1

Introduction to Project Management

Objectives

After reading this chapter, you will be able to:

1. *Understand the growing need for better project management, especially for information technology projects*
2. *Explain what a project is, provide examples of information technology projects, list various attributes of projects, and describe the triple constraint of projects*
3. *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 factors*
4. *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*
5. *Describe the project management profession, including its history, the role of professional organizations like the Project Management Institute, the importance of certification and ethics, and the growth of project management software*

OPENING CASE

*A*nne Roberts, the new Director of the Project Management Office for a large retail chain, stood in front of five hundred 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 via the Internet. The company had come a long way in implementing new information systems to improve inventory control, sell products using the Web, and streamline the sales and distribution processes.

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 a new position as Director of the Project Management Office. Most of what we do in this department involves projects, and my role in this new position is to turn the company around by helping us effectively select and manage those projects. Our challenge is to develop a culture in which we all work together to provide high-quality goods and services to our consumers while earning a profit in this difficult market. To meet this challenge, we must collaborate to focus on finding solutions to complex problems. We must 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 become 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 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 statistics below demonstrate the significance of project management in today's society, especially for projects involving information technology (IT):

■ A 2001 report showed that the U.S. spends $2.3 trillion on projects every year, an amount equal to one-quarter 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 sixteen million people regard project management as their profession.[1]

[1] Project Management Institute (PMI), The PMI Project Management Fact Book, Second Edition, 2001.

- Worldwide IT spending is expected to grow by between 4 percent and 6 percent in the next few years. Forrester Research estimated that technology spending in the United States would total $752 billion in 2004, an increase of 4.4 percent over 2003. Forrester also predicts that U.S. IT spending will grow by another 5.7 percent in 2005, to reach $795 billion.[2]

- In 2003, the average senior project manager in the U.S. earned almost $90,000 per year. The average salary of a program manager was $103,464, just slightly less than the average Chief Information Officer (CIO) salary of $103,925. The average salary for a Project Management Office (PMO) Director was $118,633.[3]

- In the U.S., the number-one reality television show in 2004, *The Apprentice*, portrayed the important role project managers play in business. Each week of the show, teams would select a project manager to lead them in accomplishing that week's project. The project manager would be held partly responsible for the team's success or failure. Whether you're trying to make money by selling lemonade, running a golf tournament, or developing a new information system, project managers play a vital role in business success.

Today's companies, governments, and non-profit 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, 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 "CHAOS". This prestigious 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. United States 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 survey found that the average cost of an information technology application development project for a large company was more than $2.3 million; for a medium company, it was more than $1.3 million; and for a small company, it was more than $434,000. Their 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.

[2] Butler, Steve, *IT Spending,* Analyst Views, February 2004.
[3] Project Management Institute (PMI), *Project Management Salary Survey, Third Edition,* 2003.

The study also found that more than 31 percent of information technology projects were canceled before completion, costing U.S. companies and government agencies more than $81 billion. The authors of this study were adamant about the need for better project management in the 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."[4]

Many organizations claim that using project management provides advantages, such as:

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

This chapter introduces projects and project 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 textbook 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."[5] 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. Information technology

[4] The Standish Group, "The CHAOS Report" (*www.standishgroup.com*) (1995). Another reference is Johnson, Jim, "CHAOS: The Dollar Drain of IT Project Failures," *Application Development Trends* (January 1995).

[5] Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (2004), p. 5. Note: Page numbers are based on the early release of the third edition released on August 31, 2004.

projects involve using hardware, software, and/or networks to create a product, service, or result. Examples of information technology projects include the following:

- A help desk or technical worker replaces laptops for a small department
- A small software development team adds a new feature to an internal software application
- A college campus upgrades its technology infrastructure to provide wireless Internet access
- A cross-functional task force in a company decides what software to purchase and how it will be implemented
- A company develops a new system to increase sales force productivity
- A television network develops a system to allow viewers to vote for contestants and provide other feedback on programs
- The automobile industry develops a Web site to streamline procurement
- A government group develops a system to track child immunizations
- A large group of volunteers from organizations throughout the world develops standards for a new communications technology

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 more clear. 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, or 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 hardware, software, and network resources. People from other companies—product suppliers and consulting companies—will become resources for meeting new project objectives. Resources, however, are limited. They 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 improve direct product sales using the Internet, he or she might be the project sponsor. If several projects related to Internet technologies were undertaken, the organization might form a program. A **program** is "a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually."[6] A program manager provides leadership for the project managers directing those projects, and the sponsors might come from several business areas.

■ *A project involves uncertainty.* Because every project is unique, it is sometimes difficult to define the project's 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.

A good **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.

[6] Ibid, p. 16.

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?
- *Time:* How long should it take to complete the project? What is the project's schedule?
- *Cost*: What should it cost to complete the project? What is the project's 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 forty- to fifty-page report and a one-hour presentation on thirty potential information technology projects. The project manager might further define project scope by 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 $50,000. These expectations provide the targets for the scope, time, and cost dimensions of the project.

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 scope and time goals. Alternatively, you might have to reduce the scope of a project to meet time and cost goals. Because projects involve uncertainty and limited resources, it is rare to complete many projects according to the exact scope, time, and cost plans originally predicted. 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 thirty 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 cost and/or schedule adjustments.

