Covers Microsoft® Project 2010

Information Technology Project Management Revised 6e

Kathy Schwalbe

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COURSE TECHNOLOGY
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Information Technology Project Management, REVISED Sixth Edition

Kathy Schwalbe

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managing projects. By seeing how different organizations successfully implement project management, you can help your organization do the same.

Although project management has been an established field for many years, managing information technology projects requires ideas and information that go beyond standard project management. For example, many information technology projects fail because of a lack of user input, incomplete and changing requirements, and a lack of executive support. This book includes suggestions on dealing with these issues. New technologies can also aid in managing information technology projects, and examples of using software to assist in project management are included throughout the book.

Information Technology Project Management, REVISED Sixth Edition, is still the only textbook to apply all nine project management knowledge areas—project integration, scope, time, cost, quality, human resource, communications, risk, and procurement management—and all five process groups—initiating, planning, executing, monitoring and controlling, and closing—to information technology projects. This text builds on the *PMBOK® Guide, Fourth Edition,* an American National Standard, to provide a solid framework and context for managing information technology projects. It also includes an appendix, *Guide to Using Microsoft Project 2010,* which many readers find invaluable. A second appendix provides advice on earning and maintaining Project Management Professional (PMP) certification from the Project Management Institute (PMI) as well as information on other certification programs, such as CompTIA's Project+ certification. A third appendix provides new case studies and information on using simulation software to help readers apply their project management skills.

Information Technology Project Management, REVISED Sixth Edition, provides practical lessons in project management for students and practitioners alike. By weaving together theory and practice, this text presents an understandable, integrated view of the many concepts, skills, tools, and techniques involved in information technology project management. The comprehensive design of the text provides a strong foundation for students and practitioners in project management.

New to the REVISED Sixth Edition

Building on the success of the previous editions, *Information Technology Project Management, REVISED Sixth Edition,* introduces a uniquely effective combination of features. The main changes made to the REVISED Sixth Edition only involve Appendix A. We know that faculty cannot update texts every single year, so this revision only provides you the option of teaching your students with the latest edition of Microsoft Project, Project 2010. The Beta release has been out for several months, and the final product should be available in summer 2010.

Appendix A has been thoroughly updated based on Microsoft Project 2010. There are many updates in Project 2010. In addition to adopting the Ribbon interface, Project 2010 provides a manual scheduling option, a simple Timeline feature, and a Team Planner view to easily assign people to tasks and reduce overallocations.

The main changes between the Sixth Edition and the Fifth Edition include the following:

- Several changes were made to synchronize the Sixth Edition with the *PMBOK® Guide, Fourth Edition,* which PMI published in December 2008. Several

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often along with an image or video to illustrate different traffic signs or driving situations. I became concerned when I found I had no idea how to answer several questions, and I was perplexed when the test seemed to stop and a message displayed saying, "Please see the person at the service counter." This was a polite way of saying I had failed the test! After controlling my embarrassment, I picked up one of the Minnesota driving test brochures, studied it for an hour or two that night, and successfully passed the test the next day.

The point of this story is that it is important to study information from the organization that creates the test and not be overconfident that your experience is enough. Because this text is based on PMI's *PMBOK® Guide, Fourth Edition,* it provides a valuable reference for studying for PMP certification. It is also an excellent reference for CompTIA's Project+ exam. I have earned both of those certifications and kept them in mind when writing this text.

Provides Exercises, Running Cases, Templates, Sample Documents, and Optional Simulation Software

Based on feedback from readers, the Sixth Edition continues to provide challenging exercises and running cases to help students apply concepts in each chapter. There are over 50 templates, examples of real project documents, and optional simulation software developed by Fissure, a PMI Registered Education Provider, that you can use to actively practice your skills in managing a project. All of these features help the subject matter come alive and have more meaning.

Includes a Companion (Premium) Web site

A companion (premium) Web site provides you with a one-stop location to access informative links and tools to enhance your learning. Similar to other companion (premium) Web sites provided by Course Technology, this site will be a valuable resource as you view lecture notes, templates, interactive quizzes, podcasts, student files for Project 2010, important articles, references, and more. You can also link to the author's site to see real class syllabi, samples of student projects, and other helpful links.

Organization and Content

Information Technology Project Management, REVISED Sixth Edition, is organized into three main sections to provide a framework for project management, a detailed description of each project management knowledge area, and three appendices to provide practical information for applying project management. The first three chapters form the first section, which introduces the project management framework and sets the stage for the remaining chapters.

Chapters 4 through 12 form the second section of the text, which describes each of the project management knowledge areas—project integration, scope, time, cost, quality, human resource, communications, risk, and procurement management—in the context of information technology projects. An entire chapter is dedicated to each knowledge area. Each knowledge area chapter includes sections that map to their major processes as described in the *PMBOK® Guide, Fourth Edition.* For example, the chapter on project quality management includes sections on planning quality, performing quality assurance, and performing quality control. Additional sections highlight other important concepts related to each knowledge area, such as Six Sigma, testing, maturity models, and using software to

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assist in project quality management. Each chapter also includes detailed examples of key project management tools and techniques as applied to information technology projects. For example, the chapter on project integration management includes samples of various project-selection documents, such as net present value analyses, ROI calculations, payback analyses, and weighted scoring models. The project scope management chapter includes a sample project charter, a project scope statement, and several work breakdown structures for information technology projects.

Appendices A through C form the third section of the text, which provides practical information to help you apply project management skills on real or practice projects. By following the detailed, step-by-step guide in Appendix A, which includes more than 60 screen shots, you will learn how to use Project 2010. Appendix B summarizes what you need to know to earn PMP or other certifications related to project management. Appendix C provides additional running cases and information on using simulation software to help you practice your new skills.

Pedagogical Features

Several pedagogical features are included in this text to enhance presentation of the materials so that you can more easily understand the concepts and apply them. Throughout the text, emphasis is placed on applying concepts to current, real-world information technology project management.

Learning Objectives, Chapter Summaries, Discussion Questions, Exercises, Quick Quizzes, Running Cases, and Companion (Premium) Web site

Learning Objectives, Chapter Summaries, Quick Quizzes, Discussion Questions, Exercises, Running Cases, and the companion (premium) Web site are designed to function as integrated study tools. Learning Objectives reflect what you should be able to accomplish after completing each chapter. Chapter Summaries highlight key concepts you should master. The Discussion Questions help guide critical thinking about those key concepts. Quick Quizzes test knowledge of essential chapter concepts and include an answer key. Exercises provide opportunities to practice important techniques, as do the Running Cases. The companion (premium) Web site provides several study aids, such as podcasts, the new Jeopardy-like game, and interactive quizzes for each chapter, which are different from the Quick Quizzes in the text.

Opening Case and Case Wrap-Up

To set the stage, each chapter begins with an opening case related to the material presented in that chapter. These "real-life" case scenarios (most based on the author's experiences) spark student interest and introduce important concepts in a real-world context. As project management concepts and techniques are discussed, they are applied to the opening case and other similar scenarios. Each chapter then closes with a case wrap-up—with some ending successfully and some, realistically, failing—to further illustrate the real world of project management.

What Went Right? and What Went Wrong?

Failures, as much as successes, can be valuable learning experiences. Each chapter of the text includes one or more examples of real information technology projects that went right

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as well as examples of projects that went wrong. These examples further illustrate the importance of mastering key concepts in each chapter.

Media Snapshot

The world is full of projects. Several televisions shows, movies, newspapers, Web sites, and other media highlight project results, good and bad. Relating project management concepts to all types of projects highlighted in the media will help you understand and see the importance of this growing field. Why not get people excited about studying project management by showing them how to recognize project management concepts in popular television shows, movies, or other media?

Best Practice

Every chapter includes an example of a best practice related to topics in that chapter. For example, Chapter 1 describes best practices written by Robert Butrick, author of *The Project Workout*, from the *Ultimate Business Library's Best Practice* book. He suggests that organizations ensure their projects are driven by their strategy and engage project stakeholders.

Key Terms

The fields of information technology and project management both include many unique terms that are vital to creating a workable language when the two fields are combined. Key terms are displayed in bold face and are defined the first time they appear. Definitions of key terms are provided in alphabetical order at the end of each chapter and in a glossary at the end of the text.

Application Software

Learning becomes much more dynamic with hands-on practice using the top project management software tool in the industry, Microsoft Project 2010, as well as other tools, such as spreadsheet software and the Internet. Each chapter offers you many opportunities to get hands-on experience and build new software skills. This text is written from the point of view that reading about something only gets you so far—to really understand project management, you have to do it for yourself. In addition to the exercises and running cases found at the end of each chapter and in Appendix C, several challenging exercises are provided at the end of Appendix A, Guide to Using Microsoft Project 2010.

SUPPLEMENTS

The following supplemental materials are available when this text is used in a classroom setting. All of the teaching tools available with this text are provided to the instructor on a single CD-ROM.

- **Electronic Instructor's Manual** The Instructor's Manual that accompanies this textbook includes additional instructional material to assist in class preparation, including suggestions for lecture topics and additional discussion questions.
- **ExamView®** This textbook is accompanied by ExamView, a powerful testing software package that allows instructors to create and administer printed,

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computer (LAN-based), and Internet exams. ExamView includes hundreds of questions that correspond to the topics covered in this text, enabling students to generate detailed study guides that include page references for further review. The computer-based and Internet testing components allow students to take exams at their computers, and also save the instructor time by grading each exam automatically.

- **PowerPoint Presentations** This text comes with Microsoft PowerPoint slides for each chapter. These are included as a teaching aid for classroom presentation, to make available to students on the network for chapter review, or to be printed for classroom distribution. Instructors can add their own slides for additional topics they introduce to the class.
- **Solution Files** Solutions to end-of-chapter questions can be found on the Instructor Resource CD-ROM and may also be found on the Course Technology Web site at *www.cengage.com/mis/schwalbe*. The solutions are password-protected.
- **Distance Learning** Course Technology is proud to present online courses in WebCT and Blackboard, to provide the most complete and dynamic learning experience possible. When you add online content to one of your courses, you're adding a lot: self tests, links, glossaries, and, most of all, a gateway to the twenty-first century's most important information resource. We hope you will make the most of your course, both online and offline. For more information on how to bring distance learning to your course, contact your Course Technology sales representative.

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I also thank my students and colleagues at Augsburg College and the University of Minnesota for providing feedback on the earlier editions of this book. I received many valuable comments from them on ways to improve the text and structure of my courses. I learn something new about project management and teaching all the time by interacting with students, faculty, and staff.

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As always, I am eager to receive your feedback on this book. Please send comments to me at schwalbe@augsburg.edu.

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CHAPTER 1

INTRODUCTION TO PROJECT MANAGEMENT

LEARNING OBJECTIVES

After reading this chapter, you will be able to:

- Understand the growing need for better project management, especially for information technology projects
- Explain what a project is, provide examples of information technology projects, list various attributes of projects, and describe the triple constraint of project management
- Describe project management and discuss key elements of the project management framework, including project stakeholders, the project management knowledge areas, common tools and techniques, and project success
- Discuss the relationship between project, program, and portfolio management and the contributions they each make to enterprise success
- Understand the role of the project manager by describing what project managers do, what skills they need, and what the career field is like for information technology project managers
- Describe the project management profession, including its history, the role of professional organizations like the Project Management Institute (PMI), the importance of certification and ethics, and the advancement of project management software

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OPENING CASE

Anne Roberts, the Director of the Project Management Office for a large retail chain, stood in front of 500 people in the large corporate auditorium to explain the company's new strategies. She was also broadcasting to thousands of other employees, suppliers, and stockholders throughout the world using live video via the Internet. The company had come a long way in implementing new information systems to improve inventory control, sell products using the Web, streamline the sales and distribution processes, and improve customer service. However, the stock price was down, the nation's economy was weak, and people were anxious to hear about the company's new strategies.

Anne began to address the audience, "Good morning. As many of you know, our CEO promoted me to this position as Director of the Project Management Office two years ago. Since then, we have completed many projects, including the advanced data networks project. That project enabled us to provide persistent broadband between headquarters and our retail stores throughout the world, allowing us to make timely decisions and continue our growth strategy. Our customers love that they can return items to any store, and any sales clerk can look up past sales information. Local store managers can make timely decisions using up-to-date information. Of course, we've had some project failures, too, and we need to continually assess our portfolio of projects to meet business needs. Two big IT initiatives this coming year include meeting new green IT regulations and providing enhanced online collaboration tools for our employees, suppliers, and customers. Our challenge is to work even smarter to decide what projects will most benefit the company, how we can continue to leverage the power of information technology to support our business, and how we can exploit our human capital to successfully plan and execute those projects. If we succeed, we'll continue to be a world-class corporation."

"And if we fail?" someone asked from the audience.

"Let's just say that failure is not an option," Anne replied.

INTRODUCTION

Many people and organizations today have a new—or renewed—interest in project management. Until the 1980s, project management primarily focused on providing schedule and resource data to top management in the military, computer, 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. Computer hardware, software, networks, and the use of interdisciplinary and global work teams have radically changed the work environment. The following statistics demonstrate the significance of project management in today's society, especially for projects involving information technology (IT). Note that IT projects involve using hardware, software, and/or networks to create a product, service, or result.

