CHAPTER 2

THE PROJECT MANAGEMENT AND INFORMATION TECHNOLOGY CONTEXT

LEARNING OBJECTIVES

After reading this chapter, you will be able to:

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

OPENING CASE

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

Like other institutions of higher learning, the use of IT at the college has grown tremendously in the past 10 years. Wireless access is available everywhere on campus. Only a few classrooms on campus have computers for the instructors and students, and most other classrooms have only instructor stations and projection systems. Tom knew that several colleges throughout the country require that all students lease laptops or tablets, and that these colleges incorporate technology components into most courses. This idea fascinated him. He and two other members of the IT department visited a local college that had required all students to lease laptops for the past three years, and they were very impressed with what they saw and heard. Because tablets were becoming more popular, they thought it would make more sense to require tablets instead of laptops. Tom had heard how easy it was for faculty members to create interactive course materials that would run on tablets; these materials also could help reduce the cost of textbooks, a concern expressed by many of his students. Tom and his staff developed plans to start requiring students either to lease or purchase tablets at their college the next year.

Tom sent an e-mail to all faculty and staff in September, and briefly described his plans. He did not get much response, however, until the February faculty meeting. As he described some of the details of his plan, the chairs of the History, English, Philosophy, and Economics departments all voiced their opposition to the idea. They eloquently stated that the college was not a technical training school, and that they did not have time to write their own course materials to run on tablets. They liked the books they used, and students could already buy books in an electronic format, but most preferred the print versions. Members of the Computer Science department voiced their concern that almost all of their students already had state-of-the art laptops and would not want to pay a mandatory fee to lease less-powerful tablets. The director of the adult education program expressed her concern that many adult-education students would balk at an increase in fees or required technology. Tom was in shock to hear his colleagues' responses, especially after he and his staff had spent a lot of time planning how to implement tablets at their campus. Now what should he do?

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

A SYSTEMS VIEW OF PROJECT MANAGEMENT

Even though projects are temporary and intended to provide a unique product or service, you cannot run projects in isolation. If project managers lead projects in isolation, it is unlikely that they will ever truly serve the needs of the organization. Therefore, projects must operate in a broad organizational environment, and project managers need to consider projects within the greater organizational context. To handle complex situations effectively, project managers need to take a holistic view of a project and understand how it relates to the larger organization. **Systems thinking** describes this holistic view of carrying out projects within the context of the organization.

What Is a Systems Approach?

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

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

In the chapter's opening case, Tom Walters planned the tablet project without using a systems approach. Members of his IT department did all of the planning. Even though Tom sent an e-mail describing the tablet project to all faculty and staff, he did not address many of the organizational issues involved in such a complex project. Most faculty and staff are very busy at the beginning of the fall term, and many may not have read the entire message. Others may have been too busy to communicate their concerns to the IT department. Tom was unaware of the effects the tablet project would have on other parts of the college. He did not clearly define the business, technological, and organizational issues associated with the project. Tom and the IT department began work on the tablet project in isolation. If they had taken a systems approach, considering other dimensions of the project and involving key stakeholders, they could have identified and addressed many of the issues raised at the February faculty meeting *before* the meeting.

The Three-Sphere Model for Systems Management

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

Figure 2-1 provides a sample of business, organizational, and technological issues that could be factors in the tablet project. In this case, technological issues, though not simple by any means, are probably the least difficult to identify and resolve. However, projects must address issues in all three spheres of the systems management model. Although it is easier to focus on the immediate and sometimes narrow concerns of a particular project, project managers and other staff must recognize the effects of any project on the interests and needs of the entire system or organization. The college president and senior administrators, in particular, will focus on whether the tablet project adds value to the college as a whole.

