

**Note: This file includes only chapter 1
as a preview of the book.**

**An Introduction to Project
Management, Sixth Edition**

**With a Brief Guide to Microsoft Project
Professional 2016**

By

Kathy Schwalbe

Professor Emeritus, Augsburg College

Department of Business Administration

Minneapolis, Minnesota

An Introduction to Project Management, Sixth Edition

Cover Photo: Dan Schwalbe

©2017 Schwalbe Publishing
ISBN-13: 978-1544701899
ISBN-10: 1544701896

ALL RIGHTS RESERVED. No part of this work covered by the copyright hereon may be reproduced, transmitted, stored, or used in any form or by any means graphic, electronic, or mechanical, including but not limited to photocopying, recording, scanning, digitizing, taping, Web distribution, information networks, or information storage and retrieval systems, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the author.

Materials from Kathy Schwalbe's Information Technology Project Management are used with permission from Cengage Learning.

Microsoft and the Office logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All screenshots from Microsoft products are used with permission from Microsoft.

Information and screenshots from MindView are used with permission from MatchWare. Information and screenshots from Basecamp are used with permission from Basecamp.

Some of the product names and company names used in this book have been used for identification purposes only and may be trademarks or registered trademarks of their respective manufacturers and sellers.

This publication is a derivative work of *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition*, which is copyrighted material of and owned by, Project Management Institute, Inc. (PMI), Copyright 2017. This publication has been developed and reproduced with the permission of PMI. Unauthorized reproduction of this material is strictly prohibited. The derivative work is the copyrighted material of and owned by, Schwalbe Publishing, Copyright 2017.

PMI, PMP, CAPM, OPM3, and PMBOK are registered marks of the Project Management Institute, Inc.

Published by Schwalbe Publishing in Minneapolis, MN, September 2017.

Free companion website at www.intropm.com.

Visit www.pmtxts.com or www.kathyschwalbe.com for more information on this and other books by Kathy Schwalbe.

For Dan, Anne, Bobby, and Scott

My husband and children continue to be my inspiration.

*My son-in-law, Jeremy, and grandson, Freddie,
are welcome additions to our family!*

BRIEF TABLE OF CONTENTS

Chapter 1	An Introduction to Project, Program, and Portfolio Management	1
Chapter 2	Project, Program, and Portfolio Selection	37
Chapter 3	Initiating Projects	71
Chapter 4	Planning Projects, Part 1 (Project Integration and Scope Management)	112
Chapter 5	Planning Projects, Part 2 (Project Time and Cost Management)	147
Chapter 6	Planning Projects, Part 3 (Project Quality, Resource, Communications, Stakeholder, Risk, and Procurement Management)	190
Chapter 7	Executing Projects	243
Chapter 8	Monitoring and Controlling Projects	299
Chapter 9	Closing Projects	339
Chapter 10	Best Practices in Project Management	361
Appendix A	Brief Guide to Microsoft Project 2016	389
Appendix B	Resources	452
Appendix C	Case Studies	460
Glossary		479
Index		488

Chapter 1

An Introduction to Project, Program, and Portfolio Management

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
- Describe project management and discuss key elements of the project management framework, including project stakeholders, the project management knowledge areas, common tools and techniques, project success factors, and project benefits measurement
- Discuss the relationship between project, program, and portfolio management and their contributions to enterprise success
- Describe the project management profession, including the role of project managers and suggested skills, the role of professional organizations like the Project Management Institute, the importance of certification and ethics, project management careers, and the growth of project and portfolio management software

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 large construction companies, they had a very difficult year. After having scaled down operations a few years ago, this past year they had trouble finding enough qualified workers to meet the growing demand for new construction. 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, Gabe. Honestly, I think the main reason we survived this year was because we are truly a project-based organization. We have dramatically improved our ability to quickly select and implement projects that help our company succeed and cancel or redirect other projects. All our projects align with our business strategies, and we have consistent processes in place for getting things done. We can also respond quickly to market changes, unlike many of our competitors. Marie Scott, our Director of the Project Management Office (PMO), has done an outstanding job in making this happen. And believe me, it was not easy. It’s never easy to implement changes across an entire company. But with this new capability to manage projects across the organization, 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 industries. Today’s project management involves much more, and people in every industry and every country manage projects. New technologies have become a significant factor in many businesses, and the use of interdisciplinary and global work teams has radically changed the work environment. The facts below demonstrate the significance of project management:

- Demand for projects continues to increase, with GDP contributions from project-oriented industries forecasted to be US\$20.2 trillion by 2017. Employers will need 87.7 million individuals working in project management-oriented roles by 2027. “The talent gap could result in a potential loss of some US\$207.9 billion in GDP through 2027.”¹
- “Job Outlook 2017” says the market is good for college graduates who demonstrate the most important attribute employers want: the ability to work as part of a team.²
- Organizations waste \$97 million for every \$1 billion spent on projects, according to Project Management Institute’s (PMI’s) 2017 Pulse of the Profession® report. That represents a 20% improvement from the previous year. Organizations realize that excelling at project management definitely affects the bottom line.³
- The United States (U.S.) signed The Program Management Improvement and Accountability Act (PMIAA) into law in December 2016 to enhance best practices in project and program management throughout the federal government.
- In 2015, the average salary for someone in the project management profession in U.S. dollars was \$108,200 per year in the U.S.; \$134,000 in Switzerland, (the highest-paid

country); and \$19,602 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 \$130,000. Of the 9,677 people from the U.S. who responded to PMI's salary survey, 81% had the Project Management Professional (PMP®) credential, and their salary was over 22% higher than those without it. This data is based on responses from over 26,000 people in 34 countries.⁴

