, the couple paying for the house might not be satisfied. Perhaps the project manager never returned their calls and texts or made important decisions without their approval. Perhaps the quality of some of the construction or materials was not acceptable. If the buyers were not happy about important aspects of the project, it would be deemed a failure due to poor customer satisfaction. One method used to measure customer satisfaction is a **net promoter score**, a number that represents the customer's willingness to recommend a product or service to others.

WHAT WENT RIGHT?

Follow-up studies by the Standish Group (see the previously quoted "CHAOS" study in the What Went Wrong? passage) showed improvement in the statistics for IT projects:

- The number of successful projects (those completed on time, on budget with a satisfactory result) was 29% in 2015 based on a sample of over 50,000 software development projects worldwide. The number of failed projects (those canceled or not used after implementation) was 19 percent. That leaves 52% of projects as challenged (over budget, late, and/or poorly implemented). These numbers include projects of all sizes and methodologies.
- The 2015 CHAOS study also summarized the success rates of projects by size, showing that 62% of small projects were successful from 2011-2015 compared to only 2% of grand, 6% of large, 9% of medium, and 21% of moderate size projects. Small projects are obviously easier to complete successfully.
- Agile approaches were also measured across all project sizes from 2011-2015, showing that 39% of all agile projects were successful compared to 11% of predictive or waterfall projects. For small projects, 58% of agile projects were successful compared to 44% of waterfall projects. About 10,000 projects were included for these statistics.[11]
- In 2021 the Standish Group website states that 31% of software projects are successful (an increase from the 29% reported in 2015). They also say that 46% of the successful projects returned high value to the organization.

Project Management Framework (PMBOK® Guide - Seventh Edition)

As mentioned earlier, the *PMBOK® Guide - Seventh Edition* focuses on a principle-centered approach to project management. Instead of being structured around project management knowledge areas and their processes, it is structured around eight project performance domains (stakeholders, team, development approach and life cycle, planning, project work, delivery, measurement, and uncertainty) along with two other sections, one describing tailoring, and the other describing models, methods, and artifacts. It also emphasizes that the 12 project management principles described in *The Standard for Project Management* (2021) guide behavior. Figure 1-3 summarizes a project management framework based on the *PMBOK® Guide - Seventh Edition*, and the following sections describe the elements of this framework.

Figure not included in sample chapter due to copyright restrictions.

Figure 1-3. Project management framework based on the *PMBOK*® *Guide - Seventh Edition*

Source: Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK*® *Guide) – Seventh Edition* (2021), Figure 4-1, p. 154.

Project Management Principles

Principles for a profession "serve as foundational guidelines for strategy, decision making, and problem solving."[12] Figure 1-3 lists the 12 principles, which are self-explanatory. Using these principles to guide behavior will be discussed throughout this text.

Project Performance Domains

A **project performance domain** is "a group of related activities that are critical for the effective delivery of project outcomes. Project performance domains are interactive, interrelated, and interdependent areas of focus that work in unison to achieve desired project

outcomes."[13] Project managers should understand each of these domains, summarized as follows:

- Stakeholders: Addresses activities and functions associated with stakeholders. See the previous discussion of stakeholders and future chapters describing stakeholder management.
- Team: Addresses activities and functions associated with the people who are responsible for producing project deliverables that realize business outcomes. The importance of teams is described throughout this text.
- Development approach and life cycle: Addresses activities and functions associated with the development approach, cadence, and life cycle phases of the project. These topics are addressed in Chapter 3, Initiating Projects.
- Planning: Addresses activities and functions associated with the initial, ongoing, and evolving organization and coordination necessary for delivering project deliverables and outcomes. Chapters 4-6 address project planning in detail.
- Project work: Addresses activities and functions associated with establishing project processes, managing physical resources, and fostering a learning environment. This topic is addressed in several chapters of this text, especially in Chapter 7, Executing Projects.
- Delivery: Addresses activities and functions associated with delivering the scope and quality that the project was undertaken to achieve. See the sections in several chapters describing project scope and quality management.
- Measurement: Addresses activities and functions associated with assessing project performance and taking appropriate actions to maintain acceptable performance. This topic is addressed in detail in Chapter 8, Monitoring and Controlling.
- Uncertainty: Addresses activities and functions associated with risk and uncertainty. See the sections in several chapters describing project risk management.

Tailoring

Just as you can benefit from tailoring clothing, especially something special like wedding attire, you can benefit from tailoring how you manage a project. **Tailoring** is "the deliberate adaptation of the project management approach, governance, and processes to make them more suitable for the given environment and the work at hand."[14] Every project is unique, as is every project team, every organization, etc., so it is very important to mindfully consider how to manage a project. One of the project management principles, in fact, is to tailor based on context. Factors to consider include the size of the project, complexity, expected duration, industry, organizational culture, and project management maturity. You can tailor which processes you will use, how you will handle stakeholder engagement, which tools, methods, and artifacts you'll use, and what life cycle and development approach is most appropriate. PMI suggests a 4-step approach to tailoring: select an initial approach; tailor for the organization; tailor for the project; and implement ongoing improvement. Many of these concepts are described later in this text and will make more sense as you read about them and see examples of when it makes sense to use each approach.

Models, Methods, and Artifacts

Instead of using the term tools and techniques, the *PMBOK® Guide - Seventh Edition* describes models, methods, and artifacts, as follows:

- A **model** is "a thinking strategy to explain a process, framework, or phenomenon." For example, there are models for leadership, communication, motivation, change, complexity, and team development.
- A **method** is "the means for achieving an outcome, output, result, or project deliverable." There are methods for data gathering and analysis, estimating, and meeting.
- An **artifact** "can be a template, document, output, or project deliverable." Examples include strategy artifacts (business cases, project charters, etc.), logs and registers (assumptions log, backlog, risk register, etc.), plans, hierarchy charts, baseline artifacts (budgets, milestone schedules, etc.), visual data and information, reports, agreements, and contracts.[15]

PROGRAM AND PROJECT PORTFOLIO MANAGEMENT

About one-quarter of the world's gross domestic product is spent on projects. Projects make up a significant portion of work in most business organizations or enterprises, and successfully managing those projects is crucial to enterprise success. Two important concepts that help projects meet enterprise goals are the use of programs and project portfolio management.

Programs

A **program** consists of "related projects, subsidiary programs, and program activities that are managed in a coordinated manner to obtain benefits not available from managing them individually."[16] A **megaproject** is a very large project that typically costs over US $1 billion, affects over one million people, and lasts several years.

MEDIA SNAPSHOT

Popular Mechanics provides a list (including photos) of the 25 most impressive megaprojects throughout the world. Several are listed below, showing the time and cost required to complete them (US$):

- Panama Canal Expansion Project, Panama, Central America: 11 years, $5.25 billion. The original canal was built in 1914. The expansion project widened and deepened the canal to allow for larger ships. (Note: The Suez Canal was the site of the container ship that was stuck for almost a week in March 2021.)
- Port Mann Bridge, Vancouver, British Columbia, Canada: 6 years, $1.92 billion. Port Mann Bridge is the second largest bridge in North America, spanning 6,866 feet.
- Three Gorges Dam, China: 17 years, $22 billion. This dam on the Yangtze River is 595 feet tall, 131 feet wide, and over 7,600 feet long, with 32 main turbines producing electricity.[17]

As you can imagine, it is often more economical to group projects together to help streamline management, staffing, purchasing, and other work. The following are examples of programs (Figure 1-4 illustrates the first program in the list).