- Total global spending on technology goods, services, and staff was projected to reach $2.4 trillion in 2008, an 8 percent increase from 2007. IT purchases in the U.S. grew less than 3 percent, while the rest of the Americas expanded in local currencies at 6-percent rates. Asia Pacific and the oil-exporting areas of Eastern Europe, the Middle East, and Africa were the main engines of growth.[1]

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- In the U.S. the size of the IT workforce topped 4 million workers for the first time in 2008. Unemployment rates in many information technology occupations were among the lowest in the labor force at only 2.3 percent. Demand for talent is high, and several organizations throughout the world cannot grow as desired due to difficulties in hiring and recruiting the people they need.[2]
- In 2007 the total compensation for the average senior project manager in U.S. dollars was $104,776 per year in the United States, $111,412 in Australia, and $120,364 in the United Kingdom. The average total compensation of a program manager was $122,825 in the United States, $133,718 in Australia, and $165,489 in the United Kingdom. The average total compensation for a Project Management Office (PMO) Director was $134,422 in the United States, $125,197 in Australia, and $210,392 in the United Kingdom. This survey was based on self-reported data from more than 5,500 practitioners in 19 countries.[3]
- The number of people earning their Project Management Professional (PMP) certification continues to increase each year.
- A research report showed that the U.S. spends $2.3 trillion on projects every year, an amount equal to 25 percent of the nation's gross domestic product. The world as a whole spends nearly $10 trillion of its $40.7 trillion gross product on projects of all kinds. More than 16 million people regard project management as their profession.[4]

Today's companies, governments, and nonprofit organizations are recognizing that to be successful, they need to be conversant with and use modern project management techniques. Individuals are realizing that to remain competitive in the workplace, they must develop skills to become good project team members and project managers. They also realize that many of the concepts of project management will help them in their everyday lives as they work with people and technology on a day-to-day basis.

WHAT WENT WRONG?

In 1995, the Standish Group published an often-quoted study entitled "The CHAOS Report." This consulting firm surveyed 365 information technology executive managers in the United States who managed more than 8,380 information technology 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 information technology 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. The study reported that the overall success rate of information technology 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 information technology projects were canceled before completion, costing U.S. companies and

continued

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government agencies more than $81 billion. The study authors were adamant about the need for better project management in the information technology 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."[5]

In a more recent study, PricewaterhouseCoopers surveyed 200 companies from 30 different countries about their project management maturity and found that *over half of all projects fail.* They also found that only 2.5 percent of corporations consistently meet their targets for scope, time, and cost goals for all types of project.[6]

Although several researchers question the methodology of such studies, their popularity has prompted managers throughout the world to examine their practices in managing projects. Many organizations assert that using project management provides advantages, such as:

- Better control of financial, physical, and human resources
- Improved customer relations
- Shorter development times
- Lower costs and improved productivity
- Higher quality and increased reliability
- Higher profit margins
- Better internal coordination
- Positive impact on meeting strategic goals
- Higher worker morale

This chapter introduces projects and project management, explains how projects fit into programs and portfolio management, discusses the role of the project manager, and provides important background information on this growing profession. Although project management applies to many different industries and types of projects, this text focuses on applying project management to information technology projects.

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."[7] 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 Information Technology 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. As described earlier, information technology projects involve using hardware, software, and/or networks to create a product, service, or result. Examples of information technology projects include the following:

- A technician replaces ten laptops for a small department
- A small software development team adds a new feature to an internal software application for the finance department

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Project Attributes

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

- *A project has a unique purpose.* Every project should have a well-defined objective. For example, Anne Roberts, the Director of the Project Management Office in the opening case, might sponsor an information technology collaboration project to develop a list and initial analysis of potential information technology projects that might improve operations for the company. The unique purpose of this project would be to create a collaborative report with ideas from people throughout the company. The results would provide the basis for further discussions and projects. As in this example, projects result in a unique product, service, or result.
- *A project is temporary.* A project has a definite beginning and a definite end. In the information technology collaboration project, Anne might form a team of people to work immediately on the project, and then expect a report and an executive presentation of the results in one month.
- *A project is developed using progressive elaboration.* Projects are often defined broadly when they begin, and as time passes, the specific details of the project become clearer. Therefore, projects should be developed in increments. A project team should develop initial plans and then update them with more detail based on new information. For example, suppose a few people submitted ideas for the information technology collaboration project, but they did not clearly address how the ideas would support the business strategy of improving operations. The project team might decide to prepare a questionnaire for people to fill in as they submit their ideas to improve the quality of the inputs.
- *A project requires resources, often from various areas.* Resources include people, hardware, software, and other assets. Many projects cross departmental or other boundaries to achieve their unique purposes. For the information technology collaboration project, people from information technology, marketing, sales, distribution, and other areas of the company would need to work together to develop ideas. The company might also hire outside consultants to provide input. Once the project team has selected key projects for implementation, they will probably require additional resources. And to meet new project objectives, people from other companies—product suppliers and consulting companies—may be added. Resources, however, are limited and must be used effectively to meet project and other corporate goals.
- *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. In this case, Anne Roberts would be the sponsor for the information technology collaboration project. Once further information technology projects are selected, however, the sponsors for those projects would be senior managers in charge of the main parts of the company affected by the projects. For example, if the vice president of sales initiates a project to

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improve direct product sales using the Internet, he or she might be the project sponsor.

- *A project involves uncertainty.* Because every project is unique, it is sometimes difficult to define its objectives clearly, estimate 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. This uncertainty is one of the main reasons project management is so challenging, especially on projects involving new technologies.

An effective **project manager** is crucial to a project's success. Project managers work with the project sponsors, the project team, and the other people involved in a project to meet project goals.

The Triple Constraint

Every project is constrained in different ways by its scope, time, and cost goals. These limitations are sometimes referred to in project management as the **triple constraint**. To create a successful project, a project manager must consider scope, time, and cost and balance these three often-competing goals. He or she 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? How will the scope be verified?
- *Time:* How long should it take to complete the project? What is the project's schedule? How will the team track actual schedule performance? Who can approve changes to the schedule?
- *Cost:* What should it cost to complete the project? What is the project's budget? How will costs be tracked? Who can authorize changes to the budget?

Figure 1-1 illustrates the three dimensions of the triple constraint. Each area—scope, time, and cost—has a target at the beginning of the project. For example, the information technology collaboration project might have an initial scope of producing a 40- to 50-page report and a one-hour presentation on about 30 potential information technology projects. The project manager might further define project scope to include providing a description of each potential project, an investigation of what other companies have implemented for similar projects, a rough time and cost estimate, and assessments of the risk and potential payoff as high, medium, or low. The initial time estimate for this project might be one month, and the cost estimate might be $45,000–$50,000. These expectations provide the targets for the scope, time, and cost dimensions of the project. Note that the scope and cost goals in this example include ranges—the report can be between 40- to 50-pages long and the project can cost between $45,000 and $50,000. Because projects involve uncertainty and limited resources, projects rarely finish according to discrete scope, time, and cost goals originally planned. Instead of discrete target goals, it is often more realistic to set a range of goals such as spending between $45,000 and $50,000 and having the length of the report between 40 and 50 pages. These goals might mean hitting the target, but not the bull's eye.

Managing the triple constraint involves making trade-offs between scope, time, and cost goals for a project. For example, you might need to increase the budget for a project to meet

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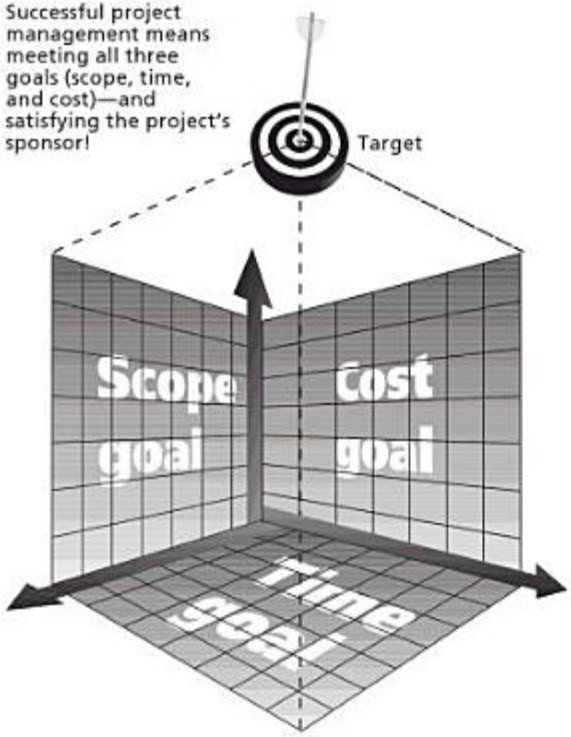

FIGURE 1-1 The triple constraint of project management

scope and time goals. Alternatively, you might have to reduce the scope of a project to meet time and cost goals. Experienced project managers know that you must decide which aspect of the triple constraint is most important. If time is most important, you must often change the initial scope and/or cost goals to meet the schedule. If scope goals are most important, you may need to adjust time and/or cost goals.

For example, to generate project ideas, suppose the project manager for the information technology collaboration project sent an e-mail survey to all employees, as planned. The initial time and cost estimate may have been one week and $5,000 to collect ideas based on this e-mail survey. Now, suppose the e-mail survey generated only a few good project ideas, and the scope goal was to collect at least 30 good ideas. Should the project team use a different method like focus groups or interviews to collect ideas? Even though it was not in the initial scope, time, or cost estimates, it would really help the project. Since good ideas are crucial to project success, it would make sense to inform the project sponsor that you want to make adjustments.

Although the triple constraint describes how the basic elements of a project—scope, time, and cost—interrelate, other elements can also play significant roles. Quality is often a key factor in projects, as is customer or sponsor satisfaction. Some people, in fact, refer to the *quadruple constraint* of project management, which includes quality as well as scope, time, and cost. Others believe that quality considerations, including customer

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satisfaction, must be inherent in setting the scope, time, and cost goals of a project. A project team may meet scope, time, and cost goals but fail to meet quality standards or satisfy their sponsor, if they have not adequately addressed these concerns. For example, Anne Roberts may receive a 50-page report describing 30 potential information technology projects and hear a presentation on the findings of the report. The project team may have completed the work on time and within the cost constraint, but the quality may have been unacceptable. Anne's view of an executive presentation may be very different from the project team's view. 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, time, and cost goals, but lose sight of quality or customer satisfaction? The answer is *good project management, which includes more than meeting the triple constraint.*

WHAT IS PROJECT MANAGEMENT?

Project management is "the application of knowledge, skills, tools and techniques to project activities to meet project requirements."[11] Project managers must not only strive to meet specific scope, time, cost, and quality goals 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 1-2 illustrates a framework to help you understand project management. Key elements of this framework include the project stakeholders, project management knowledge areas, project management tools and techniques, and the contribution of successful projects to the enterprise.

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

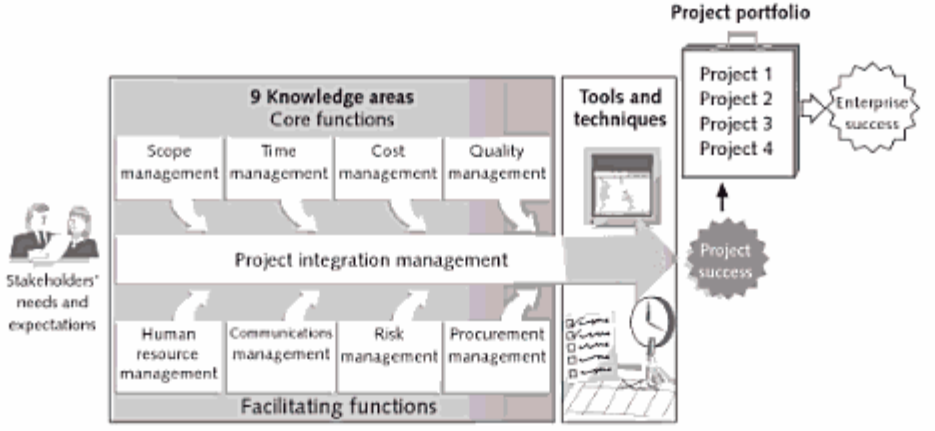

FIGURE 1-2 Project management framework

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opponents of the project. These stakeholders often have very different needs and expectations. For example, building a new house is a well-known example of a project. 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 buyers' employers, the general contractor's administrative assistant, and other people who support other stakeholders. The buyers' employers might expect their employees to still 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 so on.
- Building a house requires many suppliers. The suppliers would provide the wood, windows, flooring materials, appliances, and so on. Suppliers would expect exact details on what items they need to provide, where and when to deliver those items, and so on.
- There may or may not be opponents of 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 wake her sleeping children. She might interrupt the workers to voice her complaints or even file a formal complaint. Or, 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 often have different interests. Stakeholders' needs and expectations are important in the beginning and throughout the life of a project. Successful project managers develop

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improving project success. These super tools included software for task scheduling (such as project management software), scope statements, requirement analyses, and lessons-learned reports. Tools that are already extensively used and have been found to improve project importance include progress reports, kick-off meetings, Gantt charts, and change requests. These super tools are bolded in Table 1-1.[12] Of course, different tools can be more effective in different situations. It is crucial for project managers and their team members to determine which tools will be most useful for their particular projects.

WHAT WENT RIGHT?