- It is also interesting to note that 38% of the salary survey respondents were women, 11% had a degree in project management, and the project management department or Project Management Office (PMO) was the department most listed at 31%.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) executive managers 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. U.S. companies spent more than \$250 billion each year in the early 1990s on approximately 175,000 IT application development projects. Examples of these projects included creating a new database for a state department of motor vehicles, developing a new system for car rental and hotel reservations, and implementing a client-server architecture for the banking industry. Their study reported that the overall success rate of IT projects was 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 later study, PricewaterhouseCoopers surveyed 200 companies from 30 different countries about their project management maturity and found that over half of all projects failed. They also found that only 2.5 percent of corporations consistently met their targets for scope, schedule, and cost goals for all types of projects. These statistics made people understand the need to improve the practice of project management.⁷

Although several researchers question the methodology of the CHAOS studies, their popularity has 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. This chapter introduces projects and project management, 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.

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
- A college campus upgrades its technology infrastructure to provide wireless Internet access
- A medical technology firm develops a device that connects to smart phones
- A school implements new government standards for tracking student achievement
- A group of musicians starts a company to help children develop their musical talents
- A pharmaceutical company launches a new drug
- A television network develops a system to allow viewers to vote for contestants and provide other feedback on programs
- The automobile industry develops standards for electric cars
- A government group develops a program to track child 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:

- 2016: National Synchrotron Light Source II, New York USA
- 2015: El Segundo Refinery Coke Drum Reliability Project, California USA
- 2014: AP60 Phase 1 Project, Jonquiere, Quebec, Canada

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 www.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 in order 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. Unlike the pilot captain in the comic in Figure 1-1, project managers (and real pilots, too) must be professional on the job. You can develop skills to help manage uncertainty and other challenges you will face in managing projects.



Figure 1-1. Captain speaking (www.xkcd.com)

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 1-2 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.

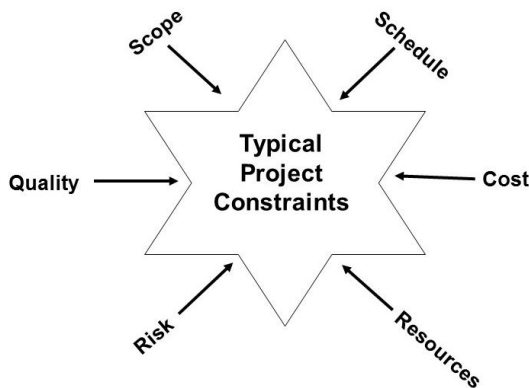


Figure 1-2. Typical project constraints

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 particular 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 communications 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.

Figure 1-3 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.

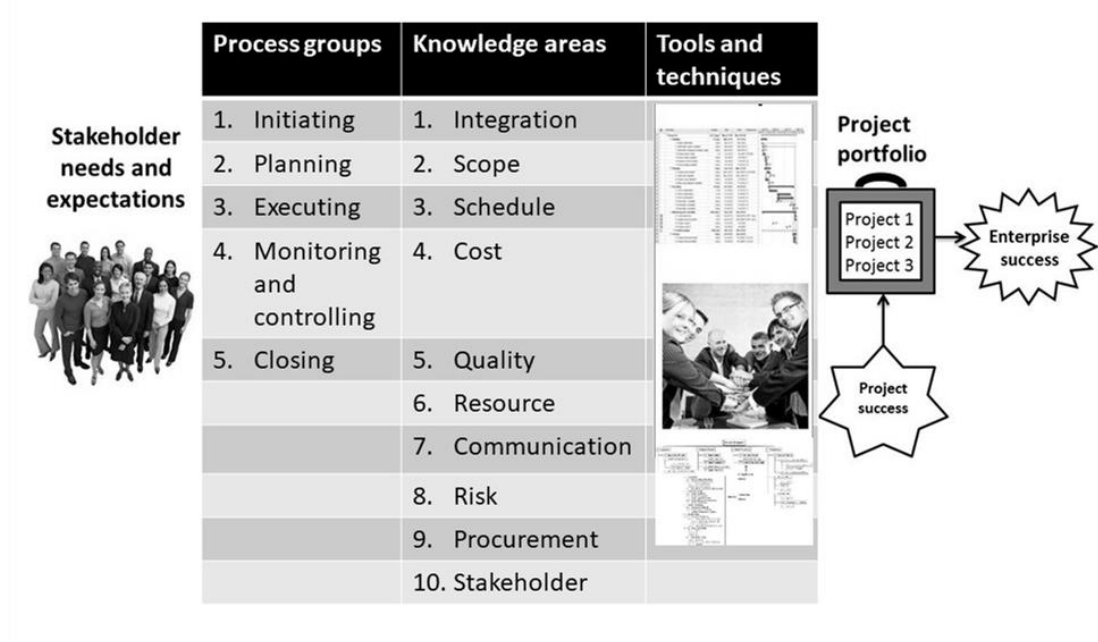


Figure 1-3. Project management framework

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 home they could afford given their budget constraints. The new homeowners would have to make important decisions to keep the costs of the house within their budget. Can they afford to finish the basement right away? If they can afford to finish the basement, will it affect the projected move-in date? In this example, the project sponsors are also the customers and users for the product, which is the house.
- The project manager 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. For example, the carpenter cannot put in kitchen cabinets until the walls are completed.
- 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 the city council and mayor, who would be interested in increasing revenues. They might suggest certain guidelines for the minimum value of the homes for providing adequate property taxes. The city may also have regulations to ensure the safety of the public in the area of 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. Note that PMI renamed project time management to

project schedule management and project human resource management to project resource management in the *PMBOK® Guide – Sixth Edition* in 2017.