- A construction firm has programs for building single-family homes, apartment buildings, and office buildings, as shown in Figure 1-4. Each home, apartment building, and office building is a separate project for a specific sponsor, but each type of building is part of a program. There would be several benefits to managing these projects under one program. For example, for the single-family homes, the program manager could try to get planning approvals for all the homes at once, advertise them together, and purchase common materials in bulk to earn discounts.
- A clothing firm has a program to analyze customer-buying patterns. Projects under this program might include one to send out and analyze electronic surveys, one to conduct several focus groups in different geographic locations with different types of buyers, and a project to develop an information system to help collect and analyze current customers' buying patterns.
- A government agency has a program for children's services, which includes a project to provide pre-natal care for expectant mothers, a project to immunize newborns and young children, and a project for developmental testing for pre-school children, to name a few.

Figure 1-4. Example programs

A **program manager** provides leadership and direction for the project managers heading the projects within the program. Program managers also coordinate the efforts of project teams, functional groups, suppliers, and operations staff supporting the projects to ensure that project products and processes are implemented to maximize benefits. Program managers are responsible for more than the delivery of project results; they are change agents responsible for the success of products and processes produced by those projects. Note that program managers are not the same as product managers. See Chapter 2 for more information on the difference between these roles.

Program managers often have review meetings with all their project managers to share important information and coordinate important aspects of each project. Many program managers worked as project managers earlier in their careers, and they enjoy sharing their wisdom and expertise with their project managers. Effective program managers recognize that

managing a program is much more complex than managing a single project. In addition to skills required for project managers, program managers must also possess strong business knowledge, leadership capability, and communication skills.

Project Portfolio Management

A **portfolio** is defined as a collection of "projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives."[18] Many organizations support an emerging business strategy of project portfolio management (also called just portfolio management) by continuously selecting and managing the optimum set of projects and programs to deliver maximum business value.

Portfolio managers need to understand how projects fit into the bigger picture of the organization, especially in terms of corporate strategy, finances, and business risks. They create portfolios based on meeting specific organizational goals, such as maximizing the value of the portfolio or making effective use of limited resources. Portfolio managers help their organizations make wise investment decisions by helping to select and analyze projects from a strategic perspective. Portfolio managers may or may not have previous experience as project or program managers. It is most important that they have strong financial and analytical skills and understand how projects and programs can contribute to meeting strategic goals.

The main distinction between project or program management and portfolio management is a focus on meeting tactical versus strategic goals. Tactical goals are generally more specific and short-term than strategic goals, which emphasize long-term goals for an organization. Individual projects and programs often address tactical goals, whereas portfolio management addresses strategic goals. Project and program management address questions like:

- Are we carrying out projects well?
- Are projects on time and budget?
- Do project stakeholders know what they should be doing?

Portfolio management addresses questions like:
- Are we working on the right projects?
- Are we investing in the right areas?
- Do we have the right resources to be competitive?

There can be portfolios for all types of projects. For example:
- In a construction firm, strategic goals might include increasing profit margins on large projects, decreasing costs on supplies, and improving skill levels of key workers. Projects could be grouped into these three categories for portfolio management purposes.
- In a clothing firm, strategic goals might include improving the effectiveness of IT, introducing new clothing lines, reducing inventory costs, and increasing customer satisfaction. These might be the main categories for their portfolio of projects.
- A government agency for children's services could group projects into a portfolio based on strategies such as improving health, providing education, and so on to help make optimum decisions on use of available funds and resources.

Organizations group projects into portfolios to help them make better investment decisions, such as increasing, decreasing, discontinuing, or changing specific projects or programs based on their financial performance, risks, resource utilization, and similar factors that affect business value. If a construction firm has much higher profit margins on apartment buildings than single-family homes, for example, it might choose to pursue more apartment building projects. The firm might also create a new project to investigate ways to increase profits for single-family home projects. On the other hand, if the company has too many projects focused on financial performance and not enough focused on improving its work force, the portfolio manager might suggest initiating more projects to support that strategic goal. Just like a personal financial portfolio, a business's portfolio should be diversified to account for risk.

By grouping projects into portfolios, organizations can better tie their projects to meeting strategic goals. Portfolio management can also help organizations do a better job of managing its human resources by hiring, training, and retaining workers to support the projects in the organization's portfolio. For example, if the construction firm needs more people with experience in building apartment buildings, they can make necessary adjustments by hiring or training current workers in the necessary skills.

AGILE

As mentioned earlier, there is growing interest in organizational agility to respond more quickly and effectively to an ever-changing world. There is an abundance of information, books, videos, and courses on agile which address this required responsiveness. The following is just a brief overview. More details and examples are provided throughout the text.

What is Agile?

There are several different definitions of agile. The Agile Alliance (2021) defines **agile** as "the ability to create and respond to change." Merriam-Webster dictionary (2021) defines agile as "marked by ready ability to move with quick easy grace," like an agile dancer. Based on these definitions, it seems that every individual and organization would want to be agile. Why wouldn't you manage all projects using agile? Of course, it's not that simple. There were over 80 different frameworks for agile by 2021! Figure 1-5 pokes fun at this situation.
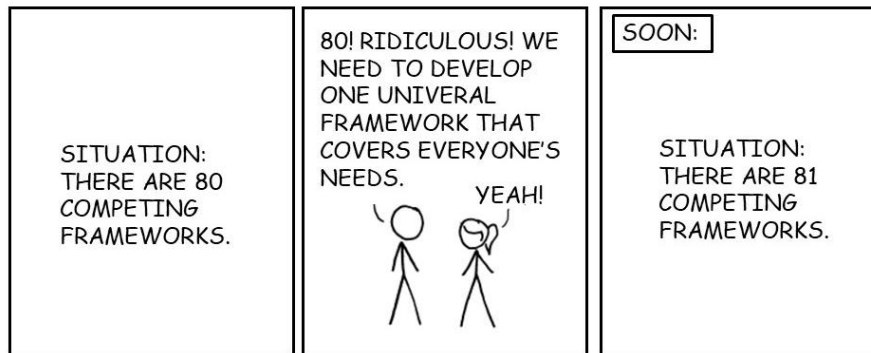
Figure 1-5: How agile frameworks proliferated, adapted from xkcd.com

PMI's *Agile Practice Guide* (2017) defines agile as "a term used to describe a mindset of values and principles as set forth in the Agile Manifesto." Early software development projects used what is often called a waterfall or predictive approach, where requirements were defined in detail before any software was written. Many of those projects took years to complete, if completed at all, and often did not produce the desired results. In response to the need to improve the process, a group of 17 people (called the Agile Alliance) developed the Manifesto for Agile Software Development and the 12 principles behind it in 2001, as shown in Figure 1-6.

Most projects are *not* software development projects, but many projects can benefit from the values and principles described in the Agile Manifesto, such as valuing individuals, focusing on delivering useful results versus paperwork, collaborating with customers as well as other people, responding to change, allowing teams to self-organize, reflecting on how to work more effectively, and so on. You can replace the word "software" with "products" or "solutions" so that it applies to all types of projects. Unfortunately, today many people associate agile with scrum, a popular agile framework.

According to "The Scrum Guide" (2020), **scrum** is "a lightweight framework that helps people, teams and organizations generate value through adaptive solutions for complex problems."[19] Scrum and other agile frameworks are described in more detail in later chapters. An important concept in truly understanding and successfully implementing agile is having an agile mindset.

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Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more

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Principles behind the Agile Manifesto

We follow these principles:

1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

</div>

Figure 1-6. Manifesto for Agile Software Development and Principles behind the Agile Manifesto (www.agilemanifesto.org (accessed August 16, 2021)).