Successful project management means meeting all three goals (scope, time, and cost)—and satisfying the project's sponsor!
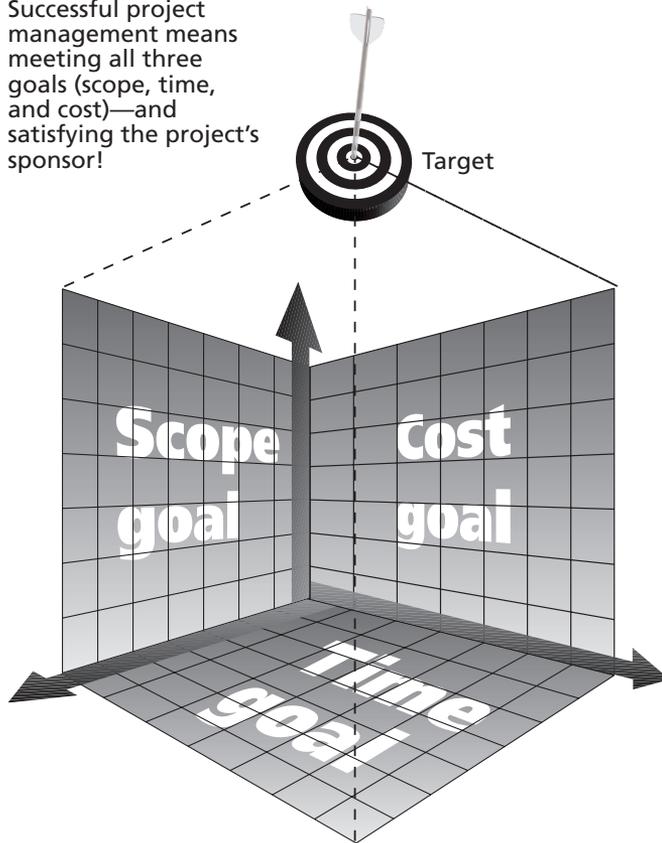
Figure 1-1. The Triple Constraint of Project Management

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, including quality along with scope, time, and cost. Others believe that quality considerations, including customer 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 fifty-page report describing thirty 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."[7] 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.
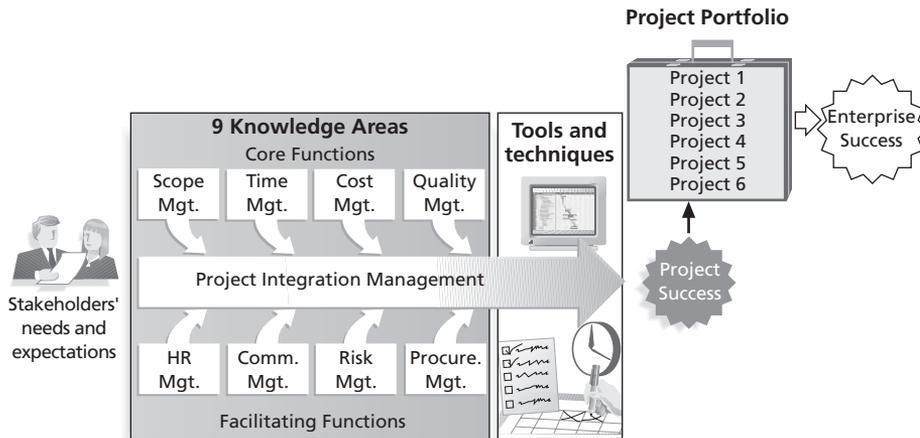
Figure 1-2. Project Management Framework

[7] Ibid, p. 8.

Project Stakeholders

Stakeholders are the people involved in or affected by project activities and include the project sponsor, project team, support staff, customers, users, suppliers, and even opponents 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 all have different interests. Stakeholders' needs and expectations are important in the beginning and throughout the life of a project. Successful project managers develop good relationships with project stakeholders to understand and meet their needs and expectations.

Project Management Knowledge Areas

Project management knowledge areas describe the key competencies that project managers must develop. The center of Figure 1-2 shows the nine knowledge areas of project management. The four core knowledge areas of project management include project scope, time, cost, and quality management. These are core knowledge areas because they lead to specific project objectives. Brief descriptions of each core knowledge area are as follows:

- Project scope management involves defining and managing all the work required to complete the project successfully.
- Project time management includes estimating how long it will take to complete the work, developing an acceptable project schedule, and ensuring timely completion of the project.
- Project cost management consists of preparing and managing the budget for the project.
- Project quality management ensures that the project will satisfy the stated or implied needs for which it was undertaken.

The four facilitating knowledge areas of project management are human resource, communications, risk, and procurement management. These are called facilitating areas because they are the processes through which the project objectives are achieved. Brief descriptions of each facilitating knowledge area are as follows:

- Project human resource management is concerned with making effective use of the people involved with the project.
- Project communications management involves generating, collecting, disseminating, and storing project information.
- Project risk management includes identifying, analyzing, and responding to risks related to the project.
- Project procurement management involves acquiring or procuring goods and services for a project from outside the performing organization.

Project integration management, the ninth knowledge area, is an overarching function that affects and is affected by all of the other knowledge areas. Project managers must have knowledge and skills in all nine of these areas. This text includes an entire chapter on each of these knowledge areas, as all of them are crucial to project success.

Project Management Tools and Techniques

Thomas Carlyle, a famous historian and author, stated, "Man is a tool-using animal. Without tools he is nothing, with tools he is all." As the world continues to become more complex, it is even more important for people to develop and use tools, especially for managing important projects. **Project management tools and techniques** assist project managers and their teams in carrying out work in all nine knowledge areas. For example, some popular time-management tools and techniques include Gantt charts, project network diagrams, and critical path analysis. Table 1-1 lists some commonly used tools and techniques by knowledge area. You will learn more about these and other tools and techniques throughout this text.