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, some popular schedule-management tools and techniques include Gantt charts, project network diagrams, and critical path analysis. Figure 1-4 lists some commonly used tools and techniques by knowledge area. You will learn more about these and other tools and techniques throughout this text.

Knowledge Area/Category	Tools and Techniques
Integration management	Project selection methods, project management methodologies, project charters, project management plans, project management software, change requests , change control boards, project review meetings, lessons-learned reports
Scope management	Scope statements, work breakdown structures , mind maps, statements of work, requirements analyses , scope management plans, scope verification techniques, and scope change controls
Schedule management	Gantt charts , project network diagrams, critical-path analyses, crashing, fast tracking, schedule performance measurements
Cost management	Net present value, return on investment, payback analyses, earned value management, project portfolio management, cost estimates, cost management plans, cost baselines
Quality management	Quality metrics, checklists, quality control charts, Pareto diagrams, fishbone diagrams, maturity models, statistical methods
Resource management	Motivation techniques, empathic listening, responsibility assignment matrices, project organizational charts, resource histograms, team building exercises
Communications management	Communications management plans, kickoff meetings , conflict management, communications media selection, status and progress reports , virtual communications, templates, project websites
Risk management	Risk management plans, risk registers, probability/impact matrices, risk rankings
Procurement management	Make-or-buy analyses, contracts, requests for proposals or quotes, source selections, supplier evaluation matrices
Stakeholder management	Stakeholder registers, stakeholder analyses, issue logs, interpersonal skills, reporting systems

Figure 1-4. Common project management tools and techniques by knowledge area

Note: The bolded items are “super tools.”

A survey of 753 project and program managers was conducted to rate several project management tools. Respondents were asked to rate tools on a scale of 1–5 (low to high) based on the extent of their use and the potential of the tools to help improve project success. “Super tools” were defined as those that had high use and high potential for improving project success. These super tools included software for task scheduling (such as project management software), scope statements, requirements analyses, and lessons-learned reports. Tools that were already extensively used and have been found to improve project performance included progress reports, kick-off meetings, Gantt charts, and change requests. These super tools are bolded in Figure 1-4.¹⁰

The *PMBOK® Guide – Sixth Edition* now lists tools and techniques based on their purpose, as follows:

- *Data gathering*: benchmarking, brainstorming, check sheets, checklists, focus groups, interviews, market research, questionnaires and surveys, statistical sampling
- *Data analysis*: alternatives analysis, assessment of other risk parameters, assumption and constraint analysis, cost of quality, cost-benefit analysis, decision tree analysis, document analysis, earned value analysis, influence diagrams, iteration burndown chart make-or-buy analysis, performance reviews, process analysis, proposal evaluation, regression analysis reserve analysis, risk data quality assessment, risk probability and impact assessment, root cause analysis, sensitivity analysis, simulation stakeholder analysis SWOT analysis, technical performance analysis, trend analysis, variance analysis, and what-if scenario analysis
- *Data representation*: affinity diagrams, cause-and-effect diagrams, control charts, flow charts, hierarchical charts, histograms, logical data models, matrix diagrams, matrix-based charts, mind mapping, probability and impact matrix, scatter diagrams, stakeholder engagement assessment matrix, stakeholder mapping/representation, and text-oriented formats
- *Decision making*: multi-criteria decision analysis and voting
- *Communication*: feedback and presentations
- *Interpersonal and team skills*: active listening, communication styles assessment, conflict management, cultural awareness, decision making, emotional intelligence, facilitation, influencing, leadership, meeting management, motivation, negotiation, networking, nominal group, observation/conversation, political awareness, team building
- *Ungrouped*: advertising, agile release planning, analogous estimating, audits, bidder conferences, bottom-up estimating, change control tools, claims administration, colocation, communication methods, communication models, communication requirements analysis, communication technology, context diagram, contingent response strategies, cost aggregation, critical path method, decomposition, dependency determination and integration, design for X, expert judgment, financing, funding limit reconciliation, ground rules, historical information review, individual and team assessments, information management, inspections, knowledge management, leads and lags, meetings, organization theory, parametric estimating, pre-assignment, precedence diagramming method, problem solving,

product analysis, project management information system, project reporting, prompt lists, prototypes, quality improvement methods, recognition and rewards, representations of uncertainty, resource optimization, risk categorization, rolling wave planning, schedule compression, schedule network analysis, source selection analysis, strategies for opportunities strategies for overall project risk, strategies for threats, test and inspection planning, testing/product evaluations, three-point estimating, to-complete performance index, training, virtual teams

These long lists of tools and techniques can be overwhelming. This text will focus on those used most often and with the most potential, providing the context and detailed examples for using them. It is crucial for project managers and their team members to determine which tools will be most useful for their particular projects. Selecting the appropriate tools and techniques (as well the processes, inputs, outputs, and life cycle phases, discussed later in this book) is part of project tailoring. Project management should be tailored to meet the unique needs of projects, organizations, and most importantly, people. After all, projects are done by, and for, people.