What is an Agile Mindset?

Gil Broza, author of "The Agile Mind-Set" (2015), emphasizes the need to focus on values, beliefs, and principles before following specific frameworks or processes. He describes how to think and make choices in an agile way by focusing on the *why* before the *how*. Many organizations that have tried to become agile have failed because they jump to specific frameworks without adopting the proper mindset first. Failure is often due to the organization's culture being at odds with the agile mindset.

One way to describe people or organizations with an agile mindset is to compare them to those with bureaucratic mindset. Most people understand bureaucracy, where organizations operate in a top-down hierarchy with many layers and divisions. Organizations with a bureaucratic mindset have a goal of making money for their firm and maximizing shareholder value. Individuals report to bosses who define their roles, rules of work, and performance criteria. Organizations with an agile mindset, in contrast, use a network of teams focused on the goal of delivering value to their customers. Work is best accomplished through small, self-organizing teams working in short cycles to deliver something of value to the customer. "Such organizations have been shown to have the capacity to adapt rapidly to a quickly shifting marketplace."[20]

WHAT IS THE DIFFERENCE BETWEEN PREDICTIVE, AGILE, AND HYBRID PROJECT MANAGEMENT?

Agile project management, also called **adaptive project management**, is used to describe an approach where the project scope cannot be well-defined upfront, incremental releases are desired, and changes are expected. Some people describe agile projects as having variable scope constraints and fixed time and cost constraints. To be successful in this scenario, key stakeholders should be continuously involved in the project. For example, if you want a website for your small business, need some features available as soon as possible, are unsure of all of the features, and want to be actively involved in its development, an agile approach makes more sense than a predictive one.

      Predictive project management, also called **waterfall** or **traditional project management**, are terms used to describe an approach where most of the project planning is done upfront, there is a single final product, service, or result delivered at the end of the project, change is constrained, costs and risks are controlled, and stakeholders are involved at specific milestones. Many projects or parts of projects are well-suited to this type of approach. For example, if you are remodeling a kitchen on a fairly fixed budget, you should be able to do most of the planning upfront (decide on the layout, pick out the appliances, countertops, cabinets, sink, tiles, etc.), get a good cost and schedule estimate for the work, and check in with the people doing the work periodically. Small changes are to be expected, but you have a good idea of what outcome will be before construction begins.

      The term **hybrid project management** is used to describe a mixture or combination of predictive and agile approaches. Some organizations will use predictive project management on some projects and agile project management on others. Some will use a bit of both approaches on the same project. For example, some tools or techniques considered to be predictive (i.e. project charters, milestone reports, Gantt charts, lessons-learned repositories, etc.) or agile (scrums or daily stand-ups, self-organized teams, prioritized backlogs, Kanban boards, etc.) may be useful for many projects. Some projects that produce several different products might use an agile approach for some deliverables and a predictive approach for others. For example, the design of a house or development of smart technology within the house can be done using an agile approach, and the construction can use a more predictive

approach. You might also use a hybrid approach because your customers, suppliers, or other stakeholders prefer to work one way and you prefer to work another.

A 2021 research report based on 477 projects in various industries found that 52% of the projects could be categorized as using a hybrid project management approach. Respondents categorized the type of projects as 65% software and 35% other. The median budget for these projects was $450,000; the median duration was 12 months; and the median team size was 10 people. Interesting findings from this study include the following:

- Project management approach was not associated with project performance in terms of meeting traditional scope, time, cost, and quality goals.
- Projects managed using agile and hybrid approaches significantly outperformed predictive approaches when it came to stakeholder success, measured as a combination of sponsor, client, and team satisfaction with the project.
- "Hybrid approaches were found to be similar in effectiveness to fully agile approaches. Results validate decisions by practitioners to combine agile and traditional practices and suggest that hybrid is a leading project management approach."[21]

You will find many different opinions on agile, agile mindsets, and agile project management. Some people say that all projects and all organizations must be agile. Some say they must use disciplined agile, where teams choose their way of working (WOW). The 2021 study cited in the previous paragraph suggests that hybrid project management is the leading approach. As mentioned earlier, project management should be tailored to meet the unique needs of the project. A small project involving new technology should be managed differently than a large project using well-known technology. Projects also exist in unique environments where the organizational culture, team dynamics, and competition play important roles.

The increased interest in agile is based partly on the hope that it will somehow make project management easier. Many books, courses, and consultants are capitalizing on this "new" approach. Seasoned project managers understand that they have always had the option of tailoring or customizing how they run projects, but that project management is not easy, even when using agile. Dan S. Roman, a senior project manager and scrum master, gives many talks and webinars on project management and was named Certification Volunteer of the Year by PMI in 2020. He continues to state that you cannot just copy what someone else does and expect it to work on your projects. You must continue to try, fail, and learn. He believes in using whatever practices make sense instead of trying to follow specific methodologies or frameworks. When asked what was the most important thing he learned about managing projects over his career, he said it was to let people work together to figure out the best way to get work done. Sounds like great advice!

THE PROJECT MANAGEMENT PROFESSION

As you can imagine, good project managers should have a variety of skills. Good program and portfolio managers often need additional skills and experience in managing projects and understanding organizational strategies. This section describes some of the skills that help you manage projects, and you will learn many more throughout this text. If you are serious about considering a career in project management, you should consider earning one or more

certifications. You should also be familiar with some of the project management software products available on the market today.

Suggested Skills for Project Managers

Project managers and their teams must develop knowledge and skills in the following areas:

- All ten project management knowledge areas and the eight project performance domains, tools, and techniques
- The application area (domain, industry, market, etc.)
- The project environment (politics, culture, change management, etc.)
- General business (financial management, strategic planning, etc.)
- Human relations (leadership, motivation, communication, etc.)

Earlier sections of this chapter introduced the ten project management knowledge areas, the eight project performance domains, and tools, and techniques (or models, methods, and artifacts) that project managers use. You'll see many examples of these concepts throughout the text.

The application area refers to the application to which project management is applied. For example, a project manager responsible for building houses or apartment buildings should understand the construction industry, including standards and regulations important to that industry and those types of construction projects. A project manager leading a large software development project should know a lot about that application area. A project manager in education, entertainment, the government, and other fields should understand those application areas. The application area is defined by the product, service, or result. Many organizations have defined their approach to creating specific products. The project is about applying that approach, i.e., the product defines the project. Chapter 2 provides more information on product management versus project management.

The project environment differs from organization to organization and project to project, but there are some skills that will help in most project environments. These skills include understanding change, and understanding how organizations work within their social, political, and physical environments. Project managers must be comfortable handling change because most projects introduce changes in organizations and involve changes within the projects themselves. Project managers need to understand the organizations they work in and how they develop projects and provide services. For example, it takes different skills and behavior to manage a project for a Fortune 100 company in the U.S. than it does to manage a government project for a new business in Poland or India.

Project managers should also possess general business knowledge and skills. They should understand important topics related to financial management, accounting, procurement, sales, marketing, the supply chain, compensation, and so on. On some projects, it will be critical for project managers to have substantial experience in one or several of these general business areas. On other projects, project managers can delegate detailed responsibility for some of these areas to a team member, support staff, or even a supplier. Even so, the project managers must be intelligent and experienced enough to know which of these areas are most important and who is qualified to do the work. They must also make and/or take responsibility for all key project decisions.