Table 1-1: Common Project Management Tools and Techniques by Knowledge Area

KNOWLEDGE AREA/CATEGORY	TOOLS AND TECHNIQUES
Integration management	Project selection methods, project management methodology, stakeholder analysis, project charters, project management plans, project management software, change control boards, configuration management, project review meetings, work authorization systems
Scope management	Project scope statements, work breakdown structures, statements of work, scope management plan, requirements analysis, scope change control
Time management	Gantt charts, project network diagrams, critical path analysis, program evaluation review technique (PERT), critical chain scheduling, crashing, fast tracking, milestone reviews
Cost management	Net present value, return on investment, payback analysis, business cases, earned value management, project portfolio management, cost estimates, cost management plan, financial software
Quality management	Six Sigma, quality control charts, Pareto diagrams, fishbone or Ishikawa diagrams, quality audits, maturity models, statistical methods
Human resource management	Motivation techniques, empathic listening, team contracts, responsibility assignment matrices, resource histograms, resource leveling, team building exercises

Table 1-1: Common Project Management Tools and Techniques by Knowledge Area (continued)

KNOWLEDGE AREA/CATEGORY	TOOLS AND TECHNIQUES
Communications management	Communications management plan, conflict management, communications media selection, communications infrastructure, status reports, virtual communications, templates, project Web sites
Procurement management	Make-or-buy analysis, contracts, requests for proposals or quotes, source selection, negotiating, e-procurement
Risk management	Risk management plan, probability/impact matrix, risk ranking, Monte Carlo simulation, top-ten risk item tracking

Project managers must work with key stakeholders to define what constitutes success for a particular project and strive to complete their projects successfully by applying appropriate tools and techniques. In many organizations, project managers also support an emerging business strategy of **project portfolio management**, in which organizations group and manage projects as a portfolio of investments that contribute to the entire enterprise's success. You will learn more about project portfolio management in Chapter 7, Project Cost Management.

✓ *What Went Right?*

Follow-up studies done by the Standish Group 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 34 percent in 2002.

■ The number of failed projects has been cut in half, from 31 percent in 1994 to 15 percent in 2002.

■ The U.S. spent about the same amount of money on IT projects in 1994 and 2002 ($250 billion and $255 billion, respectively), but the amount of money wasted on challenged and failed projects was down to $55 billion in 2002 compared to $140 billion in 1994.[8]

Even though there have been significant improvements in managing information technology projects, there is still much room for improvement. The best news is that project managers are learning how to succeed more often. "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."[9]

[8] The Standish Group, "Latest Standish Group CHAOS Report Shows Project Success Rates Have Improved by 50%," (March 25, 2003).
[9] The Standish Group, "CHAOS 2001: A Recipe for Success" (2001).

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 Factors

Why do some projects succeed and others fail? Can organizations provide a better environment to help improve project success rates? There are no easy answers to any of these questions, but many people are contributing to our knowledge base to continue to improve the theory and practice of project management.

Table 1-2 summarizes the results of the 2001 Standish Group study describing, in order of importance, what factors contribute most to the success of information technology projects. Note that the study lists executive support as the most important factor, overtaking user involvement, which was most important in the 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, *97 percent of successful projects were led by experienced project managers*, who can often help influence all of these factors to improve the probability of project success.

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 interesting to compare success factors for information technology projects in the U.S. with those in other countries. A 2004 study summarizes results

of a survey of 247 information systems project practitioners in the Mainland of 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 U.S., included top management support, user involvement, and a competent project manager as vital to project success.[10]

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 who 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.

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. You will learn how to use these metrics in later chapters.[11]

Project managers play an important role in making projects, and therefore organizations, successful.

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[10] Dong, Chang, K.B. Chuah, and Li Zhai, "A Study of Critical Success Factor of Information System Projects in China," Proceedings of PMI Research Conference (2004).

[11] Milosevic, Dragan and And Ozbay, "Delivering Projects: What the Winners Do," Proceedings of the Project Management Institute Annual Seminars & Symposium (November 2001).

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 have to be 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 following 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 of job listings for project managers. Below are a few edited postings from June 2004:

- 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 non-profit 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.

As you can see, 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. A National Science Foundation study found that project management is a skill needed in every major information technology field, from database administrator to network specialist to technical

writer. Table 1-3 lists fifteen project management job functions that are essential for good project management.

Table 1-3: Fifteen Project Management Job Functions

1. Define scope of project
2. Identify stakeholders, decision-makers, and escalation procedures
3. Develop detailed task list (work breakdown structure)
4. Estimate time requirements
5. Develop initial project management flowchart
6. Identify required resources and budget
7. Evaluate project requirements
8. Identify and evaluate risks
9. Prepare contingency plan
10. Identify interdependencies
11. Identify and track critical milestones
12. Participate in project phase review
13. Secure needed resources
14. Manage the change control process
15. Report project status

"Building a Foundation for Tomorrow: Skills Standards for Information Technology, Millennium Edition," Northwest Center for Emerging Technologies (NWCET), Belleview, WA, 1999.

Each of the job functions listed in Table 1-3 requires different skills, as do the duties described in the different job descriptions. So what skills do project managers need? Can they all be learned, or are some innate? How technical do IT project managers need to be?

Suggested Skills for Project Managers

As you can imagine, good project managers should have many skills. The Project Management Body of Knowledge (*PMBOK*® *Guide 2004)* suggests 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

The previous section introduced the nine project management knowledge areas, as well as some tools and techniques project managers use, in general. The following section focuses on the IT application area, including skills required in the project environment, general management, and soft skills.

The project environment differs from organization to organization and project to project, but there are some skills that will help in most project environments. These skills include understanding change, and understanding how organizations work within their social, political, and physical environments. Project managers must be comfortable leading and handling change, since most projects introduce changes in organizations and involve changes within the projects themselves. Project managers need to understand the organizations they work in and how products are developed and services are provided. And they must also understand the social, physical, and political environment. It takes very different skills and behavior to manage a project for a Fortune 100 company in the United States than it does to manage a government project for a new business 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 or 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 in order to use their people effectively. They need to be able to motivate different types of people and develop *esprit de corps* within the project team and with other project stakeholders. 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 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. 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.

