

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

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

- 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

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

- A college campus upgrades its technology infrastructure to provide wireless Internet access across the whole campus
- A cross-functional taskforce in a company decides what Voice-over-Internet-Protocol (VoIP) system to purchase and how it will be implemented
- A company develops a new system to increase sales force productivity and customer relationship management
- A television network implements 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 environmentally friendly or green IT

Gartner, Inc., a prestigious consulting firm, identified the top ten strategic technologies for 2008. A few of these technologies include the following:

- *Green IT*: Simply defined, **green IT** or **green computing** involves developing and using computer resources in an efficient way to improve economic viability, social responsibility, and environmental impact. For example, government regulations now encourage organizations and IT departments to use low-emission building materials, recycle computing equipment, and use alternative energy and other green technologies.
- *Unified communications*: The majority of organizations are expected to migrate from PBX (private branch exchange) to IP (Internet protocol) telephony in the next three years.
- *Business process modeling*: Enterprise and process architects, senior developers, and business process analysts must work together to help organizations effectively use IT to improve processes. Business process modeling (BPM) suites are expected to fill a critical role as a compliment to service-oriented architecture (SOA).
- *Virtualization 2.0*: **Virtualization** hides the physical characteristics of computing resources from their users, such as making a single server, operating system, application, or storage device appear to function as multiple virtual resources. Virtualization technologies can improve IT resource management and increase flexibility for adapting to changing requirements and workloads. Virtualization 2.0 adds automation technologies so that resource efficiency can improve dramatically.
- *Social software*: Most students and professionals today use online social networking sites such as MySpace, Facebook, LinkedIn, and YouTube to collaborate with others. Organizations will increasingly use social software technologies to augment traditional collaboration.⁸

As you can see, a wide variety of projects use information technologies, and organizations rely on them for their success.



MEDIA SNAPSHOT

Nicholas Carr published his exposé “IT Doesn’t Matter” in the May 2003 issue of *Harvard Business Review*, a topic he expanded on in the following year with his book *Does IT Matter? Information Technology and the Corrosion of Competitive Advantage*.⁹ Both sparked heated debates on the value of information technology in today’s society. Carr suggested that information technology has followed a pattern similar to earlier infrastructure technologies like railroads and electric power. As availability increased and costs decreased, information technology has become a commodity; therefore, Carr argued, it can no longer provide companies with a competitive advantage. In 2006, *Baseline* magazine published the article, “Where I.T. Matters: How 10 Technologies Transformed 10 Industries” as a retort to Carr’s ideas. Below are a few of the technologies and industries that have made IT an important part of their business strategy. (Visit www.nicholasgarr.com to see more recent work by Carr, including a free 2008 eBook, *IT in 2018: From Turing’s Machine to the Computing Cloud*.)

- **VoIP:** VoIP has totally transformed the telecommunications industry and broadband Internet access. Phone companies do not have a lock on dial tones anymore; you can make a phone call through a cable TV provider or over any Internet channel for less than the cost of ordinary phone service. These technologies, along with regulatory changes, have forced major phone companies to be more competitive to keep and attract customers. VoIP is more efficient and less expensive than traditional phone networks. The ramp-up to VoIP is expected to happen quickly. Research firm IDC estimates that U.S. subscribers to residential VoIP services will grow from 3 million in 2005 to 27 million by the end of 2009.
- **Global Positioning Systems (GPS) and Business Intelligence:** “Farming is the oldest known human activity,” says Michael Swanson, an agricultural economist at Wells Fargo bank, the largest lender to U.S. farmers. “You’d think that after 10,000 years there’d be nothing left to improve. Not true.” How have GPS and Business Intelligence changed the farming industry? In 1950, American farmers planted 83 million acres of corn, which produced 38 bushels per acre. In 2004, farmers planted 81 million acres of corn, which produced 160 bushels. That means that 2.5 percent fewer acres produced more than four times as much corn. Swanson estimates that if farmers did not use the technology they do today, they would have had to plant 320 million acres of corn last year to meet demand: “We’d be planting parking lots and backyards,” Swanson joked.
- **Digital Supply Chain:** The entertainment industry’s distribution system has changed dramatically due to new information technologies. “The great promise of digital technology is that consumers will be able to choose how they want to consume content,” says Kevin Tsujihara, president of Warner Home Entertainment Group, a new department formed to handle the digital delivery of entertainment to consumers. Before Warner underwent a major digital transformation, they were only able to process one or two pictures at a time. “Today, we have the capability of taking upward of 10 simultaneous motion picture projects and working on them in this environment. The creation of these digital masters obviously is important in that we can make a transformation to whatever channel we need to get to the consumer.”¹⁰