Achieving high performance on projects requires human relations skills, also known as *soft skills*. Some of these soft skills include leadership, effective communication, influencing the organization to get things done, motivation, negotiation, conflict management, and problem solving. Project managers must lead their project teams by providing vision, creating an energetic and positive working environment, and setting an example of appropriate and effective behavior. Project managers must focus on teamwork skills to use their people effectively. They need to be able to motivate different types of people and develop *esprit de corps* within the project team and with other project stakeholders.

PMI Talent Triangle® and the Importance of Leadership Skills

PMI developed a talent triangle to emphasize the types of skills project managers need to continuously develop. The talent triangle includes:

- Technical project management skills: Understanding the knowledge areas, performance domains, tools, and techniques fall into this category, as well as understanding predictive, agile, and hybrid approaches to managing projects.
- Strategic and business management skills: Topics include strategic planning (described in more detail in Chapter 2), financial management, accounting, marketing, etc.
- Leadership skills: Leadership and management are terms often used interchangeably, although there are differences. Generally, a **leader** focuses on long-term goals and big-picture objectives, while inspiring people to reach those goals. A **manager** often deals with the day-to-day details of meeting specific goals. Some people say that, "Managers do things right, and leaders do the right things." "Leaders determine the vision, and managers achieve the vision." "You lead people and manage things."

Leadership is a soft skill, and there is no one best way to be a leader. Peter Northouse, author of a popular text called *Leadership: Theory and Practice*, says, "In the past 60 years, as many as 65 different classification systems have been developed to define the dimensions of leadership."[22] Leadership will be discussed in more detail in later chapters.

Project managers often take on the role of both leader and manager. Good project managers know that people make or break projects, so they must set a good example to lead their team to success. They are aware of the greater needs of their stakeholders and organizations, so they are visionary in guiding their current projects and in suggesting future ones. As mentioned earlier, program managers need the same skills as project managers. They often rely on their past experiences as project managers, strong business knowledge, leadership capability, and communication skills to handle the responsibility of overseeing the multiple projects that make up their programs. It is most important that portfolio managers have strong financial and analytical skills and understand how projects and programs can contribute to meeting strategic goals.

Companies that excel in project, program, and portfolio management grow project leaders, emphasizing development of business and leadership skills. Instead of thinking of leaders and managers as specific people, it is better to think of people as having leadership skills, such as being visionary and inspiring, and management skills, such as being organized

and effective. Therefore, the best project, program, and portfolio managers have leadership and management characteristics; they are visionary yet focused on the bottom line. Above all else, they focus on achieving positive results!

BEST PRACTICE

A **best practice** is "an optimal way recognized by industry to achieve a stated goal or objective."[23] Robert Butrick, author of The Project Workout, wrote an article on best practices in project management for the Ultimate Business Library's Best Practice book. He suggests that organizations need to follow basic principles of project management, including these two mentioned earlier in this chapter:
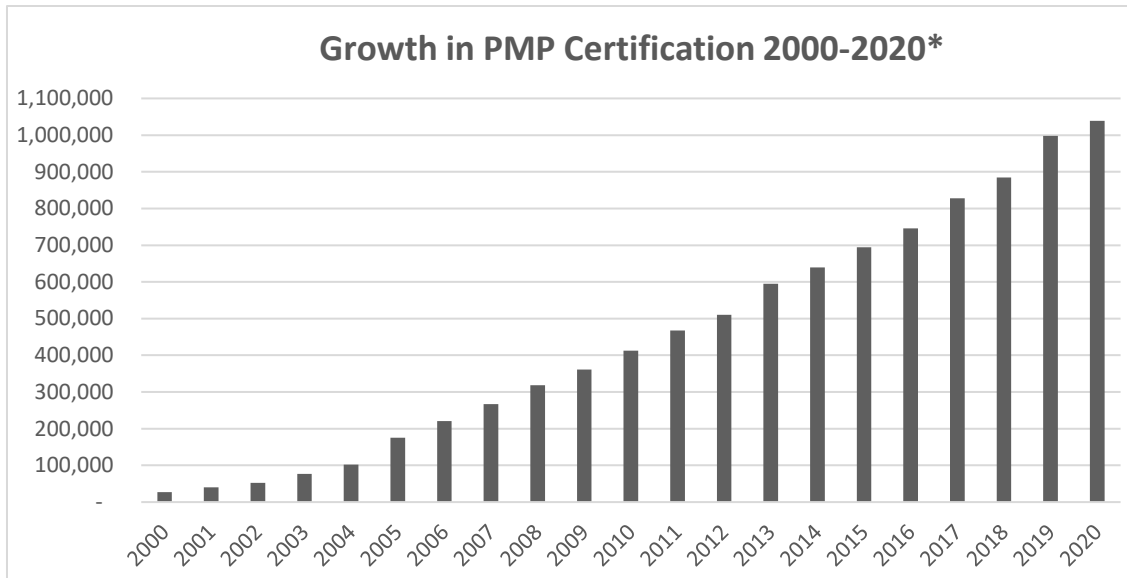
•   Make sure your projects are driven by your strategy. Demonstrate how each project you undertake fits your business strategy, and screen out unwanted projects as soon as possible.

•   Engage your stakeholders. Ignoring stakeholders often leads to project failure. Be sure to engage stakeholders at all stages of a project and encourage teamwork and commitment at all times. Use leadership and open communications to make things happen.[24]

Project Management Certifications

Professional certification is an important factor in recognizing and ensuring quality in a profession. The **Project Management Institute (PMI)** is a global professional society for project and program managers. PMI provides certification as a **Project Management Professional (PMP®)**—someone who has documented sufficient project experience, agreed to follow the PMI code of professional conduct, and demonstrated knowledge of the field of project management by passing a comprehensive examination.

The number of people earning PMP® certification continues to increase. In 1993, there were about 1,000 certified project management professionals. By the end of September 2020 there were 1,038,797 active PMP®s. There were also 46,357 CAPM®s (Certified Associates in Project Management).[25] PMI and other organizations also offer additional certifications.

Figure 1-7 shows the rapid growth in the number of people earning project management professional certification from 1993 through September 30, 2020. Although most PMP®s are in the U.S. and Canada, the PMP® credential is growing in popularity in several countries, such as Japan, China, and India. There are also requirements to maintain active certification status by continuing to develop expertise in the field. Consult PMI's website for more details.

Growth in PMP Certification 2000-2020*

*2020 data is through September 30, 2020, the last data reported in PMI Today.

Figure 1-7. Growth in PMP® certification, 1993–2020

Other certifications besides the PMP® and CAPM® are summarized below:

- PMI provides several other certifications related to business analysis, program management, risk management, scheduling, project management readiness, and several certifications related to agile.
- In 2021, Google launched a project management certification as part of their "Grow with Google" program. (Other Google certifications include IT support, data analytics, user experience (UX) design, and Android development.) Google's project management certificate program is geared toward people looking for an entry-level job in project management and requires no prior experience. It includes over 100 hours of online education provided through the Coursera platform. They suggest completing the program in under six months with 5-10 hours of study a week, but you can work at your own pace. You can get a 7-day free trial, and the program costs $39/month.
- PRINCE2, or Projects in Controlled Environments, is a process-based method for effective project management known across the world. In 2021 they announced that they had over one million certified PRINCE2 professionals.
- In 2021 Scrum.org announced that there were over 557,000 professional scrum certifications held throughout the world.
- The International Project Management Association (IPMA) provides several levels of certification based on successful experience in managing projects. In 2021 they announced that they had over 320,000 certified project professionals.

- CompTIA offers the Project+ focused on business professionals managing small- to medium-sized projects.