🎥 *Media Snapshot*

In 2004, millions of people watched the first season of the U.S. reality television show called *The Apprentice*, in which contestants vied for a high-level position working for Donald Trump. Each week, Trump fired one contestant and told the contestants bluntly why they were fired or why they were spared. Trump's reasons provide insight to improving project management skills, as follows:

1. Leadership and professionalism are crucial. No matter how smart you are (the first candidate fired had degrees in medicine and business), you must be professional in how you deal with people and display some leadership potential.

2. Know what your sponsor expects from the project, and learn from your mistakes. Jason, the second person and first project manager fired, decided not to take the time to meet with his project sponsors, causing his team to fail their assignment. Trump wanted everyone to remember that crucial mistake.

3. Trust your team and delegate decisions. Sam had several problems as a team member and project manager, but his lack of trust and respect for and from his teammates led to his downfall.

4. Know the business. Restaurants often have the highest profit margins on certain items, like drinks. Find out what's most important to your business when running projects. One team focused on increasing bar sales and easily won the competition that week.

5. Stand up for yourself. When Trump fired Kristi over the other women he explained his decision by saying that Kristi didn't fight for herself, while the other two did.

6. Be a team player. Tammy clearly did not get along with her team, and no one supported her in the boardroom when her team lost.

7. Don't be overly emotional and stay organized. Erika had a difficult time leading her team in selling Trump Ice, and she became flustered when they didn't get credit for sales because paperwork wasn't done correctly. Her emotions were evident in the boardroom when she was fired.

8. Work on projects and for people you believe in. Kwame's team selected an artist based on her profit potential, even though he and other teammates disliked her work. The other team picked an artist they liked, and they easily outsold Kwame's team.

9. Think outside the box. Troy led his team in trying to make the most money selling rickshaw rides. The other team brainstormed ideas and decided to sell advertising space on the rickshaws, which was a huge success.

10. There is some luck involved in project management, and you should always aim high. Nick and Amy were teamed against Bill, Troy, and Kwame to rent out a party room for the highest price. Troy's team seemed very organized and did get a couple of good bids, but Nick and Amy didn't seem to have any real prospects. They got lucky when one potential client came back at the last minute and agreed to a much higher than normal price.

Valuable Skills for IT Project Managers

What other skills do information technology project managers need to succeed in today's competitive market? People in industry and academia often debate the answer to this question. In an interview with two CIOs, John Oliver of True North Communications, Inc. and George Nassef of Hotjobs.com, both men provided very different responses when asked what skills good information technology project managers need. They could not agree on which skills were more important, such as can-do optimism versus assume-the-worst realism, or detail-oriented versus visionary. However, both agree that the most important skills seem to depend on the uniqueness of the project and the people involved.[12] Project managers need to have a wide variety of skills and be able to decide which particular skills are more important in different situations.

Some people believe that it is important for information technology project managers to understand the technologies they use on the projects they are managing. They 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. On small projects, the project manager might be the manager on a part-time basis and also be expected to produce some of the work. For example, on a small Web development project, the project manager might lead the team and also create some of the site. Other people say it is more important for information technology project managers to have strong business and behavioral skills so they can lead a project team and deliver a solution that will meet business needs.

It would be very difficult for someone with little or no background in information technology to become the project manager for a large information technology project. Not only would it be difficult to work with other managers and suppliers, it would also be difficult to earn the respect of the project team.

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[12] Brandel, Mary, "The Perfect Project Manager," ComputerWorld (August 6, 2001).

However, project managers for large information technology projects do not have to be experts in the field of information technology. They should have some working knowledge of various technologies, but more importantly, they should understand how the project they are managing 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. Although information technology project managers need to draw on their information technology expertise or the expertise of key team members, they must spend more time becoming better project managers and less time becoming information technology experts to lead their teams to success.

Lively debates continue on the differences between managing information technology projects and managing other types of projects. There are several differences, but there are even more similarities. Several articles and speakers joke about the differences between construction projects and software development projects. No, you cannot blow up an old information system like you can an old building and start from scratch. No, there are often no specific engineering principles and building codes that everyone knows and follows. Nevertheless, information technology project managers, like all project managers, still have the responsibility for working with their sponsors, project teams, and other stakeholders to achieve specific project and organizational goals. All project managers should continue to develop their knowledge and experience in project management, general management, and the industries they support.

Unfortunately, many people in information technology do not want to develop anything but their technical skills. They do not see how soft skills or business skills are going to improve their performance or help them earn higher salaries. Most managers disagree with that mindset because they see the need to improve communications between information technology professionals and their customers. Business people are now more savvy with information technology, but few information technology professionals have spent the time developing their business savvy.[13] Individuals must be willing to develop more than just their technical skills to be more productive team members and potential project managers. Everyone, no matter how technical they are, can develop business and soft skills.

Importance of Leadership Skills

In a recent study, one hundred project managers listed the characteristics they believed were critical for effective project management and the characteristics that made project managers ineffective. Table 1-4 lists the results. The study found that effective project managers provide leadership by example, are

[13] Thomsen-Moore, Lauren, "No 'soft skills' for us, we're techies," Computerworld Today (December 16, 2002).

visionary, technically competent, decisive, good communicators, and good motivators. They also stand up to top management when necessary, support team members, and encourage new ideas. The study also found that respondents believed *positive leadership contributes the most to project success*. The most important characteristics and behaviors of positive leaders include being a team builder and communicator, having high self-esteem, focusing on results, demonstrating trust and respect, and setting goals.