Follow-up studies by the Standish Group (see the previously quoted CHAOS study in the What Went Wrong? passage) showed some improvement in the statistics for information technology projects in the past decade:

- The number of successful IT projects has more than doubled, from 16 percent in 1994 to 35 percent in 2006.
- The number of failed projects decreased from 31 percent in 1994 to 19 percent in 2006.
- The United States spent more money on IT projects in 2006 than 1994 ($346 billion and $250 billion, respectively), but the amount of money wasted on challenged projects (those that did not meet scope, time, or cost goals, but were completed) and failed projects was down to $53 billion in 2006 compared to $140 billion in 1994.[13]

The good news is that project managers are learning how to succeed more often; the bad news is that it is still very difficult to lead successful IT projects. "The reasons for the increase in successful projects vary. First, the average cost of a project has been more than cut in half. Better tools have been created to monitor and control progress and better skilled project managers with better management processes are being used. The fact that there are processes is significant in itself."[14]

Despite its advantages, project management is not a silver bullet that guarantees success on all projects. Project management is a very broad, often complex discipline. What works on one project may not work on another, so it is essential for project managers to continue to develop their knowledge and skills in managing projects. It is also important to learn from the mistakes and successes of others.

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 the success of a project using the example of upgrading 500 desktop computers within three months for $300,000:

1. *The project met scope, time, and cost goals.* If all 500 computers were upgraded and met other scope requirements, the work was completed in three months or less, and the cost was $300,000 or less, you could consider it a

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successful project based on this criterion. The Standish Group studies used this definition of success. Several people question this simple definition of project success and the methods used for collecting the data. (See the references by Glass on the companion Web site for this text to read more about this debate.)

2. *The project satisfied the customer/sponsor.* Even if the project met initial scope, time, and cost goals, the users of the computers or their managers (the main customers or sponsors in this example) might not be satisfied. Perhaps the project manager or team members never returned calls or were rude. Perhaps users had their daily work disrupted during the upgrades or had to work extra hours due to the upgrades. If the customers were not happy with important aspects of the project, it would be deemed a failure. Conversely, a project might not meet initial scope, time, and cost goals, but the customer could still be very satisfied. Perhaps the project team took longer and spent more money than planned, but they were very polite and helped the users and managers solve several work-related problems. Many organizations implement a customer satisfaction rating system for projects to measure project success instead of only tracking scope, time, and cost performance.
3. *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.* Even if the project cost more than estimated, took longer to complete, and the project team was hard to work with, if the users were happy with the upgraded computers it would be a successful project, based on this criterion. As another example, suppose the sponsor really approved the upgrade project to provide a good return on investment by speeding up work and therefore generating more profits. If those goals were met, the sponsor would deem the project a success, regardless of other factors involved.

Why do some IT projects succeed and others fail? Table 1-2 summarizes the results of the 2001 CHAOS study, describing, in order of importance, what factors contribute most to the success of information technology projects. The study lists executive support as the most important factor, overtaking user involvement, which was ranked first in earlier studies. Also note that several other success factors can be strongly influenced by executives such as encouraging user involvement, providing clear business objectives, assigning an experienced project manager, using a standard software infrastructure, and following a formal methodology. Other success factors are related to good project scope and time management such as having a minimized scope, firm basic requirements, and reliable estimates. In fact, experienced project managers, who can often help influence all of these factors to improve the probability of project success, led 97 percent of successful projects.

It is interesting to compare success factors for information technology projects in the U.S. with those in other countries. A 2004 study summarizes the results of a survey of 247 information systems project practitioners in mainland China. One of the study's key findings is that relationship management is viewed as a top success factor for information systems in China, while it is not mentioned in U.S. studies. The study also suggested that having competent team members is less important in China than in the U.S. The Chinese, like the Americans, included top management support, user involvement, and a competent project manager as vital to project success.[15]

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TABLE 1-2 What helps projects succeed?

1. Executive support
2. User involvement
3. Experienced project manager
4. Clear business objectives
5. Minimized scope
6. Standard software infrastructure
7. Firm basic requirements
8. Formal methodology
9. Reliable estimates
10. Other criteria, such as small milestones, proper planning, competent staff, and ownership

The Standish Group, "Extreme CHAOS," (2001).

It is also important to look beyond individual project success rates and focus on how organizations as a whole can improve project performance. Research comparing companies that excel in project delivery—the "winners"—from those that do not found four significant best practices. The winners:

1. *Use an integrated toolbox.* Companies that consistently succeed in managing projects clearly define what needs to be done in a project, by whom, when, and how. They use an integrated toolbox, including project management tools, methods, and techniques. They carefully select tools, align them with project and business goals, link them to metrics, and provide them to project managers to deliver positive results.
2. *Grow project leaders.* The winners know that strong project managers—referred to as project leaders—are crucial to project success. They also know that a good project leader needs to be a business leader as well, with strong interpersonal and intrapersonal skills. Companies that excel in project management often grow their project leaders internally, providing them with career opportunities, training, and mentoring.
3. *Develop a streamlined project delivery process.* Winning companies have examined every step in the project delivery process, analyzed fluctuations in workloads, searched for ways to reduce variation, and eliminated bottlenecks to create a repeatable delivery process. All projects go through clear stages and clearly define key milestones. All project leaders use a shared road map, focusing on key business aspects of their projects while integrating goals across all parts of the organization.

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4. *Measure project health using metrics.* Companies that excel in project delivery use performance metrics to quantify progress. They focus on a handful of important measurements and apply them to all projects. Metrics often include customer satisfaction, return on investment, and percentage of schedule buffer consumed.[16]

Project managers play an important role in making projects, and therefore organizations, successful. 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'. They take the time to understand their sponsors' expectations and then track project performance based on important success criteria.

PROGRAM AND PROJECT PORTFOLIO MANAGEMENT

As mentioned earlier, 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 managed in a coordinated way to obtain benefits and control not available from managing them individually."[17] As you can imagine, it is often more economical to group projects together to help streamline management, staffing, purchasing, and other work. The following are examples of common programs in the IT field.

- *Infrastructure:* An IT department often has a program for IT infrastructure projects. Under this program, there could be several projects, such as providing more wireless Internet access, upgrading hardware and software, and developing and maintaining corporate standards for IT.
- *Applications development:* Under this program, there could be several projects, such as updating an enterprise resource planning (ERP) system, purchasing a new off-the-shelf billing system, or developing a new capability for a customer relationship management system.
- *User support:* In addition to the many operational tasks related to user support, many IT departments have several projects to support users. For example, there could be a project to provide a better e-mail system or one to develop technical training for users.

A **program manager** provides leadership and direction for the project managers heading the projects within a 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

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responsible for the success of products and processes produced by those projects. For example, the popular video game *Rock Band*™ lists the program manager and team first under the credits section for the game.

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. They recognize that technical and project management skills are not enough—program managers must also possess strong business knowledge, leadership capabilities, and communication skills.

Project Portfolio Management

In many organizations, project managers also support an emerging business strategy of **project portfolio management** (also called just **portfolio management** in this text), in which organizations group and manage projects and programs as a portfolio of investments that contribute to the entire enterprise's success. 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.

Figure 1-3 illustrates the differences between project management and project portfolio management. Notice that the main distinction is a focus on meeting tactical or strategic goals. Tactical goals are generally more specific and short-term than strategic goals, which emphasize long-term goals for an organization. Individual projects often address tactical goals, whereas portfolio management addresses strategic goals. Project management addresses questions like "Are we carrying out projects well?", "Are projects on time and budget?", and "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?", and "Do we have the right resources to be competitive?" Pacific Edge Software's product manager, Eric Burke, defines project portfolio management as "the continuous process of selecting and managing the optimum set of project initiatives that deliver maximum business value."[18]

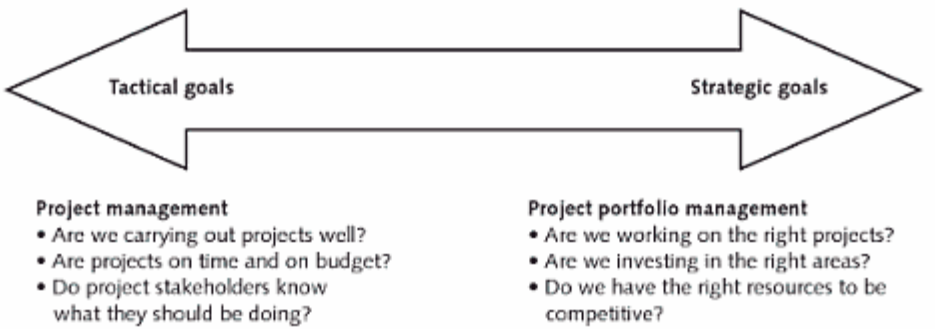

FIGURE 1-3 Project management compared to project portfolio management

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Many organizations use specialized software to organize and analyze all types of project data into project portfolios. **Enterprise** or **portfolio project management software** integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization. For example, Figure 1-5 provides a sample screen from portfolio management software provided by Planview. The charts and text in the upper half of the screen show the number and percentage of projects in this project portfolio that are on target and in trouble in terms of schedule and cost variance. The bottom half of the screen lists the names of individual projects, percent complete, schedule variance, cost variance, budget variance, and risk percentage. The last section in this chapter provides more information on project management software.

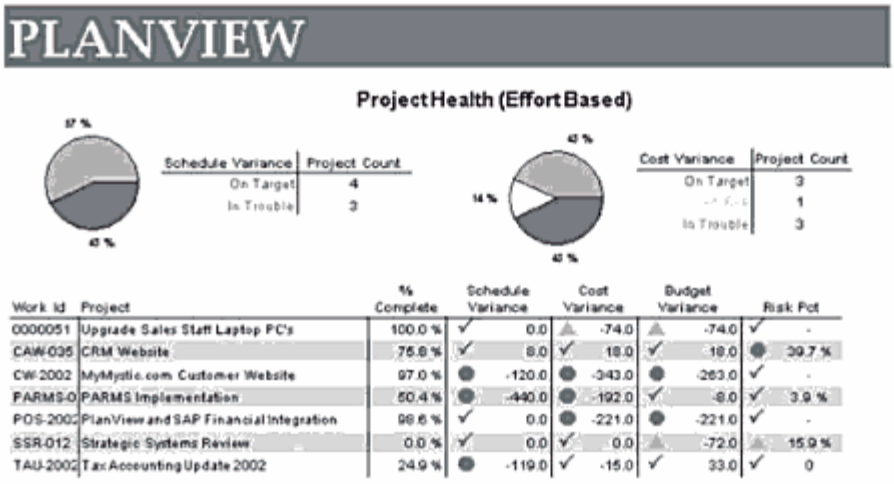

FIGURE 1-5 Sample project portfolio management screen showing project health

THE ROLE OF THE PROJECT MANAGER

You have already read that project managers must work closely with the other stakeholders on a project, especially the sponsor and project team. They are also more effective if they are familiar with the nine project management knowledge areas and the various tools and techniques related to project management. Experienced project managers help projects succeed. But what do project managers do exactly? What skills do they really need to do a good job? The next section provides brief answers to these questions, and the rest of this book gives more insight into the role of the project manager. Even if you never become a project manager, you will probably be part of a project team, and it is important for team members to help their project managers.

Project Manager Job Description

A project manager can have many different job descriptions, which can vary tremendously based on the organization and the project. For example, Monster.com includes thousands

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of job listings for project managers. They even have a job category for project/program managers. Here are a few edited postings:

- *Project manager for a consulting firm:* Plans, schedules, and controls activities to fulfill identified objectives applying technical, theoretical, and managerial skills to satisfy project requirements. Coordinates and integrates team and individual efforts and builds positive professional relationships with clients and associates.
- *IT project manager for a financial services firm:* Manages, prioritizes, develops, and implements information technology solutions to meet business needs. Prepares and executes project plans using project management software following a standard methodology. Establishes cross-functional end-user teams defining and implementing projects on time and within budget. Acts as a liaison between third-party service providers and end-users to develop and implement technology solutions. Participates in vendor contract development and budget management. Provides post implementation support.
- *IT project manager for a nonprofit consulting firm:* Responsibilities include business analysis, requirements gathering, project planning, budget estimating, development, testing, and implementation. Responsible for working with various resource providers to ensure development is completed in a timely, high-quality, and cost-effective manner.

The job description for a project manager can vary by industry and by organization, but there are similar tasks that most project managers perform regardless of these differences. In fact, project management is a skill needed in every major information technology field, from database administrator to network specialist to technical writer.

Suggested Skills for Project Managers

In an interview with two chief information officers (CIOs), John Oliver of True North Communications, Inc. and George Nassef of *Hotjobs.com*, both men agreed that the most important project management skills seem to depend on the uniqueness of the project and the people involved.[2,3] Project managers need to have a wide variety of skills and be able to decide which particular skills are more important in different situations. As you can imagine, good project managers should have many skills. *A Guide to the Project Management Body of Knowledge*—the *PMBOK® Guide*—recommends that the project management team understand and use expertise in the following areas:

- The Project Management Body of Knowledge
- Application area knowledge, standards, and regulations
- Project environment knowledge
- General management knowledge and skills
- Soft skills or human relations skills

This chapter introduced the nine project management knowledge areas, as well as some general tools and techniques project managers use. The following section focuses on the IT application area, including skills required in the project environment, general management, and soft skills. Note that the *PMBOK® Guide, Fourth Edition* describes three dimensions of project management competency: project management knowledge and performance competency (knowing about project management and being able to apply that

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knowledge) as well as personal competency (attitudes and personality characteristics). Consult PMI's Web site at *www.pmi.org* for further information on skills for project managers and PMI's Career Framework for Practitioners.

The project environment differs from organization to organization and project to project, but some skills will help in almost all 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 organization in which they work and how that organization develops products and provides services. The skills and behavior needed to manage a project for a Fortune 100 company in the United States may differ greatly from those needed to manage a government project in Poland. Chapter 2, The Project Management and Information Technology Context, provides detailed information on these topics.