Despite its advantages, project management is not a silver bullet that guarantees success on all projects. Some projects, such as those involving new technologies, have a higher degree of uncertainty, so it is more difficult to meet their scope, schedule, and cost goals. 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 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 was rude to them or made important decisions without their approval. Perhaps the quality of some of the construction or materials was not acceptable. If the customers were not happy about important aspects of the project, it would be deemed a failure based on this criterion. Many organizations implement a customer satisfaction rating system for projects to measure project success.
- The results of the project met its main objective, such as making or saving a certain amount of money, providing a good return on investment, or simply making the sponsors happy. 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 this criterion. As another example, suppose the owners wanted to keep the house for just a few years and then sell it for a good return. If that happened, the couple would deem the project a success, regardless of other factors involved. Note that for many projects done to meet ROI objectives, financial success cannot be determined until sometime after the project is completed.

Project managers play a vital role in helping projects succeed. Project managers work with the project sponsors, the project team, and the other stakeholders involved in a project to meet project goals. They also work with the sponsor to define success for that particular project. Good project managers do not assume that their definition of success is the same as the sponsors' definition. They take the time to understand their sponsors' expectations. For example, if you are building a home for someone, find out what is most important:

- Meeting scope, schedule, and cost goals of the project to build the home
- Satisfying other needs, such as communicating in a certain way
- Ensuring the project delivers a certain result, such as providing the home of the owners' dreams or a good return on investment.

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 percent 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 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

The success criteria should help you to develop key performance indicators (KPIs) needed to track project progress. It is important to document this information in enough detail to eliminate ambiguity. A project benefits management plan should be created early in the project life cycle and updated as needed, as described in later chapters.

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** 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.”¹² Programs are not large projects; 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.
- 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.¹³

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 1-5 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 1-5. 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.

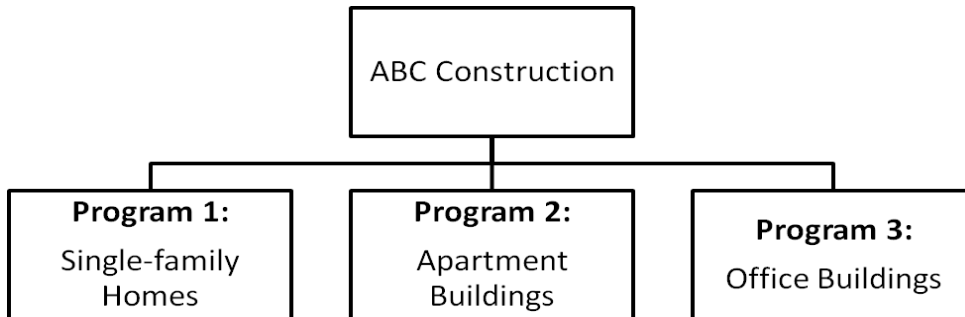


Figure 1-5. Example programs

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.

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 “projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.”¹⁴ 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.

Figure 1-6 provides a comparative overview of project, program, and portfolio management. **Organizational project management** is a “framework in which portfolio, program, and project management are integrated with organizational enablers in order to achieve strategic objectives.”¹⁵

Organizational Project Management

	Projects	Programs	Portfolios
Definition	A project is a temporary endeavor undertaken to create a unique product, service, or result.	A program is a group of related projects, subsidiary programs and program activities that are managed in a coordinated way to obtain benefits not available from managing them individually.	A portfolio is a collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.
Management	Project managers manage the project team to meet the project objectives.	Programs are managed by program managers who ensure that program benefits are delivered as expected, by coordinating the activities of a program's components.	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
Monitoring	Project managers monitor and control the work of producing the products, services, or results that the project was undertaken to produce	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	A program's success is measured by the program's ability to deliver its intended benefits to an organization, and by the program's efficiency and effectiveness in delivering those benefits.	Success is measured in terms of the aggregate investment performance and benefit realization of the portfolio.

Figure 1-6. Organizational project management framework (parts of figure)

Source: Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

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.

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 becoming a certified Project Management Professional. You should also be familiar with some of the project management software products available on the market today.

Suggested Skills for Project, Program, and Portfolio Managers

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

- All ten project management knowledge areas
- 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, negotiations, etc.)

An earlier section of this chapter introduced the ten project management knowledge areas, as well as some tools and techniques that project managers use. 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 must know a lot about that application area. A project manager in education, entertainment, the government, and other fields must 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.

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 leading and handling change, since 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 products are developed and services are provided. 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. It also takes different skills and behaviors to manage a project in the construction industry from one in the entertainment or pharmaceutical industry.

Project managers should also possess general business knowledge and skills. They should understand important topics related to financial management, accounting, procurement, sales, marketing, contracts, manufacturing, distribution, logistics, the supply chain, strategic planning, tactical planning, operations management, organizational structures and behavior, personnel administration, compensation, benefits, career paths, and health and safety practices. 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 effective communication, influencing the organization to get things done, leadership, motivation, negotiation, conflict management, and problem solving. Project managers must lead their project teams by providing vision, delegating work, creating an energetic and positive environment, and setting an example of appropriate and effective behavior. Project managers must focus on teamwork skills in order 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:

1. *Technical project management skills*: Understanding the knowledge areas, process groups, and project management tools and techniques fall into this category.
2. *Strategic and business management skills*: Topics include strategic planning (described in more detail in Chapter 2), financial management, accounting, marketing, and other topics listed in the previous section.
3. *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.”¹⁶ Some classification systems focus on group processes, while others focus on personality traits or behaviors. For example, the *PMBOK® Guide – Sixth Edition* briefly describes the following leadership styles:

1. **Laissez-faire:** Meaning “let go,” this hands-off approach lets teams determine their own goals and how to achieve them.
2. **Transactional:** This management by exception approach focuses on achieving goals or compliance by offering team members appropriate rewards and punishments.
3. **Servant leader:** People using this approach focus on relationships and community first and leadership is secondary.
4. **Transformational:** By working with others to identify needed changes, these leaders empower others and guide changes through inspiration.
5. **Charismatic:** These people can inspire others based on their enthusiasm and confidence.
6. **Interactional:** This leadership style is a combination of transactional, transformational, and charismatic.