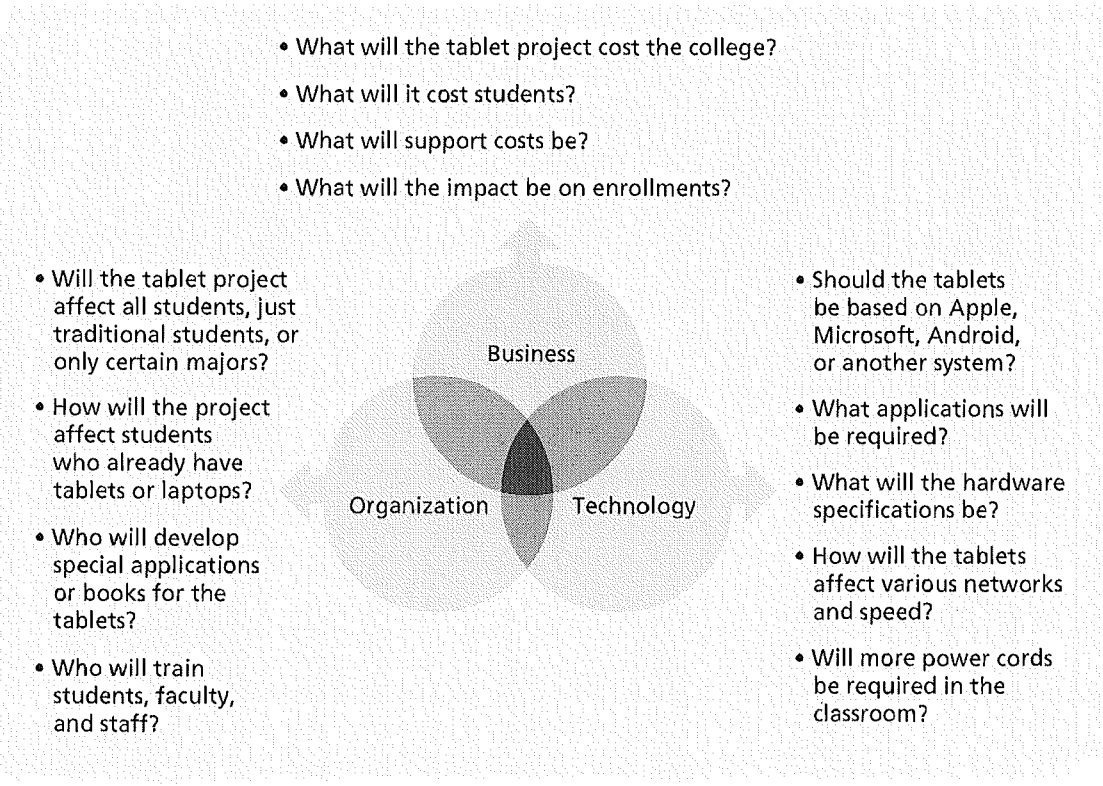

FIGURE 2-1 Three-sphere model for systems management

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

helps them look at projects as a series of interrelated phases. When you integrate business and organizational issues into project management planning and look at projects as a series of interrelated phases, you do a better job of ensuring project success.

UNDERSTANDING ORGANIZATIONS

The systems approach requires that project managers always view their projects in the context of the larger organization. Organizational issues are often the most difficult part of working on and managing projects. For example, many people believe that most projects fail because of company politics. Project managers often do not spend enough time identifying all the stakeholders involved in projects, especially the people opposed to the projects. Also, project managers often do not spend enough time considering the political context of a project or the culture of the organization. To improve the success rate of IT projects, it is important for project managers to develop a better understanding of people as well as organizations.

The Four Frames of Organizations

As shown in Figure 2-2, you can try to understand organizations better by focusing on different perspectives. Organizations can be viewed as having four different frames: structural, human resources, political, and symbolic.[1]

Structural frame: Roles and responsibilities, coordination, and control. Organizational charts help describe this frame.	**Human resources frame:** Providing harmony between needs of the organization and needs of people.
Political frame: Coalitions composed of varied individuals and interest groups. Conflict and power are key issues.	**Symbolic frame:** Symbols and meanings related to events. Culture, language, traditions, and image are all parts of this frame.