Project managers should also possess general management 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 the project manager to have a lot of experience in one or several of these general management areas. On other projects, the project manager can delegate detailed responsibility for some of these areas to a team member, support staff, or even a supplier. Even so, the project manager must be intelligent and experienced enough to know which of these areas are most important and who is qualified to do the work. He or she must also make and/or take responsibility for all key project decisions.

Achieving high performance on projects requires soft skills, otherwise called human relations skills. Some of these soft skills include effective communication, influencing the organization to get things done, leadership, motivation, negotiation, conflict management, and problem solving. Why do project managers need good soft skills? One reason is that to understand, navigate, and meet stakeholders' needs and expectations, project managers need to lead, communicate, negotiate, solve problems, and influence the organization at large. They need to be able to listen actively to what others are saying, help develop new approaches for solving problems, and then persuade others to work toward achieving project goals. 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 to employ 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. Since most projects involve changes and trade-offs between competing goals, it is important for project managers to have strong coping skills as well. It helps project managers maintain their sanity and reduce their stress levels if they cope with criticism and constant change. Project managers must be flexible, creative, and sometimes patient in working toward project goals; they must also be persistent in making project needs known.

Lastly, project managers, especially those managing IT projects, must be able to make effective use of technology as it relates to the specific project. Making effective use of technology often includes special product knowledge or experience with a particular industry.

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Project managers must make many decisions and deal with people in a wide variety of disciplines, so it helps tremendously to have a project manager who is confident in using the special tools or technologies that are the most effective in particular settings. Project managers do not normally have to be experts on any specific technology, but they have to know enough to build a strong team and ask the right questions to keep things on track. For example, project managers for large information technology projects do not have to be experts in the field of information technology, but they must have working knowledge of various technologies and understand how the project would enhance the business. Many companies have found that a good business manager can be a very good information technology project manager because they focus on meeting business needs and rely on key project members to handle the technical details.

All project managers should continue to develop their knowledge and experience in project management, general management, soft skills, and the industries they support. Non-IT business people are now very savvy with information technology, but few information technology professionals have spent the time developing their business savvy.[24] IT project managers must be willing to develop more than their technical skills to be productive team members and successful project managers. Everyone, no matter how technical they are, should develop business and soft skills.

Importance of People and Leadership Skills

In a recent study, project management experts from various industries were asked to identify the ten most important skills and competencies for effective project managers. Table 1-3 shows the results.

Respondents were also asked what skills and competencies were most important in various project situations:

- *Large projects:* Leadership, relevant prior experience, planning, people skills, verbal communication, and team-building skills were most important.
- *High uncertainty projects:* Risk management, expectation management, leadership, people skills, and planning skills were most important.
- *Very novel projects:* Leadership, people skills, having vision and goals, self confidence, expectations management, and listening skills were most important.[25]

Notice that a few additional skills and competencies not cited in the top 10 list were mentioned when people thought about the context of a project. To be the most effective, project managers require a changing mix of skills and competencies depending on the project being delivered.

Also notice the general emphasis on people and leadership skills. As mentioned earlier, all project managers, especially those working on technical projects, need to demonstrate leadership and management 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."

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TABLE 1-3 Ten most important skills and competencies for project managers

1. People skills
2. Leadership
3. Listening
4. Integrity, ethical behavior, consistent
5. Strong at building trust
6. Verbal communication
7. Strong at building teams
8. Conflict resolution, conflict management
9. Critical thinking, problem solving
10. Understands, balances priorities

Jennifer Krahn, "Effective Project Leadership: A Combination of Project Manager Skills and Competencies in Context," *PMI Research Conference Proceedings* (July 2006).

However, 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, companies that excel in project management grow project "leaders," emphasizing development of business and communication skills. Yet good project managers must also focus on getting the job done by paying attention to the details and daily operations of each task. 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 managers have leadership and management characteristics; they are visionary yet focused on the bottom line. Above all else, good project managers focus on achieving positive results!

Careers for Information Technology Project Managers

A recent article suggests that, "The most sought-after corporate IT workers in 2010 may be those with no deep-seated technical skills at all. The nuts-and-bolts programming and easy-to-document support jobs will have all gone to third-party providers in the U.S. or abroad. Instead, IT departments will be populated with 'versatilists'—those with a technology background who also know the business sector inside and out, can architect and carry out IT plans that will add business value, and can cultivate relationships both inside and outside the company."[26]

A recent survey by CIO.com supports this career projection. IT executives listed the skills they predicted would be the most in demand in the next two to five years. Project/

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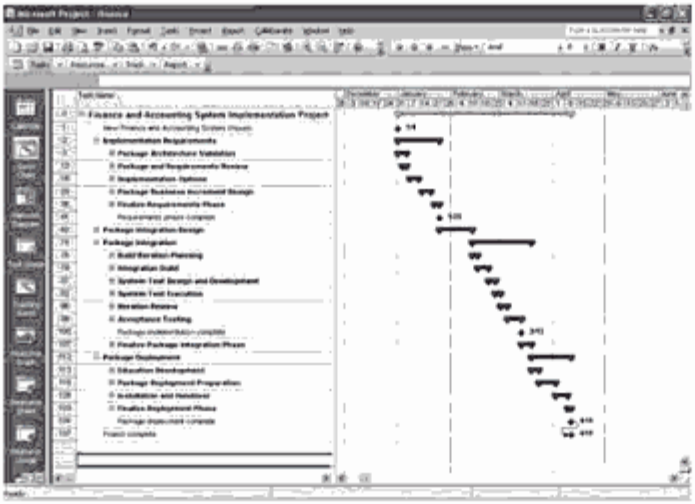

FIGURE 1-6 Sample Gantt chart created with Project 2007

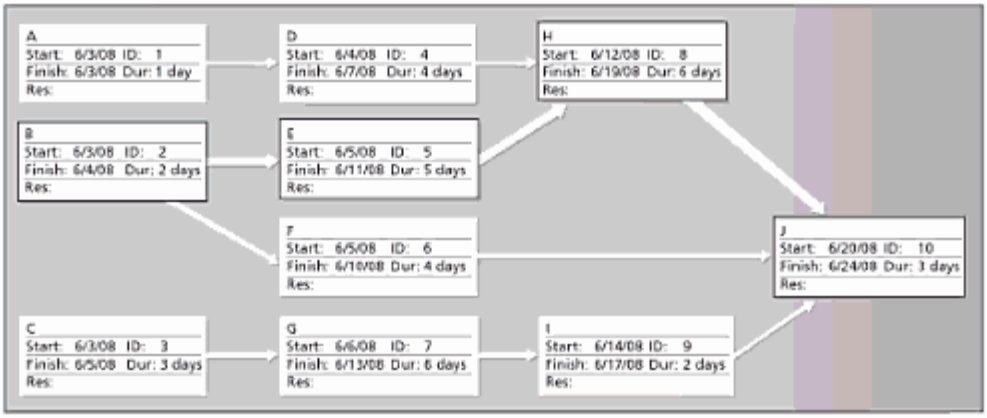

FIGURE 1-7 Sample network diagram in Microsoft Project

By the 1970s, the U.S. military and its civilian suppliers developed software to assist in managing large projects. Early project management software was very expensive to purchase and it ran exclusively on mainframe computers. For example, Artemis was an early project management software product that helped managers analyze complex schedules for designing aircraft. A full-time employee was often required to run the complicated software, and expensive pen plotters were used to draw network diagrams and Gantt charts.

As computer hardware became smaller and more affordable and software included graphical, easy-to-use interfaces, project management software became less expensive and more widely used. This made it possible—and affordable—for many industries worldwide

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to use project management software on all types and sizes of projects. New software makes basic tools, such as Gantt charts and network diagrams, inexpensive, easy to create, and available for anyone to update. See the section in this chapter on project management software for more information.

In the 1990s, many companies began creating project management offices to help them handle the increasing number and complexity of projects. A **Project Management Office (PMO)** is an organizational group responsible for coordinating the project management function throughout an organization. There are different ways to structure a PMO, and they can have various roles and responsibilities. Below are possible goals of a PMO:

- Collect, organize, and integrate project data for the entire organization.
- Develop and maintain templates for project documents.
- Develop or coordinate training in various project management topics.
- Develop and provide a formal career path for project managers.
- Provide project management consulting services.
- Provide a structure to house project managers while they are acting in those roles or are between projects.

By the end of the twentieth century, people in virtually every industry around the globe began to investigate and apply different aspects of project management to their projects. The sophistication and effectiveness with which project management tools are being applied and used today is influencing the way companies do business, use resources, and respond to market requirements with speed and accuracy. As mentioned earlier in this chapter, many organizations are now using enterprise or project portfolio management software to help manage portfolios of projects.

Many colleges, universities, and companies around the world now offer courses related to various aspects of project management. You can even earn bachelor's, master's, 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 difference in IT, for example, was dramatic. A person with certification could make five to six times as much salary, so there is terrific incentive to get certified and work for these Western companies."[28]

The problems in managing projects, the publicity about project management, and the belief that it really can make a difference continue to contribute to the growth of this field.

The Project Management Institute

Although many professional societies suffer from declining membership, the **Project Management Institute (PMI)**, an international professional society for project managers founded in 1969, has continued to attract and retain members, reporting 277,221 members worldwide by August 31, 2008. A large percentage of PMI members work in the information technology field and more than 13,000 pay additional dues to join the Information Systems Specific Interest Group. Because there are so many people working on projects in various industries, PMI has created specific interest groups (SIGs) that enable members to share ideas about project management in their particular application areas, such as information systems. PMI also has SIGs for aerospace/defense, financial services, healthcare, hospitality

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management, manufacturing, new product development, retail, and urban development, to name a few. Note that there are also other project management professional societies. See the companion Web site for more information.

PMI STUDENT MEMBERSHIP

As a student, you can join PMI for a reduced fee. Consult PMI's Web site (*www.pmi.org*) for more information. You can also network with other students studying project management by joining the Students of Project Management Specific Interest Group (SIG) at *www.studentsofpm.org*. Note that PMI is changing the SIGs into Virtual Communities, so you may see that term used.

Project Management Certification

Professional certification is an important factor in recognizing and ensuring quality in a profession. PMI provides certification as a **Project Management Professional (PMP)**—someone who has documented sufficient project experience and education, agreed to follow the PMI code of professional conduct, and demonstrated knowledge of the field of project management by passing a comprehensive examination. Appendix B provides more information on PMP certification as well as other certification programs, such as CompTIA's Project+ certification.

The number of people earning PMP certification continues to increase. In 1993, there were about 1,000 certified project management professionals. By December 31, 2008, there were 318,289 active PMPs.[29] Figure 1-8 shows the rapid growth in the number of people earning project management professional certification from 1993 to 2008.

Several studies show that organizations supporting technical certification programs tend to operate in more complex information technology environments and are more

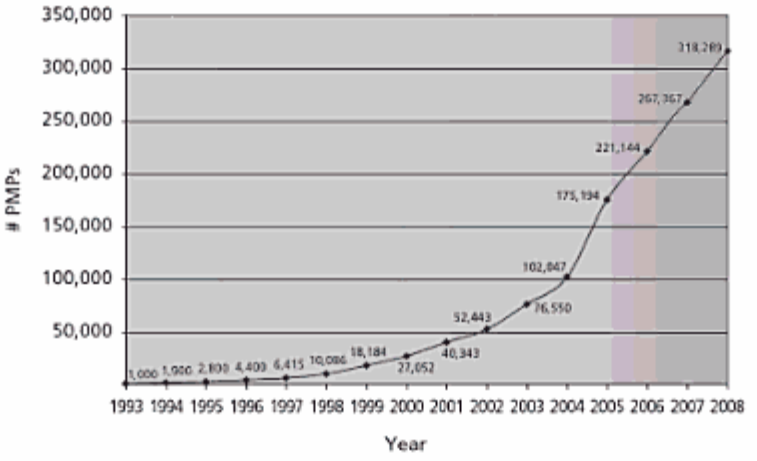

FIGURE 1-8 Growth in PMP Certification, 1993–2008

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efficient than companies that do not support certification. Likewise, organizations that support PMP certification see the value of investing in programs to improve their employees' knowledge in project management. Many employers today require specific certifications to ensure their workers have current skills, and job seekers find that they often have an advantage when they earn and maintain marketable certifications. A 2006 *Certification Magazine* survey of over 35,000 IT workers from 197 countries found that average salaries for workers in project management were among the highest for all IT specialties. IT workers with a PMP certification earned among the highest salaries for all IT workers who hold professional certifications.[30]

As information technology projects become more complex and global in nature, the need for people with demonstrated knowledge and skills in project management will continue. Just as passing the CPA exam is a standard for accountants, passing the PMP exam is becoming a standard for project managers. Some companies require that all project managers be PMP certified. Project management certification is also enabling professionals in the field to share a common base of knowledge. For example, any person with PMP certification can list, describe, and use the nine project management knowledge areas. Sharing a common base of knowledge is important because it helps advance the theory and practice of project management. PMI also offers additional certifications, including new ones in scheduling, risk, and program management. See Appendix B of this text for detailed information on certification.

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 new code applies not only to PMPs, 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 assignment 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.

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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."[31]

In addition, PMI added a new series of questions to the PMP certification exam in March 2002 to emphasize the importance of ethics and professional responsibility. See Appendix B for information on the PMP exam.