The goal of this book is to help you understand and be able to apply several important project management concepts. If you are interested in and ready to become certified, decide which certification is best for you. See Chapter 10 for more details on earning and maintaining the popular PMP® certification.

PMI Student Membership and Certification Information

As a student, you can join PMI for a reduced fee ($32 vs. $139 in 2021). Consult PMI's website (*www.pmi.org*) for more information. You can network with other students studying project management by joining a local chapter. Many welcome students to attend free events, including job networking. You can volunteer to help develop your skills and serve your community. Students should consider earning the Certified Associate in Project Management (CAPM®) credential from PMI. If you complete a bachelor's degree, you do not need any work experience to earn the CAPM®. However, if you have enough work experience, the PMP® is more marketable. See Chapter 10 of this book and the companion website (http://intropm.com Links tab) for more information on certification and several other topics.

Ethics in Project Management

Ethics, loosely defined, is a set of principles that guide our decision making based on personal values of what is "right" and "wrong." Making ethical decisions is an important part of our personal and professional lives because it generates trust and respect with other people. Project managers often face ethical dilemmas. For example, several projects involve different payment methods. If a project manager can make more money by doing a job poorly, should he or she do the job poorly? No! If a project manager is personally opposed to the development of nuclear weapons, should he or she refuse to manage a project that helps produce them? Yes! Ethics guide us in making these types of decisions.

PMI has a Code of Ethics and Professional Conduct which applies not only to PMP®s, but to all PMI members and individuals who hold a PMI certification, apply for a PMI certification, or serve PMI in a volunteer capacity. It is vital for project management practitioners to conduct their work in an ethical manner. Even if you are not affiliated with PMI, these guidelines can help you conduct your work in an ethical manner, which helps the profession earn the confidence of the public, employers, employees, and all project stakeholders. The PMI Code of Ethics and Professional Conduct includes short chapters addressing vision and applicability, responsibility, respect, fairness, and honesty.

Project Management Careers

How does one become a project manager? In the past, many people became project managers by accident. They had never heard of the job title, and their organizations did not have a real career path for project managers. They may have led a small project part-time and then been thrown into the role of project manager on a larger project. Today, individuals and organizations often take a more proactive approach. Some people study project management

in college and enter the field upon graduation. Others gain expertise in a certain industry and/or application area in a more technical capacity and then move into project management when they believe (or their bosses believe) they can lead a team.

The need for project managers is evident in recent studies and job postings.

- "As opportunities are growing, much of the available talent is reaching retirement age. These factors are creating an extraordinarily positive jobs outlook for skilled project professionals. By 2027, employers will need 87.7 million individuals working in project management-oriented roles."[26]
- In June 2020, LinkedIn listed project management jobs as #3 in the top 10 jobs identified as having the greatest number of openings, steady growth, and a livable wage.
- Sixty percent of hiring managers say interest in project management careers among younger job applicants has grown over the past decade. Suggestions for young people interested in breaking into and succeeding in project management include earning a certification (such as the PMP® or CAPM®), volunteering for leadership roles, speaking up for a position, and learning to delegate and empower team members.[27]

What is a typical career path for project managers? Being a project manager is a demanding yet rewarding profession, for the right person. Many people start off leading a small project related to their current job, part-time, to make sure they are cut out for and enjoy the work. Some organizations require their people to have a few years of experience before they let them lead any projects. Others hire entry-level people with the title of project coordinator or project manager.

Many organizations realize that they need to provide a structured career path to develop and maintain their talent pipeline for project managers. After leading a small project, many people go on to lead multiple small projects, larger projects, or become program managers. Some organizations have different levels of project managers, often based on knowledge and experience.

What if you do not want to stay in a project management career path? You can often go back to your former, more technical position, and move along that career path. Or, many ex-project managers move into higher level management positions, such as director, vice president, or even CEO. Some become consultants, educators, or entrepreneurs. Their experience leading projects makes them marketable in several different careers.

Project Management Software

The project management and software development communities have definitely responded to the need for more software to assist in managing projects. There are hundreds of tools available, ranging from free online or smart phone apps to enterprise tools costing thousands of dollars to implement plus high monthly fees per user. Deciding which project management software to use has become a project itself.

A 2020 report estimates that the global project portfolio management (PPM) market size will reach USD 11.4 billion by 2027, a compound annual growth rate of 13.4% from 2020 to 2027. "Project-intensive organizations across different industry verticals have recognized the advantages of the PPM solution and have employed it to automate and simplify several

operations and efficiently manage project lifespan. The PPM solution offers managers and organizations with the capability to see the big picture, confirming the use of best practices, principles, solutions, and standards during the project lifespan… the benefits offered by PPM solutions are propelling the growth of this market."[28]

Demand for software to help manage agile projects has also increased. Over 40,000 professionals responded to the 14th Annual State of Agile Report, with 95% of them reporting their organizations practiced some agile development methods, even though about *half said that most of their teams were not agile.* They reported using a wide variety of software tools, as listed in Figure 1-8. [29] It is interesting to note that some of these tools were not specifically designed for agile, such as Excel and Google Docs. People are still trying to figure out the best way to manage projects, and sometimes simple, well-known tools can be helpful. Examples of using several of these tools are used throughout this text.

Percentage of Respondents Using Tool

Tool	Percentage
Atlassian JIRA	67%
Microsoft Excel	40%
Microsoft Azure DevOps	23%
Google Docs	19%
VersionOne	12%
Other	12%
Microsoft Project	9%

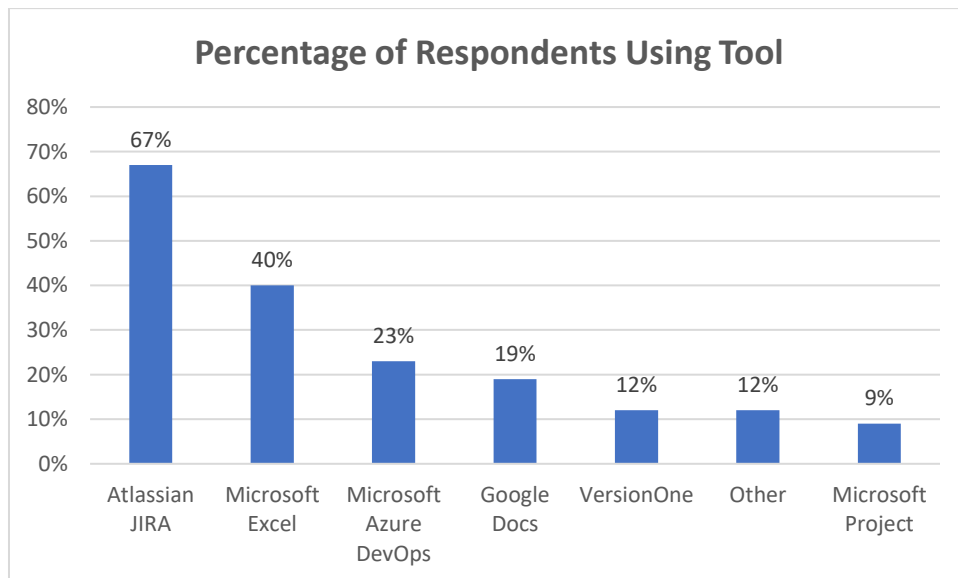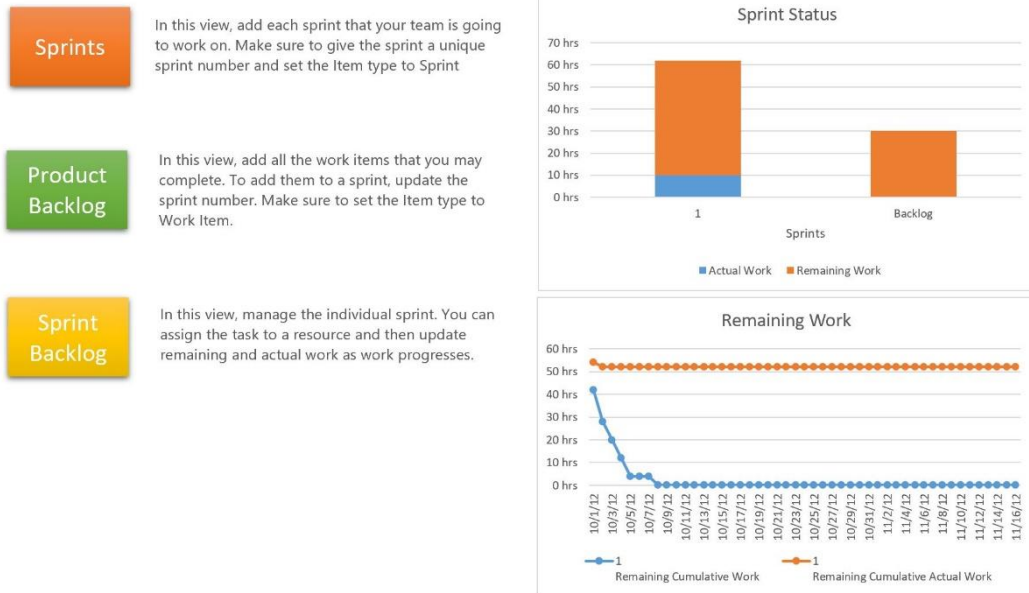**Figure 1-8. Use of agile project management tools**