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

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

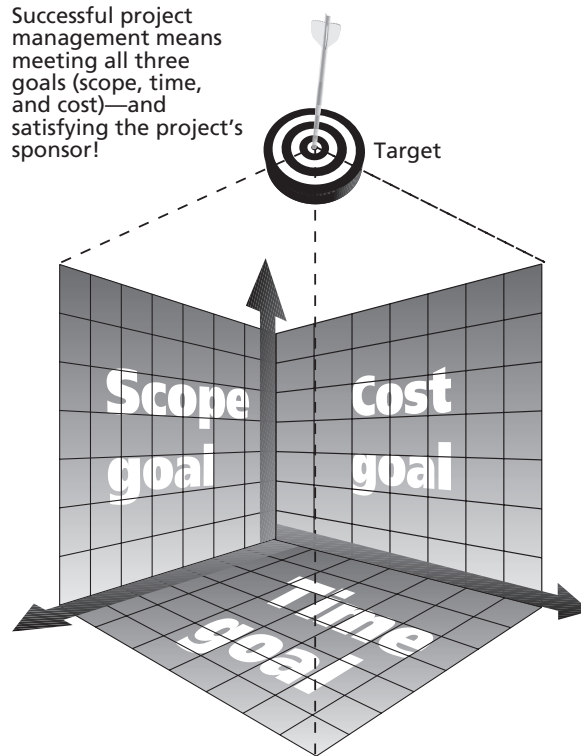


FIGURE 1-1 The triple constraint of project management

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

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

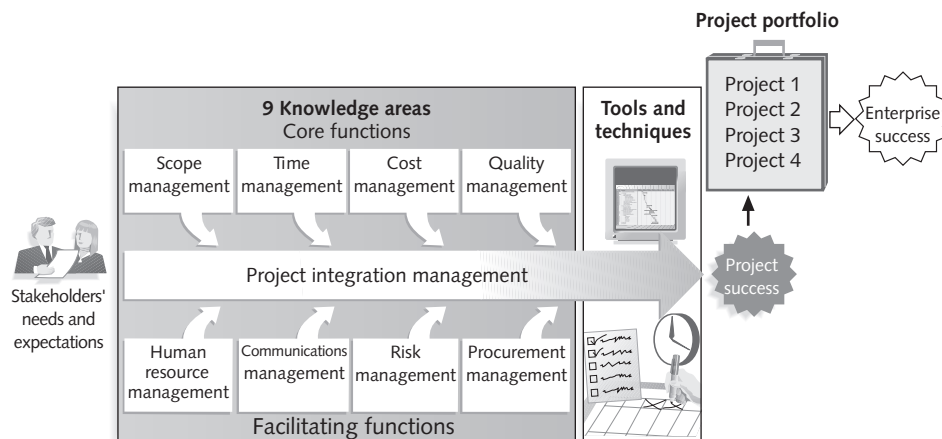


FIGURE 1-2 Project management framework

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

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.

- 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 knowledge areas because they are the processes through which the project objectives are achieved.

- 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 because 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 methodologies, stakeholder analyses, project charters, project management plans, project management software , change requests , change control boards, project review meetings, lessons-learned reports
Scope management	Scope statements , work breakdown structures , statements of work, requirements analyses , scope management plans, scope verification techniques, and scope change controls
Time management	Gantt charts , project network diagrams, critical path analysis, crashing, fast tracking, schedule performance measurements
Cost management	Net present value, return on investment, payback analysis, earned value management, project portfolio management, cost estimates, cost management plans, cost baselines
Quality management	Quality metrics, checklists, quality control charts, Pareto diagrams, fishbone diagrams, maturity models, statistical methods
Human resource management	Motivation techniques, empathic listening, responsibility assignment matrices, project organizational charts, resource histograms, team building exercises
Communications management	Communications management plans, kick-off meetings , conflict management, communications media selection, status and progress reports , virtual communications, templates, project Web sites
Risk management	Risk management plans, risk registers, probability/impact matrices, risk rankings
Procurement management	Make-or-buy analyses, contracts, requests for proposals or quotes, source selections, supplier evaluation matrices

A 2006 survey of 753 project and program managers was conducted to rate several project management tools. Respondents were asked to rate tools on a scale of 1–5 (low to high) based on the extent of their use and the potential of the tools to help improve project success. “Super tools” were defined as those that had high use and high potential for

improving project success. These super tools included software for task scheduling (such as project management software), scope statements, 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

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

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.