Project Management Software

Unlike the cobbler neglecting to make shoes for his own children, the project management and software development communities have definitely responded to the need to provide more software to assist in managing projects. The Project Management Center, a Web site for people involved in project management, provides an alphabetical directory of more than 300 project management software solutions (*www.infogoal.com/pmc*). This site and others demonstrate the growth in available project management software products, especially Web-based tools. Deciding which project management software to use has become a project in itself. This section provides a summary of the basic types of project management software available and references for finding more information. In Appendix A, you will learn how to use Microsoft Project 2007, the most widely used project management software tool today.

MICROSOFT PROJECT 2007

Appendix A includes a *Guide to Using Microsoft Project 2007*, which will help you develop hands-on skills using this most popular project management software tool. You can also access a trial version of VPMi Express—a Web-based product from VCS (*www.vcsonline.com*)—by following the information provided on the resources page in the front of this text or by going directly to the VCS Web site.

Many people still use basic productivity software such as Microsoft Word and Excel to perform many project management functions, including determining project scope, time, and cost, assigning resources, preparing project documentation, and so on. 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

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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 success rate of information technology projects has more than doubled since 1995, but still only about a third are successful in meeting scope, time, and cost goals. Using a more disciplined approach to managing projects can help projects and organizations succeed.

A project is a temporary endeavor undertaken to create a unique product, service, or result. An information technology project involves the use of hardware, software, and/or networks. Projects are unique, temporary, and developed incrementally; they require resources, have a sponsor, and involve uncertainty. The triple constraint of project management refers to managing the scope, time, 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 nine knowledge areas are project integration management, scope, time, cost, quality, human resource, communications, risk, and procurement management. There are many tools and techniques in each knowledge area. There are different ways to define project success, and project managers must understand the success criteria for their unique projects.

A program is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Project portfolio management involves organizing and managing projects and programs as a portfolio of investments that contribute to theentire enterprise's success. Portfolio management emphasizes meeting strategic goals while project management focuses on tactical goals. Studies show that executive support is crucial to project success, as are other factors like user involvement, an experienced project manager, and clear business objectives.

Project managers play a key role in helping projects and organizations succeed. They must perform various job duties, possess many skills, and continue to develop skills in project management, general management, and their application area, such as information technology. Soft skills, especially leadership, are particularly important for project managers.

The profession of project management continues to grow and mature. In the U.S., the military took the lead in project management and developed many tools such as Gantt charts and network diagrams, but today people use project management in virtually every industry around the globe. 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. Today, hundreds of project management software products are available to assist people in managing projects.

Quick Quiz

1. Approximately what percentage of the world's gross domestic product is spent on projects?
   a. 10 percent
   b. 25 percent
   c. 50 percent
   d. 75 percent

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2. Which of the following is a not a potential advantage of using good project management?
   a. Shorter development times
   b. Higher worker morale
   c. Lower cost of capital
   d. Higher profit margins
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 little uncertainty
5. Which of the following is not part of the triple constraint of project management?
   a. meeting scope goals
   b. meeting time 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

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8. Several application development projects done for the same functional group might best be managed as part of a _____.
   a. portfolio
   b. program
   c. investment
   d. collaborative
9. Which of the following is not one of the top ten skills or competencies of an effective project manager?
   a. people skills
   b. leadership
   c. integrity
   d. technical skills
10. What is the certification program called that the Project Management Institute provides?
   a. Certified Project Manager (CPM)
   b. Project Management Professional (PMP)
   c. Project Management Expert (PME)
   d. Project Management Mentor (PMM)

Quick Quiz Answers

1. b; 2. c; 3. c; 4. d; 5. c; 6. a; 7. a; 8. b; 9. d; 10. b

Discussion Questions

1. Why is there a new or renewed interest in the field of 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. What is a program? What is a project portfolio? Discuss the relationship between projects, programs, and portfolio management and the contributions they each make to enterprise success.
5. What is the role of the project manager? What are suggested skills for all project managers and for information technology project managers? Why is leadership so important for project managers? How is the job market for information technology project managers?
6. Briefly describe some key events in the history of project management. What role does the Project Management Institute and other professional societies play in helping the profession?
7. What functions can you perform with project management software? What are some popular names of low-end, midrange, and high-end project management tools?

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Exercises

1. Visit the Standish Group's Web site at *www.standishgroup.com*. Read one of the CHAOS articles, and also read at least one report or article that questions the findings of the CHAOS studies. See the Suggested Readings by Robert L. Glass on the companion Web site for references. Write a two-page summary of the reports, key conclusions, and your opinion of them.
2. Find someone who works as a project manager or someone who works on projects, such as a worker in your school's IT department or the president of a social club. Prepare several interview questions to learn more about projects and project management, and then ask them your questions in person, through e-mail, or over the phone. Write a two-page summary of your findings. Guidelines for your interview and sample questions are available on the companion Web site.
3. Search the Internet for the terms *project management, project management careers, project portfolio management,* and *information technology project management.* Write down the number of hits that you received for each of these phrases. Find at least three Web sites that provide interesting information on one of the topics. Write a two-page paper summarizing key information about these three Web sites as well as the Project Management Institute's Web site (*www.pmi.org*).
4. Find any example of a real project with a real project manager. Feel free to use projects in the media (the Olympics, television shows, movies, etc.) or a project from your work, if applicable. Write a two-page paper describing the project in terms of its scope, time, and cost goals. Discuss what went right and wrong on the project and the role of the project manager and sponsor. Also describe if the project was a success or not and why. Include at least one reference and cite it on the last page.
5. Skim through Appendix A on Microsoft Project 2007. Review information about Project 2007 from Microsoft's Web site (*www.microsoft.com/project*) and information about VPMi Express from *www.vcsonline.com*. Also, visit The Project Management Center (*www.infogoal.com/pmc*) and Top Ten Reviews (*http://project-management-software-review.toptenreviews.com*). Research two project management software tools besides Project 2007. Write a two-page paper answering the following questions:
   a. What functions does project management software provide that you cannot do easily using other tools such as a spreadsheet or database?
   b. How do the different tools you reviewed compare, based on cost of the tool, key features, and other relevant criteria?
   c. How can organizations justify investing in enterprise or portfolio project management software?
6. Research information about PMP and related certifications. Skim through Appendix B for information and find at least two articles on this topic. What are benefits of certification in general? Do you think it is worthwhile for most project managers to get certified? Is it something you would consider? Write a two-page paper summarizing your findings and opinions.

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Companion Web Site

Visit the companion Web site for this text at *www.cengage.com/mis/schwalbe* to access:

- References cited in the text and additional suggested readings for each chapter
- Template files
- Lecture notes
- Interactive quizzes
- Podcasts
- Links to general project management Web sites
- And more

See the Preface of this text for additional information on accessing the companion Web site.

Key Terms

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

critical path — The longest path through a network diagram that determines the earliest completion of a project

enterprise project management software — Software that integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization; also called portfolio project management software

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

Gantt chart — A standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format

green IT or **green computing —** Developing and using computer resources in an efficient way to improve economic viability, social responsibility, and environmental impact

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

portfolio project management software — Software that integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization; also called enterprise project management software

program — A group of projects managed in a coordinated way to obtain benefits and control not available from managing them individually

program manager — A person who provides leadership and direction for the project managers heading the projects within a 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 Institute (PMI) — An international professional society for project managers

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

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CHAPTER 2

THE PROJECT MANAGEMENT AND INFORMATION TECHNOLOGY CONTEXT

LEARNING OBJECTIVES

After reading this chapter, you will be able to:

- Describe the systems view of project management and how it applies to information technology projects
- Understand organizations, including the four frames, organizational structures, and organizational culture
- Explain why stakeholder management and top management commitment are critical for a project's success
- Understand the concept of a project phase and the project life cycle and distinguish between project development and product development
- Discuss the unique attributes and diverse nature of information technology projects
- Describe recent trends affecting IT project management, including globalization, outsourcing, and virtual teams

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OPENING CASE

Tom Walters recently accepted a new position at his college as the Director of Information Technology. Tom had been a respected faculty member at the college for the past 15 years. The college—a small, private institution in the Southwest—offered a variety of programs in the liberal arts and professional areas. Enrollment included 1,500 full-time traditional students and about 1,000 working-adult students attending evening programs. Many instructors supplemented their courses with information on the Internet and course Web sites, but they did not offer any distance-learning programs. The college's niche was serving students in that region who liked the setting of a small liberal arts college.

Like other institutions of higher learning, the use of information technology at the college had grown tremendously in the past 10 years. There were a few classrooms on campus with computers for the instructors and students, and a few more with just instructor stations and projection systems. Tom knew that several colleges throughout the country required that all students lease laptops and that these colleges incorporated technology components into most courses. This idea fascinated him. He and two other members of the Information Technology department visited a local college that had required all students to lease laptops for the past three years, and they were very impressed with what they saw and heard. Tom and his staff developed plans to start requiring students to lease laptops at their college the next year.

Tom sent an e-mail to all faculty and staff in September, which briefly described this and other plans. He did not get much response, however, until the February faculty meeting when, as he described some of the details of his plan, the chairs of the History, English, Philosophy, and Economics departments all voiced their opposition to the idea. They eloquently stated that the college was not a technical training school, and they thought the idea was ludicrous. Members of the Computer Science department voiced their concern that almost all of their students already had state-of-the art laptops and would not want to pay a mandatory fee to lease less-powerful ones. The director of the adult education program expressed her concern that many adult-education students would balk at an increase in fees. Tom was in shock to hear his colleagues' responses, especially after he and his staff had spent a lot of time planning details of how to implement laptops at their campus. Now what should he do?

Many of the theories and concepts of project management are not difficult to understand. What *is* difficult is implementing them in various environments. Project managers must consider many different issues when managing projects. Just as each project is unique, so is its environment. This chapter discusses some of the components involved in understanding the project environment, such as using a systems approach, understanding organizations, managing stakeholders, matching product life cycles to the project environment, understanding the context of information technology projects, and reviewing recent trends affecting IT project management.

A SYSTEMS VIEW OF PROJECT MANAGEMENT

Even though projects are temporary and intended to provide a unique product or service, you cannot run projects in isolation. If project managers lead projects in isolation, it is unlikely that those projects will ever truly serve the needs of the organization. Therefore, projects must operate in a broad organizational environment, and project managers need

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to consider projects within the greater organizational context. To handle complex situations effectively, project managers need to take a holistic view of a project and understand how it relates to the larger organization. **Systems thinking** describes this holistic view of carrying out projects within the context of the organization.

What Is a Systems Approach?

The term **systems approach** emerged in the 1950s to describe a holistic and analytical approach to solving complex problems that includes using a systems philosophy, systems analysis, and systems management. A **systems philosophy** is an overall model for thinking about things as systems. **Systems** are sets of interacting components working within an environment to fulfill some purpose. For example, the human body is a system composed of many subsystems—the nervous system, the skeletal system, the circulatory system, the digestive system, and so on. **Systems analysis** is a problem-solving approach that requires defining the scope of the system, dividing it into its components, and then identifying and evaluating its problems, opportunities, constraints, and needs. Once this is completed, the systems analyst then examines alternative solutions for improving the current situation, identifies an optimum, or at least satisfactory, solution or action plan, and examines that plan against the entire system. **Systems management** addresses the business, technological, and organizational issues associated with creating, maintaining, and making changes to a system.

Using a systems approach is critical to successful project management. Top management and project managers must follow a systems philosophy to understand how projects relate to the whole organization. They must use systems analysis to address needs with a problem-solving approach. They must use systems management to identify key business, technological, and organizational issues related to each project in order to identify and satisfy key stakeholders and do what is best for the entire organization.

In the opening case, when Tom Walters planned the laptop project, he did not use a systems approach. Members of his IT department did all of the planning. Even though Tom sent an e-mail describing the laptop project to all faculty and staff, he did not address many of the organizational issues involved in such a complex project. Most faculty and staff are very busy at the beginning of fall term and many may not have read the entire message. Others may have been too busy to communicate their concerns to the Information Technology department. Tom was unaware of the effects the laptop project would have on other parts of the college. He did not clearly define the business, technological, and organizational issues associated with the project. Tom and the Information Technology department began work on the laptop project in isolation. If they had taken a systems approach, considering other dimensions of the project, and involving key stakeholders, they could have identified and addressed many of the issues raised at the February faculty meeting *before* the meeting.

The Three-Sphere Model for Systems Management

Many business and information technology students understand the concepts of systems and performing a systems analysis. However, they often gloss over the topic of systems management. The simple idea of addressing the three spheres of systems management—business, organization, and technology—can have a huge impact on selecting and managing projects successfully.