There are many different leadership styles in addition to the six listed above, and the one thing most experts agree on is that the best leaders are able to adapt their style to the needs of the situation.

Daniel Goleman, author of *Emotional Intelligence*, also wrote a book called *Primal Leadership*, which describes six different styles of leadership and situations where they are most appropriate:

1. *Visionary:* Needed when an organization needs a new direction, and the goal is to move people towards a new set of shared dreams. The leader articulates where the group is going, but lets them decide how to get there by being free to innovate, experiment, and take calculated risks.
2. *Coaching:* One-on-one style that focuses on developing individuals, showing them how to improve their performance. This approach works best with workers who show initiative and request assistance.
3. *Affiliative:* Emphasizes the importance of team work and creating harmony by connecting people to each other. This approach is effective when trying to increase morale, improve communication, or repair broken trust.
4. *Democratic:* Focuses on people’s knowledge and skills and creates a commitment to reaching shared goals. This leadership style works best when the leader needs the collective wisdom of the group to decide on the best direction to take for the organization.
5. *Pacesetter:* Used to set high standards for performance. The leader wants work to be done better and faster and expects everyone to put forth their best effort.
6. *Commanding:* Most often used, also called autocratic or military style leadership. This style is most effective in a crisis or when a turnaround is needed.

“The goal for leaders should be to develop a solid understanding of the different styles of leadership and their implications, and reach the point where choosing the right one for the situation becomes second nature to them.”¹⁷

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 experience 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!

See the Resources link on the companion website (www.intropm.com) for additional readings related to leadership as well as other important topics, including project management certification, as discussed in the following section.

MEDIA SNAPSHOT

A **best practice** is “an optimal way recognized by industry to achieve a stated goal or objective.”¹⁸ 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.¹⁹

Project Management Certification

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 December, 2016 there were 745,891 active certified project management professionals. There were also 32,868 CAPM®s (Certified Associates in Project Management).²⁰

Figure 1-7 shows the rapid growth in the number of people earning project management professional certification from 1993 through 2016. 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 related to the PMI talent triangle of technical project management, strategic and business management, and leadership.

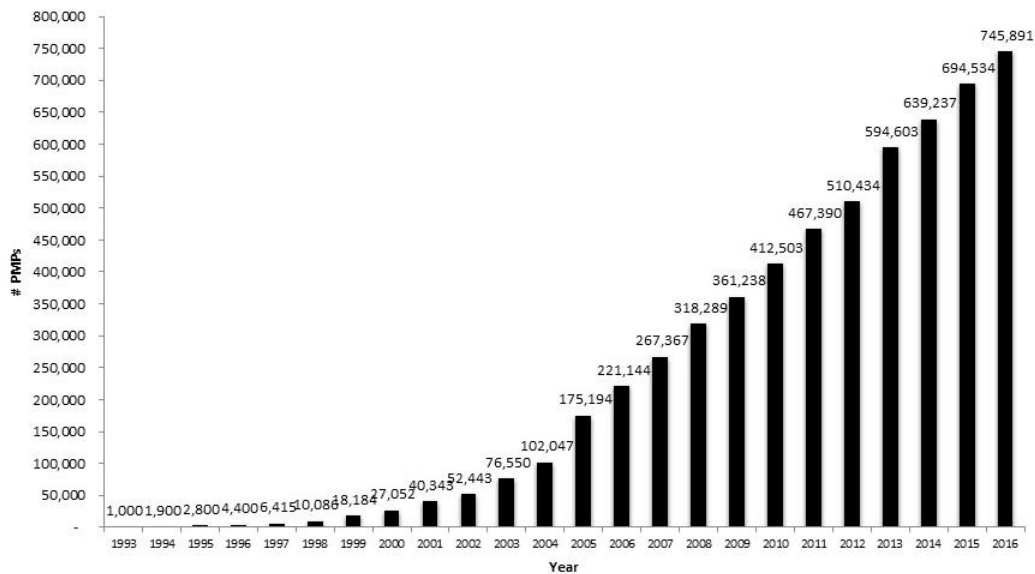


Figure 1-7. Growth in PMP® certification, 1993–2016

Some companies are requiring that all project managers be PMP® certified. Project management certification is also enabling professionals throughout the world to share a common base of knowledge and terminology. For example, any person with PMP® certification can list, describe, and use the ten project management knowledge areas. Sharing a common base of knowledge and set of terminology is important because it helps advance the theory and practice of project management.