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

responsible for the success of products and processes produced by those projects. For example, the popular video game *Rock Band*TM 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

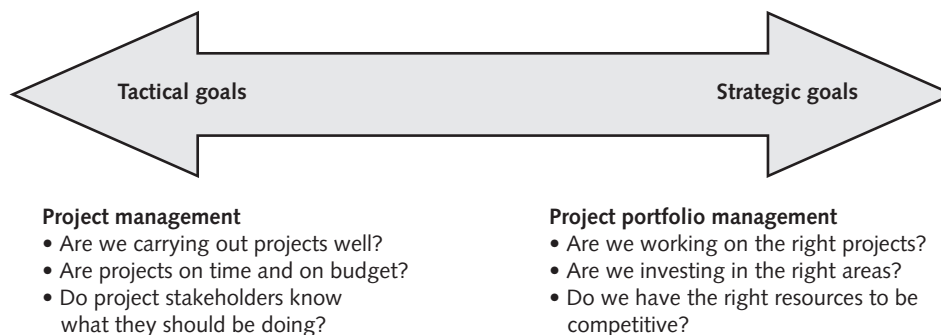


FIGURE 1-3 Project management compared to project portfolio management

Many organizations use a more disciplined approach to portfolio management by developing guidelines and software tools to assist in project portfolio management. The Project Management Institute (described later in this chapter) first published the *Organizational Project Management Maturity Model (OPM3) Knowledge Foundation* in 2003,¹⁹ which describes the importance not only of managing individual projects or programs well, but the importance of following organizational project management to align projects, programs, and portfolios with strategic goals. OPM3 is a standard that organizations can use to measure their organizational project management maturity against a comprehensive set of best practices.



BEST PRACTICE

A **best practice** is “an optimal way recognized by industry to achieve a stated goal or objective.”²⁰ Rosabeth Moss Kanter, a Professor at Harvard Business School and well-known author and consultant, says that visionary leaders know “the best practice secret: Stretching to learn from the best of the best in any sector can make a big vision more likely to succeed.”²¹ Kanter also emphasizes the need to have measurable standards for best practices. An organization can measure performance against its own past, against peers, and even better, against potential. Kanter suggests that organizations need to continue to reach for higher standards. She suggests the following exercise regime for business leaders who want to adapt best practices in an intelligent way to help their own organizations:

- Reach high. Stretch. Raise standards and aspirations. Find the best of the best and then use it as inspiration for reaching full potential.
- Help everyone in your organization become a professional. Empower people to manage themselves through benchmarks and standards based on best practice exchange.
- Look everywhere. Go far afield. Think of the whole world as your laboratory for learning.

Robert Butrick, author of *The Project Workout*, wrote an article on best practices in project management for the *Ultimate Business Library's Best Practice* book. He suggests that organizations need to follow basic principles of project management, including these two mentioned earlier in this chapter:

- Make sure your projects are driven by your strategy. Be able to demonstrate how each project you undertake fits your business strategy, and screen out unwanted projects as soon as possible.
- Engage your stakeholders. Ignoring stakeholders often leads to project failure. Be sure to engage stakeholders at all stages of a project, and encourage teamwork and commitment at all times.²²

As you can imagine, project portfolio management is not an easy task. Figure 1-4 illustrates one approach for project portfolio management where one large portfolio exists for the entire organization. This allows top management to view and manage all projects at an enterprise level. Sections of that portfolio are then broken down to improve the management of projects in each sector. For example, a company might have the main