Figure 2-1 provides a sample of some of the business, organizational, and technological issues that could be factors in the laptop project. In this case, technological issues, though

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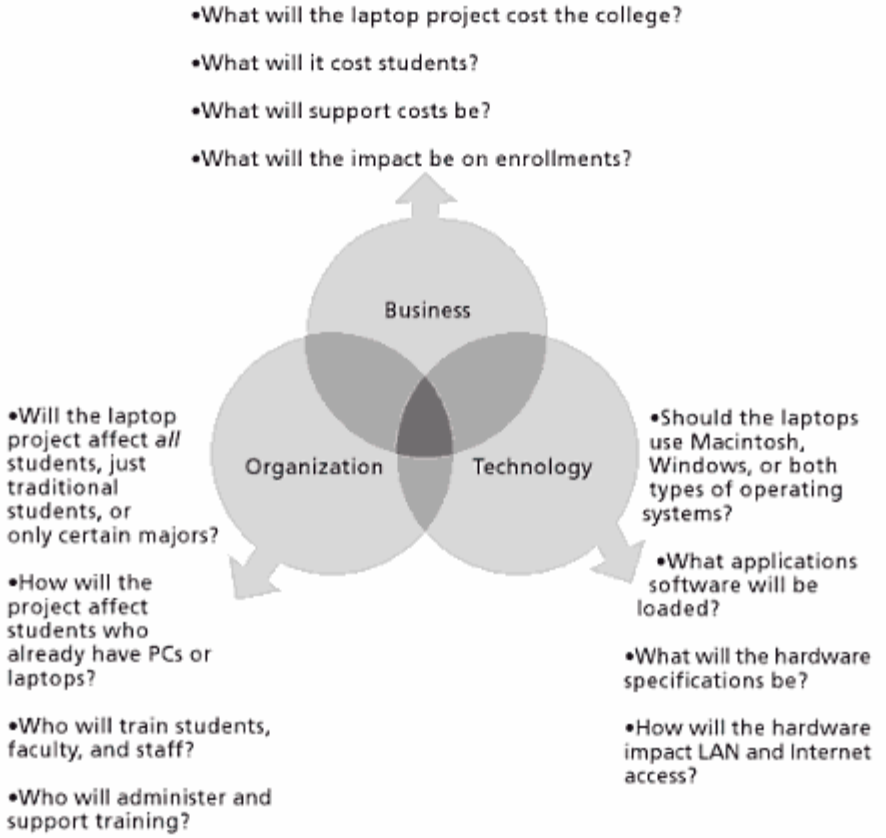

FIGURE 2-1 Three-sphere model for systems management

not simple by any means, are probably the least difficult to identify and resolve. However, projects must address issues in all three spheres of the systems management model. Although it is easier to focus on the immediate and sometimes narrow concerns of a particular project, project managers and other staff must keep in mind the effects of any project on the interests and needs of the entire system or organization.

Many information technology professionals become captivated with the technology and day-to-day problem solving involved in working with information systems. They tend to become frustrated with many of the "people problems" or politics involved in most organizations. In addition, many information technology professionals ignore important business issues—such as, "Does it make financial sense to pursue this new technology?" or, "Should the company develop this software in-house or purchase it off-the-shelf?" Using a more holistic approach helps project managers integrate business and organizational issues into their planning. It also helps them look at projects as a series of interrelated phases. When you integrate business and organizational issues into project management planning and look at projects as a series of interrelated phases, you do a better job of ensuring project success.

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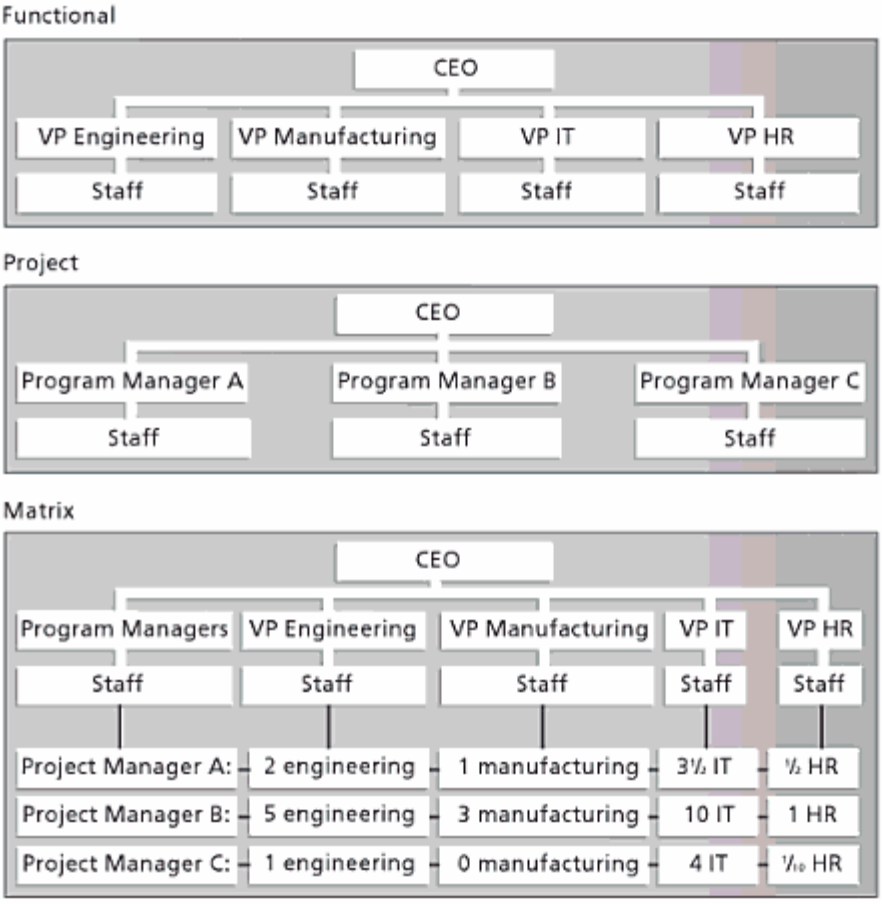

FIGURE 2-2 Functional, project, and matrix organizational structures

chart. Functional managers or vice presidents in specialties such as engineering, manufacturing, information technology, and human resources report to the chief executive officer (CEO). Their staffs have specialized skills in their respective disciplines. For example, most colleges and universities have very strong functional organizations. Only faculty in the business department teach business courses; faculty in the history department teach history; faculty in the art department teach art, and so on.

A **project organizational structure** also has a hierarchical structure, but instead of functional managers or vice presidents reporting to the CEO, program managers report to the CEO. Their staffs have a variety of skills needed to complete the projects within their programs. An organization that uses this structure earns their revenue primarily from performing projects for other groups under contract. For example, many defense, architectural, engineering, and consulting companies use a project organizational structure. These companies often hire people specifically to work on particular projects.

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A **matrix organizational structure** represents the middle ground between functional and project structures. Personnel often report to both a functional manager and one or more project managers. For example, information technology personnel at many companies often split their time between two or more projects, but they report to their manager in the information technology department. Project managers in matrix organizations have staff from various functional areas working on their projects, as shown in Figure 2-2. Matrix organizational structures can be strong, weak, or balanced, based on the amount of control exerted by the project managers.

Table 2-1 summarizes how organizational structures influence projects and project managers, based on information from several versions of the *PMBOK® Guide*. Project managers have the most authority in a pure project organizational structure and the least amount of authority in a pure functional organizational structure. It is important that project managers understand the current organizational structure under which they are working. For example, if someone in a functional organization is asked to lead a project that requires strong support from several different functional areas, he or she should ask for top management sponsorship. This sponsor should solicit support from all relevant functional managers to ensure that they cooperate on the project and that qualified people are

TABLE 2-1 Organizational structure influences on projects

Project Characteristics	Organizational Structure Type				
	Functional	Matrix			Project
		Weak Matrix	**Balanced Matrix**	**Strong Matrix**	
Project manager's authority	Little or none	Limited	Low to Moderate	Moderate to High	High to almost total
Percent of organization's personnel assigned full-time to project work	Virtually none	0–25%	15–60%	50–95%	85–100%
Who controls the project budget	Functional manager	Functional manager	Mixed	Project manager	Project manager
Project manager's role	Part-time	Part-time	Full-time	Full-time	Full-time
Common title for project manager's role	Project Coordinator/ Project Leader	Project Coordinator/ Project Leader	Project Manager/ Project Officer	Project Manager / Program Manager	Project Manager/ Program Manager
Project management administrative staff	Part-time	Part-time	Part-time	Full-time	Full-time

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available to work as needed. The project manager might also ask for a separate budget to pay for project-related trips, meetings, and training or to provide financial incentives to the people supporting the project.

Even though project managers have the most authority in the project organizational structure, this type of organization is often inefficient for the company as a whole. Assigning staff full-time to the project often creates underutilization and/or misallocation of staff resources. For example, if a technical writer is assigned full-time to a project, but there is no work for him or her on a particular day, the organization is wasting money by paying that person a full-time wage. Project organizations may also miss economies of scale available through the pooling of requests for materials with other projects.

Disadvantages such as these illustrate the benefit of using a systems approach to managing projects. For example, the project manager might suggest hiring an independent contractor to do the technical writing work instead of using a full-time employee. This approach would save the organization money while still meeting the needs of the project. When project managers use a systems approach, they are better able to make decisions that address the needs of the entire organization.

Organizational Culture

Just as an organization's structure affects its ability to manage projects, so does an organization's culture. **Organizational culture** is a set of shared assumptions, values, and behaviors that characterize the functioning of an organization. It often includes elements of all four frames described previously. Organizational culture is very powerful, and many people believe the underlying causes of many companies' problems are not in the organizational structure or staff; they are in the culture. It is also important to note that the same organization can have different subcultures. The information technology department may have a different organizational culture than the finance department, for example. Some organizational cultures make it easier to manage projects.

According to Stephen P. Robbins and Timothy Judge, authors of a popular textbook on organizational behavior, there are ten characteristics of organizational culture:

1. *Member identity*: The degree to which employees identify with the organization as a whole rather than with their type of job or profession. For example, a project manager or team member might feel more dedicated to his or her company or project team than to their job or profession, or they might not have any loyalty to a particular company or team. As you can guess, an organizational culture where employees identify more with the whole organization are more conducive to a good project culture.
2. *Group emphasis*: The degree to which work activities are organized around groups or teams, rather than individuals. An organizational culture that emphasizes group work is best for managing projects.
3. *People focus*: The degree to which management's decisions take into account the effect of outcomes on people within the organization. A project manager might assign tasks to certain people without considering their individual needs, or the project manager might know each person very well and focus on individual needs when assigning work or making other decisions. Good project managers often balance the needs of individuals and the organization.

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4. *Unit integration*: The degree to which units or departments within an organization are encouraged to coordinate with each other. Most project managers strive for strong unit integration to deliver a successful product, service, or result. An organizational culture with strong unit integration makes the project manager's job easier.
5. *Control*: The degree to which rules, policies, and direct supervision are used to oversee and control employee behavior. Experienced project managers know it is often best to balance the degree of control to get good project results.
6. *Risk tolerance*: The degree to which employees are encouraged to be aggressive, innovative, and risk seeking. An organizational culture with a higher risk tolerance is often best for project management since projects often involve new technologies, ideas, and processes.
7. *Reward criteria*: The degree to which rewards, such as promotions and salary increases, are allocated according to employee performance rather than seniority, favoritism, or other nonperformance factors. Project managers and their teams often perform best when rewards are based mostly on performance.
8. *Conflict tolerance*: The degree to which employees are encouraged to air conflicts and criticism openly. It is very important for all project stakeholders to have good communications, so it is best to work in an organization where people feel comfortable discussing conflict openly.
9. *Means-ends orientation*: The degree to which management focuses on outcomes rather than on techniques and processes used to achieve results. An organization with a balanced approach in this area is often best for project work.
10. *Open-systems focus*: The degree to which the organization monitors and responds to changes in the external environment. As discussed earlier in this chapter, projects are part of a larger organizational environment, so it is best to have a strong open-systems focus.[3]

As you can see, there is a definite relationship between organizational culture and successful project management. Project work is most successful in an organizational culture where employees identify more with the organization, where work activities emphasize groups, and where there is strong unit integration, high risk tolerance, performance-based rewards, high conflict tolerance, an open-systems focus, and a balanced focus on people, control, and means orientation.

STAKEHOLDER MANAGEMENT

Recall from Chapter 1 that project stakeholders are the people involved in or affected by project activities. Stakeholders can be internal to the organization, external to the organization, directly involved in the project, or simply affected by the project. Internal project stakeholders generally include the project sponsor, project team, support staff, and internal customers for the project. Other internal stakeholders include top management, other functional managers, and other project managers. Since organizations have limited resources, projects affect top management, other functional managers, and other project managers by using some of the organization's limited resources. Thus, while additional internal stakeholders may not be directly involved in the project, they are still stakeholders because the project

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affects them in some way. External project stakeholders include the project's customers (if they are external to the organization), competitors, suppliers, and other external groups potentially involved in or affected by the project, such as government officials or concerned citizens. Since the purpose of project management is to meet project requirements and satisfy stakeholders, it is critical that project managers take adequate time to identify, understand, and manage relationships with all project stakeholders. Using the four frames of organizations to think about project stakeholders can help you meet their expectations.

Consider again the laptop project from the opening case. Tom Walters seemed to focus on just a few internal project stakeholders. He viewed only part of the structural frame of the college. Since his department would do most of the work in administering the laptop project, he concentrated on those stakeholders. Tom did not even involve the main customers for this project—the students at the college. Even though Tom sent an e-mail to faculty and staff, he did not hold meetings with senior administration or faculty at the college. Tom's view of who the stakeholders were for the laptop project was very limited.

During the faculty meeting, it became evident that the laptop project had many stakeholders in addition to the Information Technology department and students. If Tom had expanded his view of the structural frame of his organization by reviewing an organizational chart for the entire college, he could have identified other key stakeholders. He would have been able to see that the laptop project would affect academic department heads and members of different administrative areas. If Tom had focused on the human resources frame, he would have been able to tap his knowledge of the college and identify individuals who would most support or oppose requiring laptops. By using the political frame, Tom could have considered the main interest groups that would be most affected by this project's outcome. Had he used the symbolic frame, Tom could have tried to address what moving to a laptop environment would really mean for the college. He then could have anticipated some of the opposition from people who were not in favor of increasing the use of technology on campus. He also could have solicited a strong endorsement from the college president or dean before talking at the faculty meeting.