Table 1-4: Most Significant Characteristics of Effective and Ineffective Project Managers

EFFECTIVE PROJECT MANAGERS	INEFFECTIVE PROJECT MANAGERS
Lead by example	Set bad examples
Are visionaries	Are not self-assured
Are technically competent	Lack technical expertise
Are decisive	Are poor communicators
Are good communicators	Are poor motivators
Are good motivators	
Stand up to top management when necessary	
Support team members	
Encourage new ideas	

Zimmerer, Thomas W. and Mahmoud M. Yasin, "A Leadership Profile of American Project Managers," Project Management Journal (March 1998), 31-38.

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."

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 manage-ment 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

Paul Ziv, a recruitment strategist at ComputerJobs.com, described why project management made the top-ten list of information technology skills in demand in late 2002. He explained that information technology project man-agers are expected to do much more today. They have to understand the field and possess an executive skill set in order to lead teams in developing prod-ucts and services that improve the bottom line. Table 1-5 summarizes the top-ten information technology skills and average salaries based on job postings in 2002.

Table 1-5: Top Ten Most In Demand Information Technology Skills

RANK	IT SKILL/JOB	AVERAGE ANNUAL SALARY
1	SQL Database Analyst	$80,664
2	Oracle Database Analyst	$87,144
3	C/C++ Programmer	$95,829
4	Visual Basic Programmer	$76,903
5	E-commerce/Java Developer	$89,163
6	Windows NT/2000 Expert	$80,639
7	Windows/Java Developer	$93,785
8	Security Architect	$86,881
9	**Project Manager**	**$95,719**
10	Network Engineer	$82,906

Ziv, Paul "The Top 10 IT Skills in Demand," Global Knowledge Webcast (*www.globalknowledge.com*) (11/20/2002).

Many people recognize the need to fill these other information technology careers, but most are unaware of the need for project managers or do not really understand what project management is all about. Each of the positions listed above is carried out in conjunction with the role of project management as the specific technologies are deployed. For example, an SQL database analyst would be a team member on a project that requires development or support of SQL databases.

Recent articles also emphasize the need for good project managers in the infor-mation technology field. In a 2004 survey by CIO.com, IT executives listed the IT skills that were most in demand: application development, project management,

database management, and networking. Figure 1-3 shows these results in graphi-cal format. Note that 58 percent of survey respondents included project manage-ment as a top IT skill in demand, the second most mentioned skill. Even if you choose to stay in a technical role, you still need project management knowledge and skills to help your team and your organization succeed.
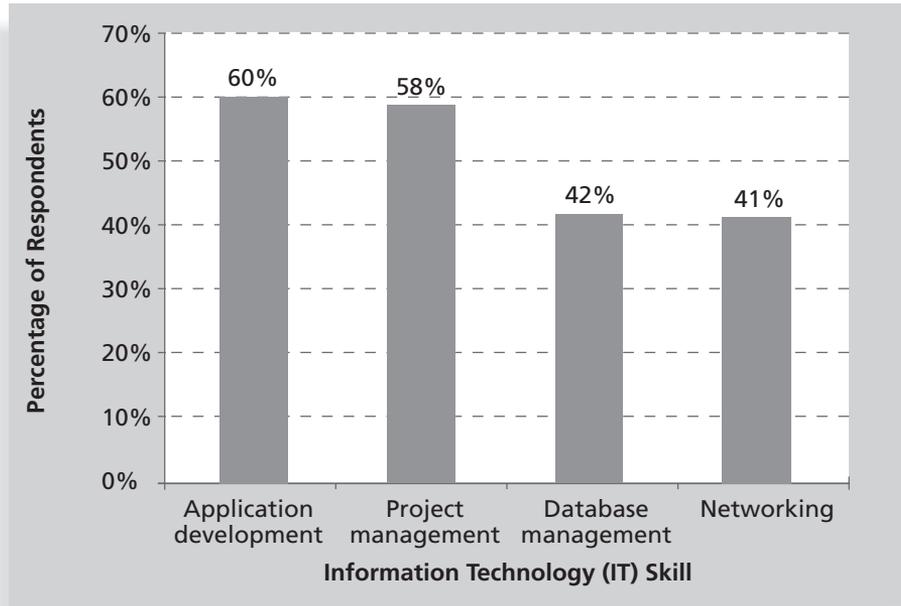
Figure 1-3. Top Information Technology Skills

Cosgrove, Lorraine, "January 2004 IT Staffing Update," CIO Research Reports, (February 3, 2004).

THE PROJECT MANAGEMENT PROFESSION

The profession of project management is growing at a very rapid pace. To understand this line of work, it is helpful to briefly review the history of project management, introduce you to the Project Management Institute (PMI) and some of its services (such as certification), and discuss the growth in project management software.

History of Project Management

Some people might argue that building the Egyptian pyramids or building the Great Wall of China was a project. Most people agree, however, that the modern concept of project management began with the Manhattan Project, which the U.S. military led to develop the atomic bomb. The Manhattan Project involved many people with different skills at several different locations. It also clearly separated the overall management of the project's mission, schedule, and budget under General Leslie R. Groves and the technical management of the project under Dr. Robert Oppenheimer. The Manhattan Project lasted about three years and cost almost $2 billion in 1946.

In developing the project, the military realized that scientists and other technical specialists often did not have the desire or the necessary skills to manage large projects. For example, after being asked several times for each team member's responsibilities at the new Los Alamos laboratory in 1943, Dr. Oppenheimer threw a piece of paper with an organization chart on it at his director and said, "Here's your damn organization chart."[14] Project management was recognized as a distinct discipline requiring people with special skills and, even more importantly, the desire to lead project teams.