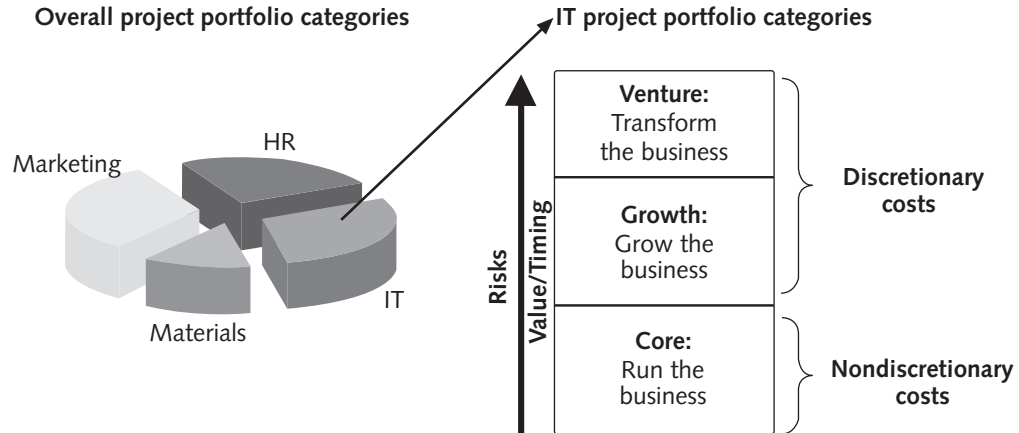


FIGURE 1-4 Sample project portfolio approach

portfolio categories as shown in the left part of Figure 1-4—marketing, materials, IT, and human resources (HR)—and divide each of those categories further to address their unique concerns. The right part of this figure shows how the IT projects could be categorized in more detail to assist in their management. In this example, there are three basic IT project portfolio categories:

- *Venture*: Projects in this category help transform the business. For example, the large retail chain described in the opening case might have an IT project to provide kiosks in stores and similar functionality on the Internet where customers and suppliers could quickly provide feedback on products or services. This project could help transform the business by developing closer partnerships with customers and suppliers.
- *Growth*: Projects in this category would help the company grow in terms of revenues. For example, a company might have an IT project to provide information on their corporate Web site in a new language, such as Chinese or Japanese. This capability could help them grow their business in those countries.
- *Core*: Projects in this category must be accomplished to run the business. For example, an IT project to provide computers for new employees would fall under this category.

Note on the right part of Figure 1-4 that the Core category of IT projects is labeled as nondiscretionary costs. This means that the company has no choice in whether to fund these projects; they must fund them to stay in business. Projects that fall under the Venture or Growth category are discretionary costs because the company can use its own discretion or judgment in deciding whether or not to fund them. Notice the arrow in the center of Figure 1-4 labeled Risks, Value/Timing. This arrow indicates that the risks, value, and timing of projects normally increase as you move from Core to Growth to Venture projects. However, some core projects can also be high risk, have high value, and require good timing. As you can see, many factors are involved in portfolio management.

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.

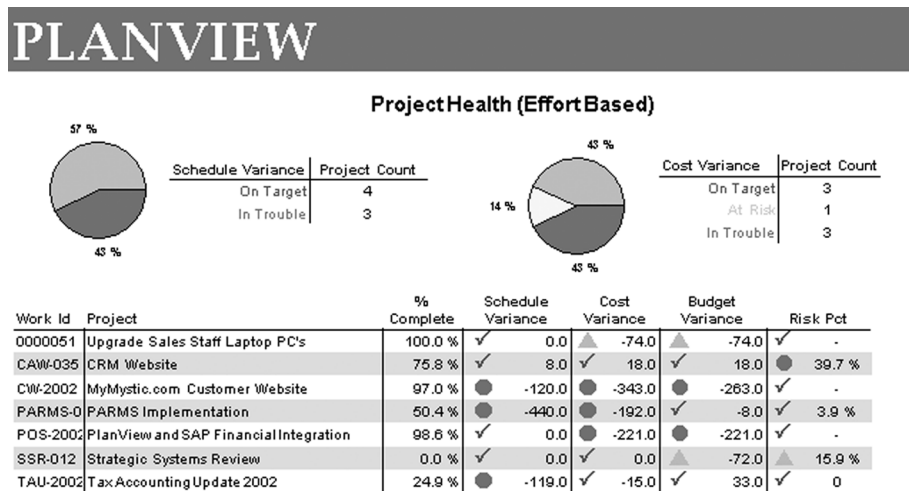


FIGURE 1-5 Sample project portfolio management screen showing project health

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

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.²³ 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

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.