Tom Walters, like many new project managers, learned the hard way that his technical and analytical skills were not enough to guarantee success in project management. To be more effective, he had to identify and address the needs of different stakeholders and understand how his project related to the entire organization.

MEDIA SNAPSHOT

The *New York Times* reported that the project to rebuild Ground Zero in New York City is having severe problems. Imagine all of the stakeholders involved in this huge, highly emotional project. A 34-page report (see the article reference for further information) describes the many challenges faced in the reconstruction of the former World Trade Center site nearly seven years after the terrorist attack of September 11, 2001. The report listed at least 15 fundamental unresolved issues, including the lack of final designs for the proposed World Trade Center Transportation Hub; the unfinished decontamination and

continued

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large projects full-time to increase involvement from end users of the systems. Some CEOs even take a strong leadership role in promoting the use of information technology in their organizations.

Gartner, Inc., a well-respected information technology consulting firm, provides awards to organizations for excellence in applying various technologies. For example, in 2006, Gartner announced the winners of its eighth annual Customer Relationship Management (CRM) Excellence Awards. BNSF Railway received the award in the "Excellence in Enterprise CRM" category, and UnitedHealth Group received the award in the "Excellence in Sales, Marketing or Customer Service" category. (Electronic Arts, an independent producer of electronic games, won the award in 2007.) The 2006 award winners had the following to say:

- *Elizabeth Obermiller, director of ERM systems for BNSF Railway*: "Our success was driven by the ongoing executive commitment and passionate and talented teams, who were able to implement a planned and phased approach with advanced application of analytics to monitor, measure and drive success."
- *John Reinke, a senior vice president of Uniprise, a UnitedHealth Group*: "We are excited to receive this award for our partnership with eLoyalty to implement a new, cutting-edge call center technology application called Behavioral Analytics™. This technology allows us to engage in deeper, more personally relevant phone conversations with each consumer who speaks with a customer care professional. Health care consumers often face complex and emotional issues, and this is a great example of how technology can help improve their experience."[7]

The Need for Organizational Standards

Another problem in most organizations is not having standards or guidelines to follow that could help in performing project management. These standards or guidelines might be as simple as providing standard forms or templates for common project documents, examples of good project management plans, or guidelines on how the project manager should provide status information to top management. The content of a project management plan and how to provide status information might seem like common sense to senior managers, but many new information technology project managers have never created plans or given a non-technical status report. Top management must support the development of these standards and guidelines and encourage or even enforce their use. For example, an organization might require all potential project information in a standard format to make project portfolio management decisions. If a project manager does not submit a potential project in the proper format, it could be rejected.

As described in Chapter 1, some organizations invest heavily in project management by creating a project management office or center of excellence, an organizational entity created to assist project managers in achieving project goals and maintaining project governance. Rachel Hollstadt, founder and CEO of a project management consulting firm, suggests that organizations consider adding a new position, a Chief Project Officer (CPO). Some organizations develop career paths for project managers. Some require that all project managers have Project Management Professional (PMP) certification and that all

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employees have some type of project management training. The implementation of all of these standards demonstrates an organization's commitment to project management.

PROJECT PHASES AND THE PROJECT LIFE CYCLE

Since projects operate as part of a system and involve uncertainty, it is good practice to divide projects into several phases. A **project life cycle** is a collection of project phases. Some organizations specify a set of life cycles for use on all of their projects, while others follow common industry practices based on the types of projects involved. In general, project life cycles define what work will be performed in each phase, what deliverables will be produced and when, who is involved in each phase, and how management will control and approve work produced in each phase. A **deliverable** is a product or service, such as a technical report, a training session, a piece of hardware, or a segment of software code, produced or provided as part of a project. (See Chapter 5, Project Scope Management, for detailed information on deliverables.)

In early phases of a project life cycle, resource needs are usually lowest and the level of uncertainty is highest. Project stakeholders have the greatest opportunity to influence the final characteristics of the project's products, services, or results during the early phases of a project life cycle. It is much more expensive to make major changes to a project during latter phases. During the middle phases of a project life cycle, the certainty of completing a project improves as a project continues, more information is known about the project requirements and objectives, and more resources are usually needed than during the initial or final phase. The final phase of a project focuses on ensuring that project requirements were met and that the project sponsor approves completion of the project.

Project phases vary by project or industry, but some general phases in traditional project management are often called the concept, development, implementation, and close-out phases. The *PMBOK Guide®, Fourth Edition* calls these phases starting the project, organizing and preparing, carrying out the project work, and finishing the project. These phases should not be confused with the project management process groups of initiating, planning, executing, monitoring and controlling, and closing, as described in Chapter 3. The first two traditional project phases (concept and development) focus on planning and are often referred to as **project feasibility**. The last two phases (implementation and close-out) focus on delivering the actual work and are often referred to as **project acquisition**. A project should successfully complete each phase before moving on to the next. This project life cycle approach provides better management control and appropriate links to the ongoing operations of the organization.

Figure 2-3 provides a summary framework for the general phases of the traditional project life cycle. In the concept phase of a project, managers usually develop some type of business case, which describes the need for the project and basic underlying concepts. A preliminary or rough cost estimate is developed in this first phase, and an overview of the work involved is created. A work breakdown structure (WBS) outlines project work by decomposing the work activities into different levels of tasks. The WBS is a deliverable-oriented document that defines the total scope of the project. (You will learn more about the work breakdown structure in Chapter 5, Project Scope Management.) For example, if Tom

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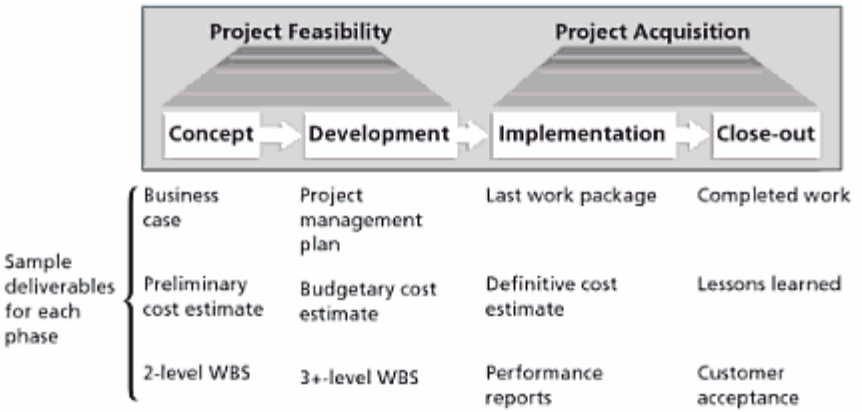

FIGURE 2-3 Phases of the traditional project life cycle

Walters (from the opening case) had followed the project life cycle instead of moving full-steam ahead with the laptop project, he could have created a committee of faculty and staff to study the concept of increasing the use of technology on campus. This committee might have developed a business case and plan that included an initial, smaller project to investigate alternative ways of increasing the use of technology. They might have estimated that it would take six months and $20,000 to conduct a detailed technology study. The WBS at this phase of the study might have three levels and partition the work to include a competitive analysis of what five similar campuses were doing, a survey of local students, staff, and faculty, and a rough assessment of how using more technology would affect costs and enrollments. At the end of the concept phase, the committee would be able to deliver a report and presentation on its findings. The report and presentation would be an example of a deliverable.

After the concept phase is completed, the next project phase—development—begins. In the development phase, the project team creates more detailed project management plans, a more accurate cost estimate, and a more thorough WBS. In the example under discussion, suppose the concept phase report suggested that requiring students to have laptops was one means of increasing the use of technology on campus. The project team could then further expand this idea in the development phase. They would have to decide if students would purchase or lease the laptops, what type of hardware and software the laptops would require, how much to charge students, how to handle training and maintenance, how to integrate the use of the new technology with current courses, and so on. If, however, the concept phase report showed that the laptop idea was not a good idea for the college, then the project team would no longer consider increasing the use of technology by requiring laptops in the development phase and would cancel the project before development. This phased approach minimizes the time and money spent developing inappropriate projects. A project idea must pass the concept phase before evolving into the development phase.

The third phase of the traditional project life cycle is implementation. In this phase, the project team creates a definitive or very accurate cost estimate, delivers the required work, and provides performance reports to stakeholders. Suppose Tom Walters' college took the

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idea of requiring students to have laptops through the development phase. During the implementation phase, the project team would need to obtain the required hardware and software, install the necessary network equipment, deliver the laptops to the students, create a process for collecting fees, provide training to students, faculty, and staff, and so on. Other people on campus would also be involved in the implementation phase. Faculty would need to consider how best to take advantage of the new technology. The recruiting staff would have to update their materials to reflect this new feature of the college. Security would need to address new problems that might result from having students carry around expensive equipment. The project team usually spends the bulk of their efforts and money during the implementation phase of projects.

The last phase of the traditional project life cycle is close-out. In the close-out phase, all of the work is completed, and there should be some sort of customer acceptance of the entire project. The project team should document its experiences on the project in a lessons-learned report. If the laptop idea made it all the way through the implementation phase and all students received laptops, the project team would then complete the project by closing out any related activities. Team members might administer a survey to students, faculty, and staff in order to gather opinions on how the project fared. They would ensure that any contracts with suppliers were completed and appropriate payments made. They would transition future work related to the laptop project to other parts of the organization. The project team could also share its lessons-learned report with other college campuses that are considering implementing a similar program.

Many projects, however, do not follow this traditional project life cycle. They still have general phases with some similar characteristics as the traditional project life cycle, but they are much more flexible. For example, there may be just three phases, the initial, intermediate, and final phase. Or there may be multiple intermediate phases. There might be a separate project just to complete a feasibility study. Regardless of the project life cycle's specific phases, it is good practice to think of projects as having phases that connect the beginning and the end of the project, so that people can measure progress toward achieving project goals during each phase.

Just as a *project* has a life cycle, so does a *product*. Information technology projects help produce products and services such as new software, hardware, networks, research reports, and training on new systems. Understanding the product life cycle is just as important to good project management as understanding the phases of the traditional project life cycle.

Product Life Cycles

Recall from Chapter 1 that a project is defined as "a temporary endeavor undertaken to create a unique product, service, or result," and a program is defined as "a group of projects managed in a coordinated way." A program often refers to the creation of a product, like an automobile or a new operating system. Therefore, developing a product often involves many projects.

All products follow some type of life cycle—cars, buildings, even amusement parks. The Walt Disney Company, for example, follows a rigorous process to design, build, and test new products. They assign project managers to oversee the development of all new products, such as rides, parks, and cruise lines. Likewise, major automotive companies follow product life cycles to produce new cars, trucks, and other products. Most information technology

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professionals are familiar with the concept of a product life cycle, especially for developing software.

Software development projects are one subset of information technology projects. Many information technology projects involve researching, analyzing, and then purchasing and installing new hardware and software with little or no actual software development required. However, some projects involve minor software modifications to enhance existing software or to integrate one application with another. Other projects involve a major amount of software development. Many argue that developing software requires project managers to modify traditional project management methods, depending on a particular product's life cycle.

A **systems development life cycle (SDLC)** is a framework for describing the phases involved in developing information systems. Some popular models of an SDLC include the waterfall model, the spiral model, the incremental build model, the prototyping model, and the Rapid Application Development (RAD) model. These life cycle models are examples of a **predictive life cycle**, meaning that the scope of the project can be clearly articulated and the schedule and cost can be accurately predicted. The project team spends a large portion of the project effort attempting to clarify the requirements of the entire system and then producing a design. Users are often unable to see any tangible results in terms of working software for an extended period. Below are brief descriptions of several predictive SDLC models.[8]

- The waterfall life cycle model has well-defined, linear stages of systems analysis, design, construction, testing, and support. This life cycle model assumes that requirements will remain stable after they are defined.
- The spiral life cycle model was developed based on experience with various refinements of the waterfall model as applied to large government software projects. It recognizes the fact that most software is developed using an iterative or spiral approach rather than a linear approach.
- The incremental build life cycle model provides for progressive development of operational software, with each release providing added capabilities.
- The prototyping life cycle model is used for developing software prototypes to clarify user requirements for operational software. It requires heavy user involvement, and developers use a model to generate functional requirements and physical design specifications simultaneously. Developers can throw away or keep prototypes, depending on the project.
- The RAD life cycle model uses an approach in which developers work with an evolving prototype. This life cycle model also requires heavy user involvement and helps produce systems quickly without sacrificing quality. Developers use RAD tools such as CASE (computer-aided software engineering), JRP (joint requirements planning), and JAD (joint application design) to facilitate rapid prototyping and code generation.

In contrast to the predictive life cycle models, the **Adaptive Software Development (ASD)** life cycle model assumes that software development follows an adaptive approach because the requirements cannot be clearly expressed early in the life cycle. An adaptive approach is also used to provide more freedom than the prescriptive approaches. It allows the development to proceed by creating components that provide the functionality specified by the business group as these needs are discovered in a more free-form approach.