Many colleges, universities, and companies around the world now offer courses related to various aspects of project management. You can even earn bachelors, masters, and doctoral degrees in project management. PMI reported in 2008 that of the 280 institutions it has identified that offer degrees in project management, 103 are in mainland China. “When Western companies come into China they are more likely to hire individuals who have PMP®

certification as an additional verification of their skills. In our salary survey, the salary differences in IT, for example, was dramatic. A person with certification could make five to six times as much salary, so there is a terrific incentive to get certified and work for these Western companies.”²¹ Today, there are even more degree programs in project management. A recent gradschools.com search for “project management” found 370 campus and online accredited graduate, certificate, and doctoral programs from all types of institutions. PMI also manages a Global Accreditation Center (GAC), listing 110 GAC accredited programs in 2017.

PMI Student Membership and Certification Information

As a student, you can join PMI for a reduced fee (\$32 vs. \$139 in 2017). 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 the companion website (www.intropm.com) section called Links 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 approved a new Code of Ethics and Professional Conduct effective January 1, 2007. This code 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. A few excerpts from this document include the following:

“As practitioners in the global project management community:

- 2.2.1 We make decisions and take actions based on the best interests of society, public safety, and the environment.
- 2.2.2 We accept only those assignments that are consistent with our background, experience, skills, and qualifications.

- 2.2.3. We fulfill the commitments that we undertake—we do what we say we will do.
- 3.2.1 We inform ourselves about the norms and customs of others and avoid engaging in behaviors they might consider disrespectful.
- 3.2.2 We listen to others' points of view, seeking to understand them.
- 3.2.3 We approach directly those persons with whom we have a conflict or disagreement.
- 4.2.1 We demonstrate transparency in our decision-making process.
- 4.2.2 We constantly reexamine our impartiality and objectivity, taking corrective action as appropriate.
- 4.3.1 We proactively and fully disclose any real or potential conflicts of interest to appropriate stakeholders.
- 5.2.1 We earnestly seek to understand the truth.
- 5.2.2 We are truthful in our communications and in our conduct."²²

In addition, PMI added a new series of questions to the PMP® certification exam in March 2002 and continues to include this topic to emphasize the importance of ethics and professional responsibility.

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, often as a project coordinator. 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. Some people earn the CAPM® or PMP® certification to move into project management roles within their own companies or at different ones.

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

- Between 2010 and 2020, 15.7 million new project management roles will be created globally across seven project-intensive industries. Along with job growth, there will be a significant increase in the economic footprint of the profession; the project management profession is slated to grow by USD\$6.61 trillion.²³
- Indeed.com, a popular job search site, listed over 354,000 jobs in the U.S. when searching for project manager in March 2017. Cities with the most openings included New York City, Chicago, Seattle, San Francisco, and Washington, D.C.
- 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.²⁴

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 to provide 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 and high monthly fees per user. Deciding which project management software to use has become a project in itself. Microsoft Project continues to lead the Project Portfolio Management (PPM) market with 35% of the \$874 million market, followed by Oracle (19%), ServiceNow, Inc. (7%), and SAP and Autodesk (5% each).²⁵

See Appendix A for details on the various configurations available for Microsoft Project and detailed instructions for using Project Professional 2016, the product available for a free trial. This section provides a summary of the basic types of project management software available and references for finding more information.

Free Trials and Information on Using Project 2016, MindView, Basecamp, and Other Software

A 60-day evaluation copy of Microsoft Project is available from Microsoft's website. Note that the trial is for Project Professional 2016, which requires Windows. You can also access a 30-day trial version of MindView software for PCs, Macs, or an online version at www.matchware.com. Basecamp is a totally online project management tool. Educators can request a free Basecamp account without a time restriction from www.basecamp.com. See Appendix A for a guide to using Project 2016 and Appendix B for information on MindView and Basecamp. There are many other tools available, and most offer free trials.

Many people still use basic productivity software such as Microsoft Word and Excel to perform many project management functions, including determining project scope, schedule, and cost, assigning resources, and preparing project documentation. People often use productivity software instead of specialized project management software because they already have it and know how to use it. However, there are hundreds of project management software tools that provide specific functionality for managing projects. These project management software tools can be divided into three general categories based on functionality and price:

- **Low-end tools:** These tools provide basic project management features and generally cost less than \$200 per user or a low monthly fee for online software. They are often recommended for small projects and single users. Most of these tools allow users to create Gantt charts, which cannot be done easily using current productivity software. Some of these tools are available online while others are stand-alone desktop applications. There are also several smart phone applications, and many online tools include smart phone integration. Examples of popular low-end tools include BaseCamp (described further in Appendix B), Smartsheet, and Trello.
- **Midrange tools:** A step up from low-end tools, midrange tools are designed to handle larger projects, multiple users, and multiple projects. All of these tools can produce Gantt charts and network diagrams, and can assist in critical path analysis, resource allocation, project tracking, status reporting, and other tasks. Prices range from about \$200 to \$600 per user or require a monthly fee per user. Microsoft Project (Professional, to be specific) is still the most widely used project management software today in this category and in general. Figure 1-8 provides a screen shot from showing a Gantt chart for a project that you can create by following the steps in Appendix A. There is also an enterprise or PPM version of Microsoft Project, as described briefly below and in more detail from Microsoft’s website.