The military was the key industry behind the development of several project management techniques. In 1917, Henry Gantt developed the famous Gantt chart as a tool for scheduling work in factories. A **Gantt chart** is a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format. Managers drew Gantt charts by hand to show project tasks and schedule information, and this tool provided a standard format for planning and reviewing all the work on early military projects.

Today's project managers still use the Gantt chart as the primary tool to communicate project schedule information, but with the aid of computers, it is no longer necessary to draw the charts by hand. Figure 1-4 displays a Gantt chart for developing an intranet. This version of the chart was created with Microsoft Project, the most widely used project management software today. You will learn more about using Project 2003, the most recent version of Microsoft Project, in Appendix A.

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[14] The Regents of the University of California, Manhattan Project History, "Here's Your Damned Organization Chart," (1998-2001).
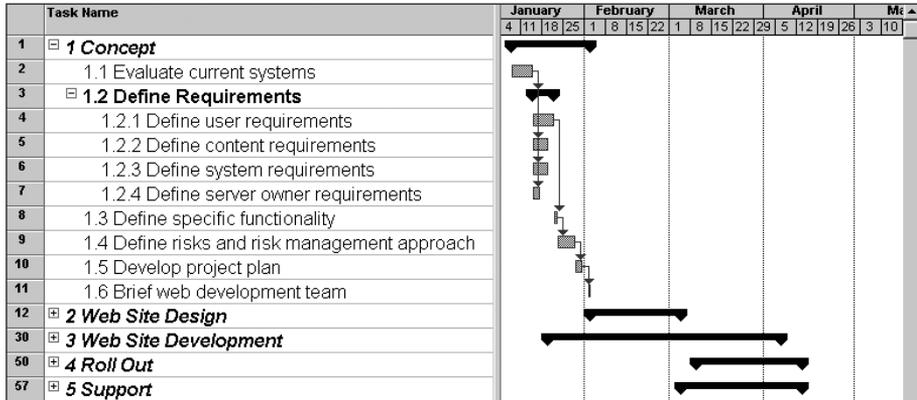
Figure 1-4. Sample Gantt Chart in Microsoft Project

Members of the Navy Polaris missile/submarine project first used network diagrams in 1958. These diagrams helped managers model the relationships among project tasks, which allowed them to create schedules that were more realistic. Figure 1-5 displays a network diagram created using Microsoft Project. Note that the diagram includes arrows that show which tasks are related and the sequence in which team members must perform the tasks. The concept of determining relationships among tasks is essential in helping to improve project scheduling. This concept allows you to find and monitor the **critical path**—the longest path through a network diagram that determines the earliest completion of a project. You will learn more about Gantt charts, network diagrams, critical path analysis, and other time management concepts in Chapter 6, Project Time Management.
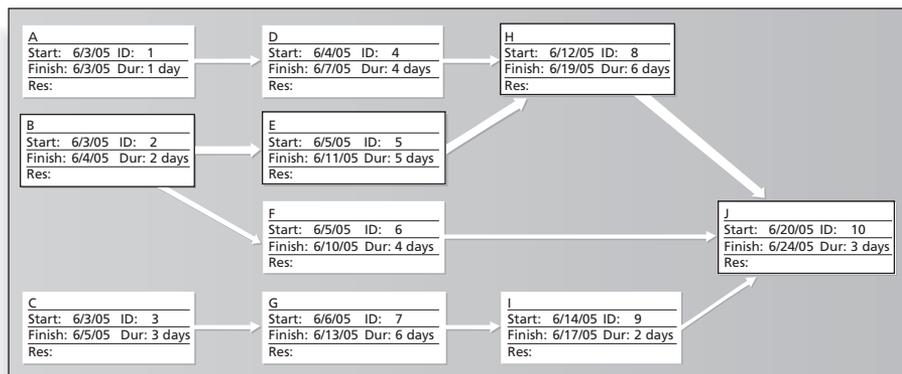
Figure 1-5. Sample Network Diagram in Microsoft Project

By the 1970s, the military had begun to use software to help manage large projects. Early project management software products were very expensive and ran 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 became graphical and easy to use, project management software became less expensive and more widely used. Today, many industries 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 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. Web-based project management tools are now available to help organizations manage individual projects as well as portfolios of projects. Figure 1-6 provides a sample chart that could be displayed from an enterprise project management solution. **Enterprise project management software** integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization and provides links to more detailed information. Summary charts often show status as green to indicate things are going well, yellow to indicate that there are some problems, and red to indicate major problems. Appendix A provides more information on Microsoft's Enterprise Project Management Solution, and the last section of this chapter describes recent advances in project management software.

Company ABC Project Portfolio				
Project Name	**Scope**	**Schedule**	**Budget**	**Links**
Active Projects				
Project 1	○	◔	◔	
Project 2	●	●	◔	
Project 3	○	○	○	
Project 4	○	◔	●	
Approved Projects				
Project 10	○	○	○	
Project 11	○	○	○	
Project 12	○	○	○	
Project 13	○	○	○	
Project 14	○	○	○	
Opportunities				
Project 100				
Project 200				
○	White = going well			
◔	Gray = some problems			
●	Black = major problems			

Figure 1-6. Sample Enterprise Project Management Tool

Many colleges, universities, and companies now offer courses related to various aspects of project management. You can even earn Bachelor's, Master's, and doctoral degrees in project management. 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 are suffering from declining memberships, the **Project Management Institute (PMI)**, an international professional society for project managers founded in 1969, has continued to attract and retain members, reporting more than 133,000 members worldwide by May 2004. A large percentage of PMI members work in the information technology field and more than 15,000 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 management, manufacturing, new product development, retail, and urban development, to name a few. As a student, you

can join PMI for a reduced fee. Consult PMI's Web site (*www.pmi.org*) or the Information Systems SIG site (*www.pmi-issig.org*) for more information. You can also network with other students studying project management by joining the Students of Project Management SIG at *www.studentsofpm.org*.