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weekly to review the project's progress and discuss work planned for the following week. Gottron said the meetings ensured that "if we were missing a beat on the project, no matter which company [was responsible], we were on top of it and adding additional resources to make up for it."[10]

Managers in the motorcycle industry now understand the importance of overseeing their IT projects. Harley-Davidson Motor Company used to focus only on producing and selling high-quality motorcycles. In 2003, however, management realized that it had to improve its IT operations and control to stay in business and adhere to new government laws such as the accounting reporting regulations of Sarbanes-Oxley. Harley-Davidson had no standardized processes for user access, change management, or backup and recovery at that time. "Although complying with Sarbanes-Oxley was going to be a challenge, the company took strong action, utilized COBIT (Control Objectives for Information and related Technology) and passed Sarbanes-Oxley year one compliance . . . . One of the major benefits of using COBIT as its overall internal control and compliance model was getting everyone—especially non-technical motorcycle experts—revved up about control activities and why controls are important.[11]

THE CONTEXT OF INFORMATION TECHNOLOGY PROJECTS

As described earlier, software development projects can follow several different product life cycles based on the project context. There are several other issues related to managing information technology projects. This section highlights some of the issues unique to the information technology industry that affect project management, including the nature of projects, the characteristics of project team members, and the diverse nature of technologies involved.

The Nature of Information Technology Projects

Unlike projects in many other industries, projects labeled as information technology projects can be very diverse. Some involve a small number of people installing off-the-shelf hardware and associated software. Others involve hundreds of people analyzing several organizations' business processes and then developing new software in a collaborative effort with users to meet business needs. Even for small hardware-oriented projects, there is a wide diversity in the types of hardware that could be involved—personal computers, mainframe computers, network equipment, kiosks, or small mobile devices, to name a few. The network equipment might be wireless, phone-based, cable-based, or require a satellite connection. The nature of software development projects is even more diverse than hardware-oriented projects. A software development project might include developing a simple, standalone Microsoft Excel or Access application or a sophisticated, global e-commerce system using state-of-the-art programming languages.

Information technology projects also support every possible industry and business function. Managing an information technology project for a film company's animation department would require different knowledge and skills of the project manager and team members than a project to improve a federal tax collection system or install a communication infrastructure in a third-world country. Because of the diversity of information

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technology projects and the newness of the field, it is important to develop and follow best practices in managing these varied projects. That way, information technology project managers will have a common starting point and method to follow with every project.

Characteristics of Information Technology Project Team Members

Because of the nature of information technology projects, the people involved come from very diverse backgrounds and possess different skill sets. Most trade schools, colleges, and universities did not start offering degrees in computer technology, computer science, management information systems, or other information technology areas until the 1970s. Therefore, many people in the field do not have a common educational background. Many companies purposely hire graduates with degrees in other fields such as business, mathematics, or the liberal arts to provide different perspectives on information technology projects. Even with these different educational backgrounds, there are some common job titles for people working on most information technology projects such as business analyst, programmer, network specialist, database analyst, quality assurance expert, technical writer, security specialist, hardware engineer, software engineer, and system architect. Within the category of programmer, there are several other job titles used to describe the specific technologies the programmer uses, such as Java programmer, XML programmer, C/C++ programmer, and so on.

Some information technology projects require the skills of people in just a few of these job functions, but many require inputs from many or all of them. Occasionally, information technology professionals move around between these job functions, but more often people become technical experts in one area or they decide to move into a management position. It is also rare for technical specialists or project managers to remain with the same company for a long time, and in fact, many information technology projects include a large number of contract workers. Working with this "army of free agents," as Rob Thomsett, author and consultant for the Cutter Consortium, calls them, creates special challenges. (See the companion Web site for an article on this topic by Thomsett and other suggested readings.)

Diverse Technologies

Many of the job titles for IT professionals reflect the different technologies required to hold that position. Unfortunately, hardware specialists might not understand the language of database analysts, and vice versa. Security specialists may have a hard time communicating with business analysts. It is also unfortunate that people within the same information technology job function often do not understand each other because each uses different technology. For example, someone with the title of programmer can often use several different programming languages. A COBOL programmer, however, cannot be of much help on a Java project. These highly specialized positions also make it difficult for project managers to form and lead project teams.

Another problem with diverse technologies is that many of them change rapidly. A project team might be close to finishing a project when it discovers a new technology that can greatly enhance the project and better meet long-term business needs. New technologies have also shortened the time frame many businesses have to develop, produce, and distribute new products and services. This fast-paced environment requires equally fast-paced processes to manage and produce information technology projects and products.

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RECENT TRENDS AFFECTING INFORMATION TECHNOLOGY PROJECT MANAGEMENT

Additional challenges and opportunities face IT project managers and their teams in the form of the recent trends of increased globalization, outsourcing, and virtual teams. Each of these trends and suggestions for addressing them are provided in this section.

Globalization

In his popular book, *The World Is Flat*, Thomas L. Friedman describes the effects of globalization, which has created a "flat" world where everyone is connected and the "playing field" is level for many more participants.[12] Lower trade and political barriers and the digital revolution have made it possible to interact almost instantaneously with billions of other people across the planet, and for individuals and small companies to compete with large corporations. Friedman also discusses the increase in "uploading," where people share information through blogging, podcasts, and open-source software.

Information technology is a key enabler of globalization, and globalization has significantly affected the field of IT. Even though major IT companies such as Microsoft and IBM started in the United States, much of their business is global—indeed, companies and individuals throughout the world contribute to the growth of information technologies and work and collaborate on various IT projects. As mentioned in Chapter 1, the total global spending on technology goods, services, and staff was projected to reach $2.4 trillion in 2008, and the main engines of growth were Asia Pacific and the oil-exporting areas of Eastern Europe, the Middle East, and Africa.

It is important for project managers to address several issues when working on global projects. Several key issues include the following:

- *Communications*: Since people will be working in different time zones, speak different languages, have different cultural backgrounds, celebrate different holidays, etc., it is important to address how people will communicate in an efficient and timely manner. A communications management plan (like the one described in Chapter 10, Project Communications Management) is vital.
- *Trust*: Trust is an important issue for all teams, especially when they are global teams. It is important to start building trust immediately by recognizing and respecting others' differences and the value they add to the project.
- *Common work practices*: It is important to align work processes to come up with an agreed-upon modus operandi with which everyone is comfortable. Project managers must allow time for the team to develop these common work practices. Using special tools, as described in the next section, can facilitate this process.
- *Tools*: Information technology plays a vital role in globalization, especially in enhancing communications and work practices. For example, Timothy Porter, a project manager for Hundsun Technologies, a Chinese domestic software company building a global services business, describes several tools they use as follows:
  - XPlanner is used for project planning and project monitoring. This tool is suitable for agile software development and is Web-based for ease of distributed geographic access.

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- TRAC is an enhanced issue-tracking system for software development projects. TRAC includes features such as defect management, source code control, project roadmap management, and an integrated wiki—a collaborative, Web-based feedback system—for project documentation that is very easy for stakeholders to review.
- CruiseControl is a framework for a continuous build process. It includes plug-ins for e-mail notification, source control tools, and so on. A Web interface is provided to view the details of the current and previous builds.
- WebEx, a Web-based conferencing tool, is used to record each development cycle's demo, which is stored on our wikis. These demos provide stakeholders visibility into our progress and can also be used as training materials for new staff members or the test team.
- E-mail, telephone, SKYPE (software that allows users to make telephone calls over the Internet), and instant messaging (IM) are used for routine daily communication among team members.[13]

After researching over 600 global organizations, KPMG International summarized several suggestions for managing global project teams:

- Employ greater project discipline for global projects, otherwise weaknesses within the traditional project disciplines may be amplified by the geographical differences.
- Think global, but act local to align and integrate stakeholders at all project levels.
- Consider collaboration over standardization to help balance the goals and project approach.
- Keep project momentum going for projects, which will typically have a long duration.
- Consider the use of newer, perhaps more innovative, tools and technology.[14]

Outsourcing

As described in detail in Chapter 12, Project Procurement Management, **outsourcing** is when an organization acquires goods and/or sources from an outside source. The term **offshoring** is sometimes used to describe outsourcing from another country. Offshoring is a natural outgrowth of globalization. IT projects continue to rely more and more on outsourcing, both within and outside of their country boundaries.

Organizations remain competitive by using outsourcing to their advantage. For example, many organizations have found ways to reduce costs by outsourcing. Their next challenge is to make strategic IT investments with outsourcing by improving their enterprise architecture to ensure that IT infrastructure and business processes are integrated and standardized. (See the Suggested Readings on the companion Web site for this chapter by Ross and Beath and KPMG International. Chapter 12, Project Procurement Management, also features more information.)

Because of the increased use of outsourcing for IT projects, project managers should become more familiar with negotiating contracts and many other issues, including working on and managing virtual teams.

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Virtual Teams

Increased globalization and outsourcing have increased the need for virtual teams. A **virtual team** is a group of individuals who work across time and space using communication technologies. Team members might all work for the same company in the same country, or they might include employees as well as independent consultants, suppliers, or even volunteers providing their expertise from around the globe.

The main advantages of virtual teams include:

- Increasing competiveness and responsiveness by having a team of workers available 24/7.
- Lowering costs because many virtual workers do not require office space or support beyond their home offices.
- Providing more expertise and flexibility by having team members from across the globe working any time of day or night.
- Increasing the work/life balance for team members by eliminating fixed office hours and the need to travel to work.

Disadvantages of virtual teams include:

- Isolating team members who may not adjust well to working in a virtual environment.
- Increasing the potential for communications problems since team members cannot use body language or other communications to understand each other and build relationships and trust.
- Reducing the ability for team members to network and transfer information informally.
- Increasing the dependence on technology to accomplish work.

Like any team, a virtual team should focus on achieving a common goal.

Research on virtual teams reveals a growing list of factors that influence their success including:

- *Team processes*: It is important to define how the virtual team will operate. For examples, teams must agree on how and when work will be done, what technologies will be used, how decisions will be made, and other important process issues.
- *Leadership style*: The project manager's leadership style affects all teams, especially virtual ones.
- *Trust and relationships*: Many virtual teams fail because of a lack of trust. It is difficult to build relationships and trust from a distance. Some project managers like to have a face-to-face meeting so team members can get to know each other and build trust. If that is not possible, phone or video conferences can help.
- *Team member selection and role preferences*: Dr. Meredith Belbin defined a team role as "a tendency to behave, contribute and interrelate with others in a particular way."[15] It is important to select team members carefully and to form a team where all roles are covered. Each virtual team member must also understand his or her role(s) on the team. (Visit *www.belbin.com* for more information on this topic.)

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Chapter Summary

Projects operate in an environment broader than the project itself. Project managers need to take a systems approach when working on projects; they need to consider projects within the greater organizational context.

Organizations have four different frames: structural, human resources, political, and symbolic. Project managers need to understand all of these aspects of organizations to be successful. The structural frame focuses on different groups' roles and responsibilities to meet the goals and policies set by top management. The human resources frame focuses on producing harmony between the needs of the organization and the needs of people. The political frame addresses organizational and personal politics. The symbolic frame focuses on symbols and meanings.

The structure of an organization has strong implications for project managers, especially in terms of the amount of authority the project manager has. The three basic organizational structures include functional, matrix, and project. Project managers have the most authority in a pure project organization, an intermediate amount of authority in a matrix organization, and the least amount of authority in a pure functional organization.

Organizational culture also affects project management. A culture where employees have a strong identity with the organization, where work activities emphasize groups, where there is strong unit integration, high risk tolerance, performance-based rewards, high conflict tolerance, an open-systems focus, and a balance on the dimensions of people focus, control, and means-orientation is more conducive to project work.

Project stakeholders are individuals and organizations who are actively involved in the project or whose interests may be positively or negatively affected because of project execution or successful project completion. Project managers must identify and understand the different needs of all stakeholders on their projects.

Top management commitment is crucial for project success. Since projects often affect many areas in an organization, top management must assist project managers if they are to do a good job of project integration. Organizational commitment to information technology is also important to the success of information technology projects. Development standards and guidelines assist most organizations in managing projects.

A project life cycle is a collection of project phases. Traditional project phases include concept, development, implementation, and close-out phases. Projects often produce products, which follow product life cycles. Examples of product life cycles for software development include the waterfall, spiral, incremental build, prototyping, RAD, and the adaptive software development models. Project managers must understand the specific life cycle of the products they are producing as well as the general project life cycle model.

A project should successfully pass through each of the project phases in order to continue to the next phase. A management review should occur at the end of each project phase, and more frequent management inputs are often needed. These management reviews and inputs are important for keeping projects on track and determining if projects should be continued, redirected, or terminated.

Project managers need to consider several factors due to the unique context of information technology projects. The diverse nature of these projects and the wide range of business areas and technologies involved make information technology projects especially challenging to manage. Leading project team members with a wide variety of specialized skills and understanding rapidly changing technologies are also important considerations.

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Several recent trends have affected information technology project management. Increased globalization, outsourcing, and virtual teams have changed the way many IT projects are staffed and managed. Project managers must stay abreast of these and other trends and discover ways to use them to their advantage.

Quick Quiz

1. Which of the following is not part of the three-sphere model for systems management?
   a. business
   b. information
   c. technology
   d. organization
2. Which of the four frames of organizations addresses how meetings are run, employee dress codes, and expected work hours?
   a. structural
   b. human resources
   c. political
   d. symbolic
3. Personnel in a _____ organizational structure often report to two or more bosses.
   a. functional
   b. project
   c. matrix
   d. hybrid
4. Project work is most successful in an organizational culture where all of the following characteristics are high except _____.
   a. member identity
   b. group emphasis
   c. risk tolerance
   d. control
5. A _____ is a product or service, such as a technical report, a training session, or hardware, produced or provided as part of a project.
   a. deliverable
   b. product
   c. work package
   d. tangible goal

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