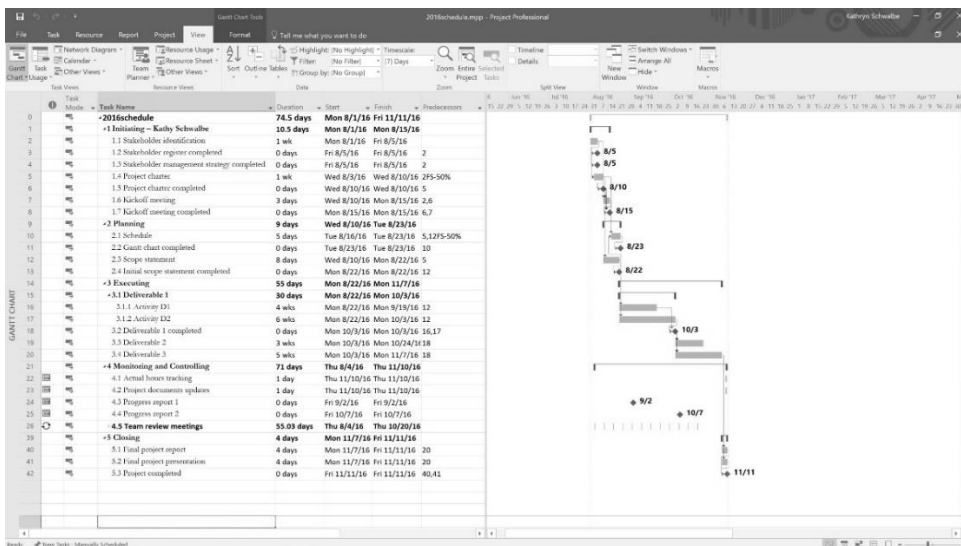


Figure 1-8. Screenshot from Microsoft Project Professional showing a Gantt chart

- *High-end tools:* Another category of project management software is high-end tools, sometimes referred to as PPM or enterprise project management software, as described earlier. These tools provide robust capabilities to handle very large projects, dispersed workgroups, and enterprise and portfolio management functions that summarize and combine individual project information to provide an enterprise view of all projects. These products are generally licensed on a per-user basis, integrate with enterprise database management software, and are accessible via the Internet and smart phones. In mid-2002, Microsoft introduced the first version of their Enterprise Project Management software, and in 2003, they introduced the Microsoft Enterprise Project Management solution, which was updated several times since then. In 2008, Oracle acquired Primavera Software, Inc., another popular tool for project-intensive industries.

Several free or open-source tools are also available. For example, ProjectLibre, LibrePlan, and OpenProject are all free open-source project management tools. Remember, however, that these tools are developed, managed, and maintained by volunteers and may not be well supported. See Appendix B for information on several tools, including Basecamp, which provides free accounts for educators with no time limitation.

By the end of the twentieth century, people in virtually every industry around the globe began to investigate and apply different aspects of project, program, and portfolio management. The sophistication and effectiveness with which organizations use these concepts and tools today is influencing the way companies do business, use resources, 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 what the PMO Director did to help the company become more successful at managing projects. He explained how Marie Scott worked with him and all the VPs to reorganize several parts of the company to support their new emphasis on project, program, and project portfolio management. They formed a project team to implement a web-based project management software tool across the enterprise. They formed another team to develop project-based reward systems for all employees. They also authorized funds for a project to educate all employees in project management and to develop a mentoring program for project, program, and project portfolio managers. Doug and Marie had successfully convinced everyone that effectively selecting and managing projects was crucial to their company's future. The board and the company's shareholders were very pleased with the results.

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. The 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.

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 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.

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.

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. 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. Microsoft Project is the most popular.

QUICK QUIZ

Note that you can find additional, interactive quizzes at www.intropm.com

1. Which of the following statements is false?
 - A. Demand for project managers continues to increase.
 - B. Employers prefer college graduates with the ability to work as part of a team.
 - C. Organizations waste \$97 million for every \$1 billion spent on projects, according to a 2017 PMI report.
 - D. According to PMI's salary survey, professionals with a PMP® credential earned 22% more than those without it.

2. Approximately what percentage of global projects fail, according to PricewaterhouseCoopers?
 - A. 50%
 - B. 30%
 - C. 15%
 - D. 75%

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 communications 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. Requirements management

7. 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
8. Several individual housing projects done in the same area by the same firm might best be managed as part of a _____.
 - A. portfolio
 - B. program
 - C. investment
 - D. collaborative
9. Which of the following skills is not part of PMI's project management talent triangle?
 - A. technical project management
 - B. strategic/business
 - C. application area
 - D. leadership
10. What is the popular certification program called that the Project Management Institute provides?
 - A. Microsoft Certified Project Manager (MCPM)
 - B. Project Management Professional (PMP®)
 - C. Project Management Expert (PME)
 - D. Project Management Mentor (PMM)

Quick Quiz Answers

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

DISCUSSION QUESTIONS

1. Why is there a new or renewed interest in the field of project management? What statistics presented provide the most motivation for you to study 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?
3. What is project management? Briefly describe the project management framework, providing examples of stakeholders, knowledge areas, tools and techniques, and project success factors.
4. Discuss the relationship between project, program, and portfolio management and their contribution to enterprise success.
5. What are suggested skills for project managers? What is the PMI talent triangle? Discuss different leadership styles and your views on leadership.
6. What role does PMI play in advancing the profession?

7. What functions can you perform with project management software? What are the main differences between low-end, midrange, and high-end tools?

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 or prepare a short presentation to show their results.