Figures 1-9 and 1-10 show screenshots from a free trial of Microsoft Project. The first shows an instruction screen describing how to use Project to manage agile projects, and the second shows a sample Gantt chart, often used to show schedules for predictive projects. This example is from a Microsoft Project template file for residential construction.

Using Project to Manage your Agile Projects

Sprints

In this view, add each sprint that your team is going to work on. Make sure to give the sprint a unique sprint number and set the Item type to Sprint

Product Backlog

In this view, add all the work items that you may complete. To add them to a sprint, update the sprint number. Make sure to set the Item type to Work Item.

Sprint Backlog

In this view, manage the individual sprint. You can assign the task to a resource and then update remaining and actual work as work progresses.

Filter these charts to the current sprint you are working on by clicking on the chart and then the filter icon.

Figure 1-9. Using Microsoft Project to manage your agile projects

Figure 1-10. Sample Gantt chart in Microsoft Project

Figure 1-11 shows a screenshot from the free trial of Atlassian Jira showing a product backlog with a sprint in progress that the author created for the sample agile case study on this textbook's website. Figure 1-12 shows some of the reports available in Jira. Note that many project management tools are cloud-based, with new features added often.

Figure 1-11. Sample product backlog in Jira

Figure 1-12. Sample agile reporting charts in Jira

This text shows several screen shots from Microsoft Project and Jira, as well as several other software tools, such as Excel, MindView and Basecamp.

Free Trials and Information on Using Microsoft Project, Jira, Asana, MindView, Basecamp, and Other Software
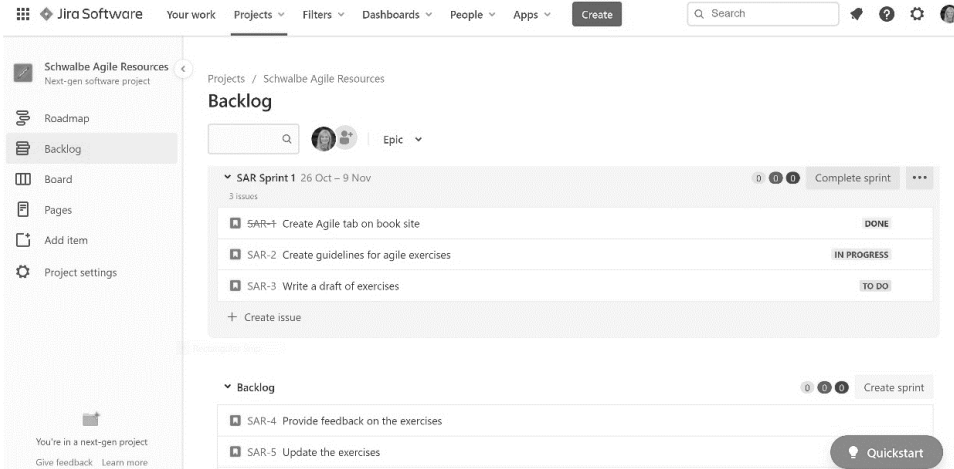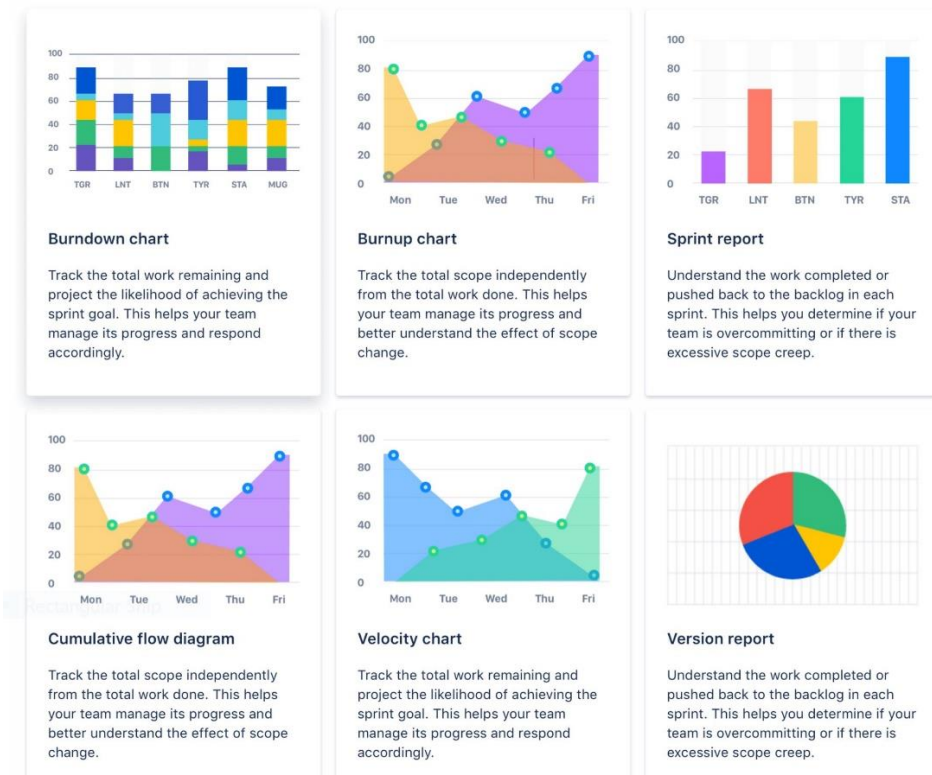
A 30-day evaluation copy of many tools, such as Microsoft Project and MindView, are available from their company websites. Other tools, including Jira, Asana, and Basecamp, provide trial versions of their software for unlimited timeframes. See Appendix A, Resources, for more information on these and other tools. Also see this book's companion website for links to updated information on project management software at http://intropm.com/.