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, 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 the end of May 2004, there were 81,913 certified project management professionals.[15] Figure 1-7 shows the rapid growth in the number of people earning project management professional certification from 1993 to 2003.
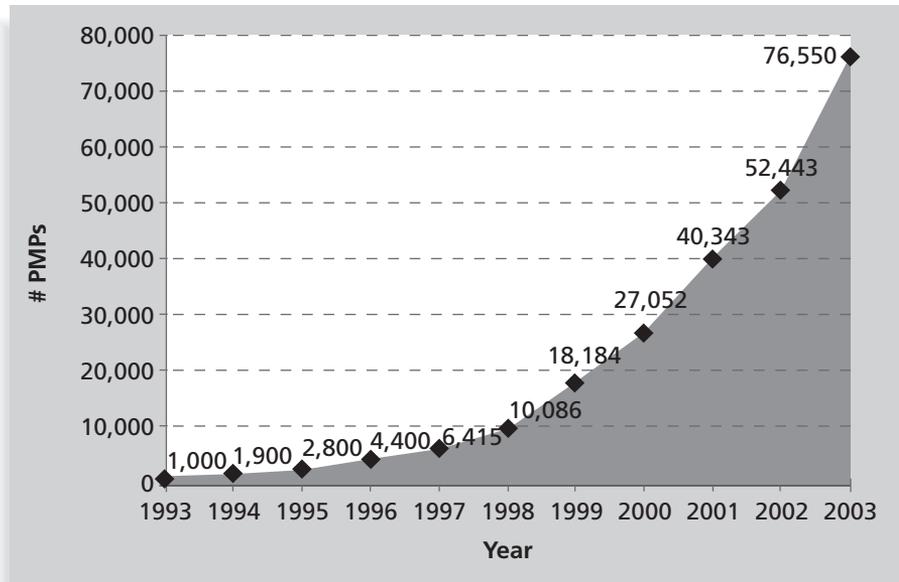
Figure 1-7. Growth in PMP Certification, 1993–2003

[15] The Project Management Institute, "PMI Today," (August 2004).

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

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 are requiring 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. See Appendix B of this text for detailed information on certification.

Ethics in Project Management

Ethics is an important part of all professions. 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? 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? It is important for project managers to make decisions in an ethical manner.

PMI developed a PMP code of professional conduct that all applicants must sign in order to become certified project management professionals (PMPs). PMI states that it is vital for all PMPs to conduct their work in an ethical manner. Conducting work in an ethical manner helps the profession earn the confidence of the public, employers, employees, and project team members. The PMP code of professional conduct lists responsibilities to the profession, such as compliance with all organizational rules and policies, professional practice, and advancement of the profession. It also lists responsibilities to customers and the public, such as qualifications, experience, and performance of professional services, as well as conflict-of-interest situations. For example, one of the responsibilities to customers and the public includes refraining "from offering or accepting inappropriate payments, gifts or other forms of compensation for

personal gain, unless in conformity with applicable laws or customs of the country where project management services are being provided."[16]

PMI even added a new series of questions to the PMP certification exam in March 2002 to emphasize the importance of professional responsibility. See Appendix B for more information.

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. PMI published a Project Management Software Survey in 1999 that describes, compares, and contrasts more than 200 project management software tools. 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 2003, the most widely used project management software tool today.

Many people still use basic productivity software, such as Microsoft Word or Excel, to perform many project management functions, such as 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 management software tools that provide specific functionality for managing projects. These project management software tools can be divided into three general categories based on functionality and price:

- *Low-end tools*: These tools provide basic project management features and generally cost less than $200 per user. They are often recommended for small projects and single users. Most of these tools allow users to create Gantt charts, which cannot be done easily using current productivity software. For example, Milestones Simplicity by KIDASA Software, Inc., has a Schedule Setup Wizard that walks users through simple steps to produce a Gantt chart. For $49 per user, this tool also includes a large assortment of symbols, flexible formatting, an outlining utility, and an Internet Publishing Wizard. Several companies provide add-on features to Excel or Access to provide basic project management functions using familiar software products.

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[16] The Project Management Institute, Project Management Institute Certification Handbook, (January 2003) (22).

■ *Midrange tools*: A step up from low-end tools, midrange tools are designed to handle larger projects, multiple users, and multiple projects. All of these tools can produce Gantt charts and network diagrams, and can assist in critical path analysis, resource allocation, project tracking, status reporting, and so on. Prices range from about $200 to $500 per user, and several tools require additional server software for using workgroup features. Microsoft Project is still the most widely used project management software today, and Project 2003 includes an enterprise version, as described briefly below and in more detail in Appendix A. Other companies that sell midrange project management tools include Artemis, PlanView, Primavera, and Welcom, to name just a few.

■ *High-end tools*: Another category of project management software is high-end tools, sometimes referred to as enterprise project management software. These tools provide robust capabilities to handle very large projects, dispersed workgroups, and enterprise functions that summarize and combine individual project information to provide an enterprise view of all projects. These products are generally licensed on a per-user basis, integrate with enterprise database management software, and are accessible via the Internet. In mid 2002, Microsoft introduced the first version of their Enterprise Project Management software, and in 2003, they introduced the Microsoft Enterprise Project Management solution, as described in Appendix A. Several companies that provide midrange tools now offer enterprise versions of their software. There are also several inexpensive, Web-based products on the market. For example, VPMi Enterprise Online (*www.vcsonline.com*) is available for only $12 per user per month. See the Project Management Center Web site (*www.infogoal.com/pmc*) or similar sites for links to many companies that provide project management software.