1. Review PMI's website (www.pmi.org) and read and summarize one article from PM Network (a monthly magazine – under Learning, Publications). Write a one-page paper or prepare a short presentation summarizing key information and your opinion of the article.
2. Read the latest PMI report called the “Pulse of the Profession.” Download the entire report from www.pmi.org – under Learning, Publications. Write a one-page paper or prepare a short presentation summarizing key information and your opinion of the report.
3. Find an example of a real project with a real project manager. Feel free to use projects in the media (the Olympics, television shows, movies, and so on) or a project from work, if applicable. Write a one-page paper or prepare a short presentation describing the project in terms of its scope, schedule, and cost goals and each of the project's attributes. Try to include information describing what went right and wrong on the project and the role of the project manager and sponsor. Also, describe whether you consider the project to be a success or not and why. Include at least one reference and proper citations.
4. Go to www.mastersinprojectmanagement.com to search for graduate schools that offer courses and programs related to project management. Review schools by location and format. Summarize your findings and opinions in a short paper or presentation.
5. Review information about various project management software tools. Also, investigate smart phone apps for project management. Write a one-page paper or prepare a short presentation summarizing your findings.
6. 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? Write a short paper or prepare a presentation summarizing your findings.
7. Research recent studies about project success, especially those that focus on benefits realization. Write a short paper or prepare a presentation summarizing your findings.
8. Write a short paper or prepare a presentation summarizing your views of your personal leadership style and experience. How do you think people can improve their leadership skills?
9. Research information about earning and maintaining PMP® and CAPM® certifications. See the Links section of www.intropm.com for some references. Summarize your findings in a short paper or presentation.

TEAM PROJECTS

1. Find someone who works as a project manager or is a member of a project team. If possible, find more than one person. 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 prepare a one- to two-page paper or prepare a short presentation to 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.

- 1) How did you get into project management?
- 2) 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?
- 3) Briefly explain the reason for your rating. What do you enjoy most and what do you like least about being a project manager?
- 4) 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®?
- 5) 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?
- 6) 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.
- 7) What are some of the tools, software or otherwise, that you use, and what is your opinion of those tools?
- 8) 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?
- 9) 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?
- 10) Do you have any suggestions for future project managers, such as any specific preparations they should make, skills they should learn, etc.?

2. 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. Write a one- to two-page paper or prepare a short presentation summarizing what you found.
3. As a team, discuss projects that you are currently working on or would like to work on to benefit yourself, your employers, your family, or the broader community. Come up with at least ten projects, and then determine if they could be grouped into programs. Write a one- to two-page paper or prepare a short presentation summarizing your results.
4. Review information about the exams required for earning PMP® and CAPM® certification. Find and take several sample tests. Document your findings in a one- to two-page paper or short presentation, citing your references.

KEY TERMS

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

Charismatic — These people can inspire others based on their enthusiasm and confidence.

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

interactional — This leadership style is a combination of transactional, transformational, and charismatic.

laissez-faire — Meaning "let go," this hands-off approach lets teams determine their own goals and how to achieve them.

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.

organizational project management — A framework in which portfolio, program, and project management are integrated with organizational enablers in order to achieve strategic objectives.

portfolio — 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, and procurement 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 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.

servant leader — People using this approach focus on relationships and community first and leadership is secondary.

stakeholders — People involved in or affected by project activities.

transactional — This management by exception approach focuses on achieving goals or compliance by offering team members appropriate rewards and punishments.

transformational — By working with others to identify needed changes, these leaders empower others and guide changes through inspiration.

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

END NOTES

¹Project Management Institute, “Project Management Job Growth and Talent Gap 2017-2027,” (2017).

²National Association of Colleges and Employers, “Job Outlook 2017,” (2016).

³Project Management Institute, “Pulse of the Profession®: Success Rates Rise: Transforming the High Cost of Low Performance” (2017).

⁴Project Management Institute, *Earning Power: Project Management Salary Survey Ninth Edition* (2015).

⁵Ibid.

⁶Standish Group, “The CHAOS Report” (www.standishgroup.com) (1995).

⁷PriceWaterhouseCoopers, “Boosting Business Performance through Programme and Project Management” (June 2004).

⁸Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

⁹Ibid, p. 6.

¹⁰Claude Besner and Brian Hobbs, “The Perceived Value and Potential Contribution of Project Management Practices to Project Success,” PMI Research Conference Proceedings (July 2006).

¹¹Shane Hastie and Stéphane Wojewoda, “Standish Group 2015 Chaos Report - Q&A with Jennifer Lynch,” InfoQ (October 4, 2015).

¹²Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

¹³Tim Newcomb, “The World’s 25 Most Impressive Megaprojects,” *Popular Mechanics* (August 11, 2015).

¹⁴Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

¹⁵Ibid.

¹⁶Peter Northouse, *Leadership: Theory and Practice*, Seventh Edition, SAGE Publications, Inc. (2015) p. 5.

¹⁷ Bendelta, “Goleman’s 6 leadership styles – and when to use them,” *Fast Company* (December 9, 2014).

¹⁸Ultimate Business Library, *Best Practice: Ideas and Insights from the World’s Foremost Business Thinkers* (New York: Perseus 2003), p. 1.

¹⁹Ibid., p. 8.

²⁰The Project Management Institute, “PMI Today” (February 2017).

²¹Vanessa Wong, “PMI On Specialization and Globalization,” *Projects@Work* (June 23, 2008).

²²The Project Management Institute, “PMP® Credential Handbook,” (August 31, 2011).

²³The Project Management Institute, “Project Management Talent Gap Report,” (March 2013).

²⁴Rachel Bertsche, “How to Break Into Project Management—and Succeed,” *PM Network* (March 2015).

²⁵Albert Pang, “Top 10 Project Portfolio Management Software Vendors and Market Forecast 2015-2020,” *Apps Run The World* (June 30, 2016).