It's very important to remember the old saying, however, that "A fool with a tool is still just a fool." People will always try to exploit "new" ideas—project portfolio management, agile, servant leadership, six sigma, healthy eating, you name it—to make money. Before investing in any tool, learn the fundamental concepts and decide what is most appropriate for you and your organization.

By 2021, people in virtually every industry around the globe began to investigate and apply different aspects of project, program, and portfolio management using predictive, agile, and hybrid approaches. The sophistication and effectiveness with which organizations use these concepts and tools today is influencing the way companies do business and respond to market needs with speed and accuracy. As mentioned earlier, there are many reasons to study project, program, and portfolio management. The number of projects continues to grow, the complexity of these projects continues to increase, and the profession of project management continues to expand and mature. Many colleges, universities, and companies now offer courses related to various aspects of project, program, and portfolio management. The growing number of projects and the evidence that good project management really can make a difference continue to contribute to the growth of this field.

CASE WRAP-UP

Another board member asked Doug Milis, the CEO, to describe more about specific projects that helped them succeed and how they developed such a strong culture of teamwork. He explained how Marie Scott, the Director of their Project Management Office (PMO) worked with him and other senior managers to quickly prioritize needs and define specific projects. For example, the first project identified was to define guidelines and procedures to ensure safety during the pandemic. Within days, the results were communicated and implemented throughout the organization. Another project assisted employees in working from home. Another project focused on communicating with key suppliers and customers to minimize work disruption. Fortunately, Marie had also overseen a program last year to train all employees on agile to help the organization become more flexible and responsive. A key part of that training was getting people to work in self-managed teams, focusing on being creative and professional in completing prioritized tasks. The board and the company's shareholders were very pleased with the results of these efforts and the company's continued success.

CHAPTER SUMMARY

There is a new or renewed interest in project management today as the number of projects continues to grow and their complexity continues to increase. A majority of projects fail to meet scope, schedule, and cost goals, costing organizations millions of dollars. Using a more disciplined approach to managing all types of projects can help organizations succeed.

A project is a temporary endeavor undertaken to create a unique product, service, or result. Projects are developed incrementally; they require resources, have a sponsor, and involve uncertainty. The triple constraint of project management refers to managing the scope, schedule, and cost dimensions of a project. There are other constraints as well.

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Stakeholders are the people involved in or affected by project activities. A framework for project management based on the *PMBOK® Guide - Sixth Edition*, includes the project stakeholders, project management knowledge areas, and project management tools and techniques. The ten knowledge areas are project integration management, scope, schedule, cost, quality, human resource, communications, risk, procurement, and stakeholder management. Another framework based on the *PMBOK® Guide - Seventh Edition*, emphasizes 12 project management principles, eight project performance domains, tailoring, and models, methods, and artifacts.

A program is a group of related projects, subsidiary programs, and program activities managed in a coordinated manner to obtain benefits not available from managing them individually. Project portfolio management involves organizing and managing projects and programs as a portfolio of investments that contribute to the entire enterprise's success. Portfolio management emphasizes meeting strategic goals while project management focuses on tactical goals.

Many organizations today are using agile to manage projects. It is important to use an agile mindset first to help agile projects succeed. The terms agile or adaptive project management describes an approach where the project scope cannot be well-defined upfront, incremental releases are desired, and changes are expected. To be successful in this scenario, key stakeholders should be continuously involved in the project. Predictive, waterfall, or traditional project management describes an approach where most of the project planning is done upfront, there is a single final product, service, or result delivered at the end of the project, change is constrained, costs and risks are controlled, and stakeholders are involved at specific milestones. A hybrid approach uses a mixture or combination of these two approaches.

The profession of project management continues to grow and mature. Project, program, and portfolio managers play key roles in helping projects and organizations succeed. They must perform various duties, possess many skills, and continue to develop skills in project management, general management, and their application area, such as IT, healthcare, or construction. Soft skills, especially leadership, are particularly important for project managers. The Project Management Institute (PMI) is an international professional society that provides certification as a Project Management Professional (PMP®) and upholds a code of ethics. The number of people earning PMP® certification continues to grow, and several other organizations provide certifications, including Google. Demand for project managers is high, and several organizations provide defined career paths. Hundreds of project management software products are available to assist people in managing projects.

QUICK QUIZ

Note that you can find additional, interactive quizzes at http://intropm.com.

1.   Which of the following statements is true?
      A.   Demand for projects and project managers continues to decrease.
      B.   Agile organizations do not respond better to change.
      C.   You must have work experience to earn the CAPM® credential.
      D.   According to PMI's salary survey (2020), professionals with a PMP® credential earned 22% more than those without it.

2.   A predictive approach to project management is also called _____.
      A.   adaptive
      B.   waterfall
      C.   iterative
      D.   scrum

3.   A _____ is a temporary endeavor undertaken to create a unique product, service, or result.
      A.   program
      B.   process
      C.   project
      D.   portfolio

4.   Which of the following is not an attribute of a project?
      A.   projects are unique
      B.   projects are developed using progressive elaboration
      C.   projects have a primary customer or sponsor
      D.   projects involve no uncertainty

5.   Which of the following is not part of the triple constraint of project management?
      A.   meeting scope goals
      B.   meeting schedule goals
      C.   meeting communication goals
      D.   meeting cost goals

6.   _____ is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.
      A.   Project management
      B.   Program management
      C.   Project portfolio management
      D.   Project performance domain

7.   Which of the following is not a project performance domain according to the
      PMBOK® Guide - Seventh Edition?
      A.   Development approach and life cycle
      B.   Planning
      C.   Delivery
      D.   Leadership

8.   Project portfolio management addresses _____ goals of an organization,
      while project management addresses _____ goals.
      A.   strategic, tactical
      B.   tactical, strategic
      C.   internal, external
      D.   external, internal

9.   Which of the following statements is true concerning agile project management?
      A.   You should use a tool like Jira and not Microsoft Project on agile projects.
      B.   All projects should be run using an agile framework such as scrum.
      C.   You cannot use both agile and predictive project management tools on the
            same project.
      D.   You should first understand and use an agile mindset before trying to
            implement agile project management.

10.   Which of the following statements is false concerning the project management
      profession?
      A.   Project managers, program managers, and portfolio managers require the
            same skillset.
      B.   The number of people earning the Project Management Professional (PMP®)
            has increased in recent years, and several other organizations, including
            Google, provide their own certifications in project management.
      C.   People in virtually every industry around the globe can benefit from good
            project management.
      D.   Many of the software tools used for managing agile projects can be used for
            predictive and hybrid projects.

Quick Quiz Answers

1. D, 2. B 3. C, 4. D, 5. C, 6. A, 7. D, 8. A, 9. D, 10. A.

DISCUSSION QUESTIONS

1.   Why is there a new or renewed interest in the field of project management? What
      statistics presented would motivate someone to begin a career in project management?
2.   What is a project, and what are its main attributes? How is a project different from
      what most people do in their day-to-day jobs? What is the triple constraint? What are
      other project constraints? Provide examples of projects and their constraints.

3.   What is project management? Briefly describe the project management framework based on the *PMBOK® Guide - Sixth Edition*, providing examples of stakeholders, knowledge areas, tools and techniques, and project success factors.

4.   Discuss the project management principles and project performance domains described in the *PMBOK® Guide - Sixth Edition*.

5.   What is agile? What is an agile mindset? What are the main differences between predictive, agile, and hybrid approaches to project management?

6.   Discuss the relationship between project, program, and portfolio management and their contribution to enterprise success.