As mentioned earlier, there are many reasons to study project management, particularly as it relates to information technology projects. The number of information technology projects continues to grow, the complexity of these projects continues to increase, and the profession of project management continues to expand and mature. As more people study and work in this important field, the success rate of information technology projects should continue to improve.

CASE WRAP-UP

Anne Roberts worked with the VPs and the CEO to begin reorganizing several parts of the company to support their new emphasis on projects. They formed a project team to implement an enterprise project management software tool across the organization. They

formed another team to develop project-based reward systems for all employees. They also authorized funds for a project to educate all employees in project management and to develop a mentoring program. Anne had successfully convinced everyone that effectively managing projects was crucial to their company's future.

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 resources, communications, risk, and procurement management. Project portfolio management involves organizing and managing projects as a portfolio of investments that contribute to the entire enterprise's success. 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 in virtually every

industry around the globe use project management. 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.

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 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?
5. Briefly describe some key events in the history of project management. What role does the Project Management Institute play in helping the profession? What functions can you perform with project management software? What are some popular names of low-end, midrange, and high-end project management tools?

EXERCISES

1. Visit the Standish Group's Web site at *www.standishgroup.com*. Read one of the CHAOS articles or a similar report on information technology project management on their site or a similar site. Write a one-page summary of the report, its key conclusions, and your opinion of the report.
2. Find someone who works as a project manager or is a member of a project team. Prepare several interview questions, and then ask them your questions in person, via the phone, or via the Internet. Write a one- to two-page summary of your findings.
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. In a one- to two-page paper, summarize 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 one-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 2003. Review information about Project 2003 from Microsoft's Web site (*www.microsoft.com/project*). Also, visit The Project Management Center (*www.infogoal.com/pmc*) and visit two other sites for project management software providers. 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 three 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 project management software?

SUGGESTED READINGS

1. Harvard Business Review. "Your Best Managers Lead *and* Manage," Harvard Business School Publishing Corporation (2003).

   This publication includes three articles: Abraham Zaleznik's "Managers and Leaders: Are They Different?"; Henry Mintzberg's "The Manager's Job: Folklore and Fact'; and Jonathan Gosling and Henry Mintzberg's "The Five Minds of a Manager." The main conclusion of these articles is that organizations need people who can manage and lead, as suggested in this chapter.

2. Ibbs, C. William and Young, H. Kwak. "Calculating Project Management's Return on Investment," *Project Management Journal* (*www.ce.berkeley.edu/ pmroi/calculating-PMROI.pdf*) (June 2000).

   Many companies want proof that project management is a good investment. This paper describes a procedure to measure the return on investment for project management. Information is based on thirty-eight companies and government agencies in four different industries. William Ibbs also published a book called Quantifying the Value of Project Management *in 2002.*

3. Milosevic, Dragan. "Project Management Toolbox: Tools and Techniques for the Practicing Project Manager," John Wiley & Sons, Inc. (2003).

   This text includes detailed descriptions of more than fifty tools and techniques used in project management. Tools are organized to assist in project initiation, planning, implementation, and closure.

4. Musser, John. "Project Management Resources," Columbia University, (*www.columbia.edu/~jm2217/#SampleSDP*) (2004).

> *Professor John Musser at Columbia University has created an excellent Web site with links to hundreds of online references on various project management topics. You can also link to this site from the online companion for this text.*

5. Project Management Institute Web site (*www.pmi.org*).

> *PMI's Web site changes often, but it provides useful information on project management as well as links to other sites, several articles and publications, and their online bookstore. Students can join PMI at reduced rates and receive copies of* PM Network *magazine monthly and the* Project Management Journal *quarterly.*

6. Shenhar, Aaron J. and Dov Dvir. "Project Management Evolution: Past History and Future Research Directions," Proceedings of PMI Research Conference (2004).

> *PMI sponsored its first international research conference in Paris, France in June 2000, the second research conference in Seattle in July 2002, and the third in London in 2004. This article is one of many excellent articles from these proceedings. The authors discuss project management research in its historical perspective and offer insights into its evolution.*

7. Yourdon, Ed. "Surviving a Death March Project," *Software Development* (July 1997).

> *Ed Yourdon is famous for his books on software development, including a 1999 and 2004 text titled* Death March*. Yourdon offers practical advice on how to handle software projects that are plagued with problems from the start. He describes the importance of a project manager being able to negotiate schedules, budgets, and other aspects of a project with users, managers, and other stakeholders. Yourdon's latest book,* Brain Drain*, describes the effects of outsourcing on the software development industry.*

KEY TERMS

- **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
- **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

- **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
- **program** — a group of projects managed in a coordinated way to obtain benefits and control not available from managing them individually
- **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 manager** — the person responsible for working with the project sponsor, the project team, and the other people involved in a project to meet project goals
- **Project Management Institute (PMI)** — international professional society for project managers
- **project management knowledge areas** — project integration management, scope, time, cost, quality, human resource, communications, risk, and procurement management
- **Project Management Office (PMO)** — an organizational group responsible for coordinating the project management functions throughout an organization
- **Project Management Professional (PMP)** — certification provided by PMI that requires documenting project experience, agreeing to follow the PMI code of ethics, and passing a comprehensive exam
- **project management tools and techniques** — methods available to assist project managers and their teams; some popular tools in the time management knowledge area include Gantt charts, network diagrams, and critical path analysis
- **project portfolio management** — when organizations group and manage projects as a portfolio of investments that contribute to the entire enterprise's success
- **project sponsor** — the person who provides the direction and funding for a project
- **stakeholders** — people involved in or affected by project activities
- **triple constraint** — balancing scope, time, and cost goals