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.”

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/

program management came in first place, followed by business process management, business analysis, and application development. Table 1-4 shows these results, as well as the percentage of respondents who listed the skill as most in demand. 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.

TABLE 1-4 Top information technology skills

Skill	Percentage of Respondents
Project/program management	60%
Business process management	55%
Business analysis	53%
Application development	52%
Database management	49%
Security	42%
Enterprise architect	41%
Strategist/internal consultant	40%
Systems analyst	39%
Relationship management	39%
Web services	33%
Help desk/user support	32%
Networking	32%
Web site development	30%
QA/testing	28%
IT finance	28%
Vendor management/ procurement	27%
IT HR	21%
Other	3%

Carolyn Johnson, "2006 Midyear Staffing Updates," *CIO Research Reports*, October 2, 2006.

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

Although people have worked on projects for centuries, most agree that the modern concept of project management began with the Manhattan Project, which the U.S. military led to develop the atomic bomb in World War II. 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 the lead scientist, 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 tossed a piece of paper with an organization chart on it at his director and said, "Here's your damn organization chart."²⁷ Project management was recognized as a distinct discipline requiring people with special skills and, more importantly, the desire to lead project teams.

In 1917, Henry Gantt developed the famous Gantt chart 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. Initially, 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 and they can be more easily shared and disseminated to project stakeholders. Figure 1-6 displays a Gantt chart created with Microsoft Project, the most widely used project management software today. You will learn more about using Project 2007 in Appendix A.

During the Cold War years of the 1950s and '60s, the military continued to be key in refining several project management techniques. Members of the U.S. 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 1-7 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.