7.   What are suggested skills for project managers? What is the talent triangle? What skills do you think good project managers possess?

8.   What types of certifications are available in project management? Why do you think the number of people earning project management certification keeps increasing?

9.   What types of software can assist in project management? What are some of the most popular tools on the market today for both agile and predictive project management? What unique functions can you perform with these tools perform?

EXERCISES

Note: These exercises can be done individually or in teams, in-class, as homework, or in a virtual environment. Learners can either write their results in a paper (one- to two-pages is usually sufficient) or prepare a short video, podcast, or presentation (5-10 minutes) to show their results.

1.   Review PMI's website (www.pmi.org) and read and summarize two articles from PM Network (a monthly magazine – under Learning, Publications). Summarize key information and your opinion of the articles.

2.   Find an example of a real project with a real project manager that was completed in the past year. Feel free to use projects mentioned in the media related to sporting events, entertainment, business, healthcare, etc. or a project from your work, if applicable. Describe the project in terms of its scope, schedule, and cost goals. Was it managed using a predictive, agile, or hybrid approach? Describe at least one example of what went right and wrong on the project. Also, describe whether you consider the project to be a success or not and why. Include at least one reference and proper citations.

3.   Review information about various project management software tools. Also, investigate smart phone apps for project management. Summarize your findings.

4.   Watch at least three videos of PMI's Project of the Year Award winners from PMI's website. Summarize key points from at least two of the videos. What did the project teams do to ensure success? What challenges did they face, and how did they overcome them?

5.   Research recent studies about project success, especially those that focus on benefits realization. Summarize your findings, citing at least two references from the past year.

6.   Research information about earning and maintaining PMP® and CAPM® certifications. How long do you think most people study for the PMP® exam? Review Google's project management certification. Do you think it is valuable? Do you think that having a certification makes you a more successful project manager? Summarize your findings and opinions.

7.   Go to *www.indeed.com* or another job search site and search for jobs as a "project manager" or "program manager" in three geographic regions of your choice. Summarize your findings, including the number of positions, qualifications, salary, and other information of interest to you.

TEAM PROJECTS

Note: Team projects can be done in-class, as homework, or in a virtual environment. Learners can either write their results in a paper (three- to four-pages is usually sufficient) or prepare a short video, podcast, or presentation (15-20 minutes) to show their results.

1.   Interviewing real project managers: Find two to three people who currently work as project managers. Use the interview guidelines below and ask the questions in person, via the phone, or via the Internet. Discuss the results with your team, and then summarize your findings.

Project Manager Interview Guidelines
Please note that these are guidelines and sample questions only. Use only the questions that seem appropriate, and feel free to add your own. If the interviewee wants to remain anonymous, that's fine. If not, please include his/her name and place of employment as a project manager in your paper. Let him/her know that you are doing this interview for a class assignment and that the information may be shared with others.

The main purpose of these interviews is for students to gain more insight into what project managers really do, what challenges they face, what lessons they've learned, what concepts/tools you're learning about that they really use, and what suggestions they have for you and other students as future team members and project managers. People often like to tell stories or relate particular situations they were in to get their points across. To this end, here are a few sample questions.

- How did you get into project management?
- If you had to rate the job of project manager on a scale of 1-10, with 10 being the highest, how would you rate it?
- Briefly explain the reason for your rating. What do you enjoy most and what do you like least about being a project manager?
- Did you have any training or special talents or experiences that qualified you to be a project manager? Are you certified or have you thought about becoming certified as a PMP®?
- What do you feel is the most important thing you do as a project manager? On what task do you spend the most time each day?
- What are some of the opportunities and risks you have encountered on projects? Please describe any notable successes and failures and what you have learned from them.

- What are some of the tools, software or otherwise, that you use, and what is your opinion of those tools?
- What are some steps a project manager can take to improve the effectiveness and efficiency of a team? How does a new project manager gain the respect and loyalty of team members? Can you share any examples of situations you faced related to this topic?
- What suggestions do you have for working with sponsors and senior managers? Can you share any examples of situations you faced related to this topic?
- Do you have any suggestions for future project managers, such as any specific preparations they should make, skills they should learn, etc.?

2.   Project ideas: As a team, discuss projects that you are currently working on or would like to work on to benefit yourself, your employer, your family, or the broader community. Come up with at least ten projects. Summarize the purpose of the projects, estimate the time and money needed to complete them, and document how you would measure if they were successful or note. Summarize your results.

3.   Agile: Agile today is used in many industries and on many types of projects (not just software development). Entire organizations are striving to be agile. Read two articles by McKinsey & Company: "The Journey to an Agile Organization and "An operating model for the next normal: Lessons from agile organizations in the crisis." Also find two additional articles published in the past year. Summarize your findings and opinions.

4.   Certifications: Summarize requirements for earning at least four different project management certifications. Which ones do you think are most valuable and why? Summarize your findings and opinions.

KEY TERMS

agile — The ability to create and respond to change.

agile or adaptive project management — An approach where the project scope cannot be defined upfront, incremental releases are desired, and changes are expected.

artifact — A template, document, output, or project deliverable.

best practice — An optimal way recognized by industry to achieve a stated goal or objective.

ethics — A set of principles that guide our decision making based on personal values of what is "right" and "wrong."

hybrid project management — A mixture or combination of predictive and agile approaches to managing projects**.**

leader — A person who focuses on long-term goals and big-picture objectives, while inspiring people to reach those goals.

manager — A person who deals with the day-to-day details of meeting specific goals.

megaproject — A very large project that typically costs over US $1 billion, affects over one million people, and lasts several years.

method — The means for achieving an outcome, output, result, or project deliverable.

model — A thinking strategy to explain a process, framework, or phenomenon.

net promoter score — A number that represents the customer's willingness to recommend a product or service to others.

principles — Foundational guidelines for strategy, decision making, and problem solving.

portfolio — A collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.

program — A group of related projects, subsidiary programs, and program activities managed in a coordinated manner to obtain benefits not available from managing them individually.

program manager — A person who provides leadership and direction for the project managers heading the projects within the program.

project — A temporary endeavor undertaken to create a unique product, service, or result.

project management — The application of knowledge, skills, tools, and techniques to project activities to meet project requirements.

project management process groups — Initiating, planning, executing, monitoring and controlling, and closing.

project manager — The person responsible for working with the project sponsor, the project team, and the other people involved in a project to meet project goals.

Project Management Institute (PMI) — International professional society for project managers.

project management knowledge areas — Project integration management, scope, schedule, cost, quality, human resource, communications, risk, procurement, and stakeholder management.

Project Management Professional (PMP®) — Certification provided by PMI that requires documenting project experience, agreeing to follow the PMI code of ethics, and passing a comprehensive exam.

project management tools and techniques — Methods available to assist project managers and their teams; some popular tools in the time management knowledge area include Gantt charts, network diagrams, critical path analysis, and project management software.

project performance domain — A group of related activities that are critical for the effective delivery of project outcomes.

project portfolio management — The grouping and managing of projects and programs as a portfolio of investments.

project sponsor — The person who provides the direction and funding for a project.

scrum — A lightweight framework that helps people, teams and organizations generate value through adaptive solutions for complex problems.

stakeholders — People involved in or affected by project activities.

triple constraint — Balancing scope, schedule, and cost goals.

value — The worth, importance, or usefulness of something.

waterfall, **predictive**, or **traditional project management** — Terms used to describe an approach where most of the project planning is done upfront, there is a single final product, service, or result delivered at the end of the project, change is constrained, costs and risks are controlled, and stakeholders are involved at specific milestones.

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