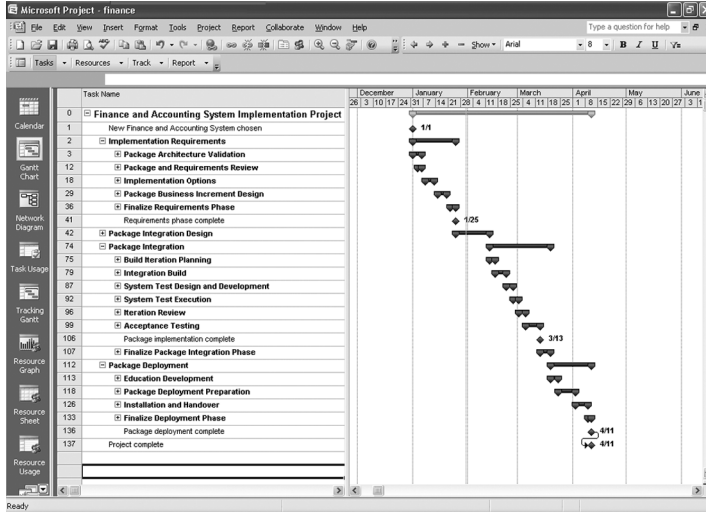


FIGURE 1-6 Sample Gantt chart created with Project 2007

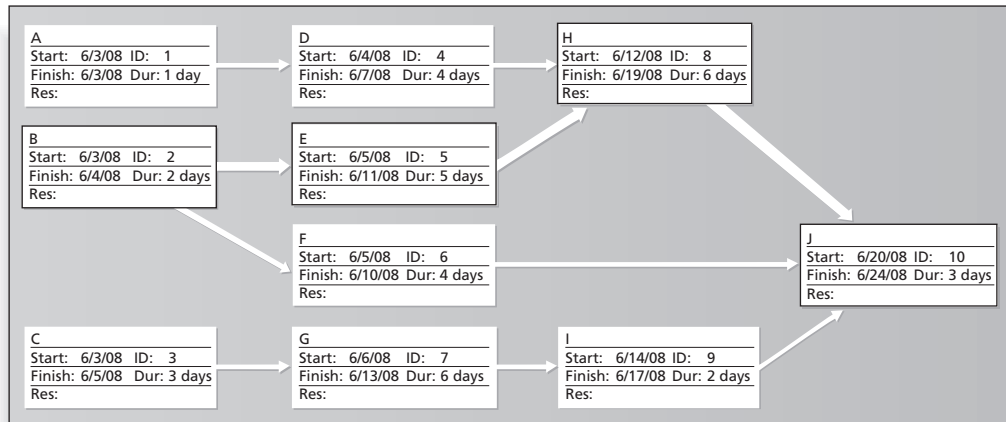


FIGURE 1-7 Sample network diagram in Microsoft Project

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

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

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

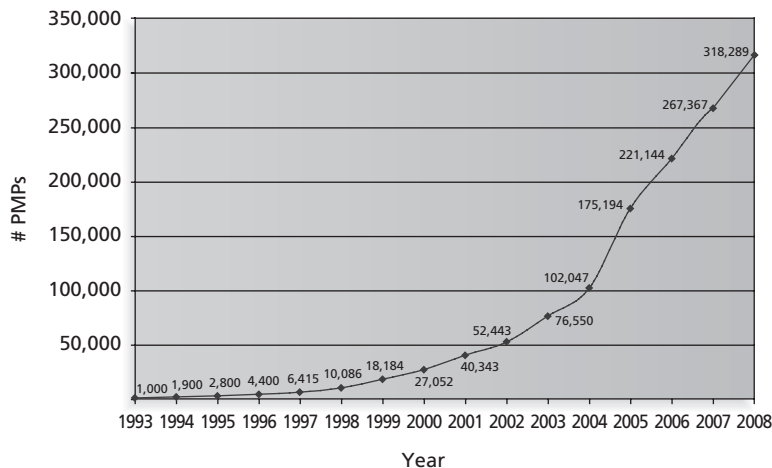


FIGURE 1-8 Growth in PMP Certification, 1993–2008

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.

- 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.vconline.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

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. Top Ten Reviews listed MinuteMan (\$49.95) and Project Kickstart (\$199.95) in their list of top 10 project management software tools for 2008.³² Basecamp (www.basecamphq.com) is another popular tool with low-end through high-end versions ranging in price from \$24 to \$149 per month. Several companies provide add-in features to Excel (see www.business-spreadsheets.com) to provide basic project management functions using a familiar software product.
- *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 \$600 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 in this category, and there is also an enterprise version, as described briefly below and in Appendix A. In the summer of 2008, Top Ten Reviews listed Microsoft Project as the number one choice (\$599), along with Milestones (\$249). A product called Copper also made the top ten list, with a price of \$999 for up to 50 users. As noted earlier, this text includes a trial version of Project 2007 as well as one of VPMi Express, a totally Web-based tool. Note that students and educators can purchase software like Microsoft Project 2007 at reduced prices from sites like www.journeyed.com (\$59.98 for Project 2007 Standard in October 2008), and anyone can download a trial version from Microsoft's Web site. Many other suppliers also provide trial versions of their products.
- *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 and portfolio management functions that summarize and combine individual project information to provide an enterprise view of all projects. These products are generally licensed on a per-user basis, integrate with enterprise database management software, and are accessible via the Internet. In mid-2002, Microsoft introduced the first version of their Enterprise Project Management software, and in 2003, they introduced the Microsoft Enterprise Project Management solution, which was updated in 2007 to include Microsoft Office Project Server 2007 and Microsoft Office Project Portfolio Server 2007A. Several inexpensive, Web-based products that provide enterprise and portfolio management capabilities are also on the market. For example, VPMi Enterprise Online (www.vcsonline.com) is available for a low monthly fee per user (see the front cover of this text for free trial information). See the Project Management Center Web site (www.infogoal.com/pmc) or Top Ten Reviews

(<http://project-management-software-review.toptenreviews.com>) for links to many companies that provide project management software.

There are also several free or open-source tools available. For example, Open Workbench (www.openworkbench.org), dotProject (www.dotproject.net), and TaskJuggler (www.taskjuggler.org) are all free online project management tools. Remember, however, that these tools are developed, managed, and maintained by volunteers. They also often run on limited platforms and may not be well supported.

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 improve.

CASE WRAP-UP

Anne Roberts worked with the VPs and the CEO to form teams to help identify potential IT projects that would support their business strategies. They formed a project team to implement a project portfolio 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, to help people earn PMP and related certifications, 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 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 the entire 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

2. Which of the following is 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

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?

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.

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

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 and education, 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 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 portfolio management or **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

virtualization — Hiding the physical characteristics of computing resources from their users, such as making a single server, operating system, application, or storage device appear to function as multiple virtual resources

End Notes

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