Source: Bolman and Deal

FIGURE 2-2 Perspectives on organizations[2]

- The **structural frame** deals with how the organization is structured (usually depicted in an organizational chart) and focuses on different groups' roles and responsibilities to meet the goals and policies set by top management. This frame is very rational and focuses on coordination and control. For example, within the structural frame, a key IT issue is whether a company should centralize the IT personnel in one department or decentralize across several departments. You will learn more about organizational structures in the next section.
- The **human resources (HR) frame** focuses on producing harmony between the needs of the organization and the needs of people. It recognizes that mismatches can occur between the needs of the organization and those of individuals and groups, and works to resolve any potential problems. For example, many projects might be more efficient for the organization if employees worked 80 or more hours a week for several months. However, this work schedule would conflict

with the personal lives of many employees. Important IT issues related to the human resources frame are the shortage of skilled IT workers within the organization and unrealistic schedules imposed on many projects.

- The **political frame** addresses organizational and personal politics. **Politics** in organizations take the form of competition among groups or individuals for power and leadership. The political frame assumes that organizations are coalitions composed of varied individuals and interest groups. Often, important decisions need to be made based on the allocation of scarce resources. Competition for resources makes conflict a central issue in organizations, and power improves the ability to obtain those resources. Project managers must pay attention to politics and power if they are to be effective. It is important to know who opposes your projects as well as who supports them. Important IT issues related to the political frame are the power shifts from central functions to operating units or from functional managers to project managers.
- The **symbolic frame** focuses on symbols and meanings. In this frame, the most important aspect of any event in an organization is not what actually happened, but what it means. Was it a good sign that the CEO came to a kickoff meeting for a project, or was it a threat? The symbolic frame also relates to the company's culture. How do people dress? How many hours do they work? How do they run meetings? Many IT projects are international and include stakeholders from various cultures. Understanding those cultures is also a crucial part of the symbolic frame.

WHAT WENT WRONG?

In a paper titled "A Study in Project Failure," two researchers examined the success and failure of 214 IT projects over an eight-year period in several European countries. The researchers found that only one in eight (12.5 percent) were considered successful in terms of meeting scope, time, and cost goals. The authors made the following conclusions about factors that contribute to a project's failure:

"Our evidence suggests that the *culture* within many organisations is often such that leadership, stakeholder and risk management issues are not factored into projects early on and in many instances cannot formally be written down for *political* reasons and are rarely discussed openly at project board or steering group meetings although they may be discussed at length behind closed doors. ... Despite attempts to make software development and project delivery more rigorous, a considerable proportion of delivery effort results in systems that do not meet user expectations and are subsequently cancelled. In our view this is attributed to the fact that very few organisations have the infrastructure, education, training, or management discipline to bring projects to successful completion."[3]

Project managers must learn to work within all four frames to function well in organizations. Organizational issues are discussed further in Chapter 9, Project Human Resource Management, Chapter 10, Project Communications Management, and Chapter 13, Project Stakeholder Management. The following sections on organizational structures, organizational culture, stakeholder management, and the need for top management commitment provide additional information related to the structural and political frames.

Organizational Structures

Many discussions of organizations focus on their structure. Three general classifications of organizational structures are functional, project, and matrix. Many companies today use all three structures somewhere in the organization, but using one is most common. Figure 2-3 portrays the three organizational structures. A **functional organizational structure** is the hierarchy most people think of when picturing an organizational chart. Functional managers or vice presidents in specialties such as engineering, manufacturing, IT, and human resources report to the chief executive officer (CEO). Their staffs have specialized skills in their respective disciplines. For example, most colleges and universities have very strong functional organizations. Only faculty members in the business department teach business courses; faculty in the history department teach history; faculty in the art department teach art, and so on.

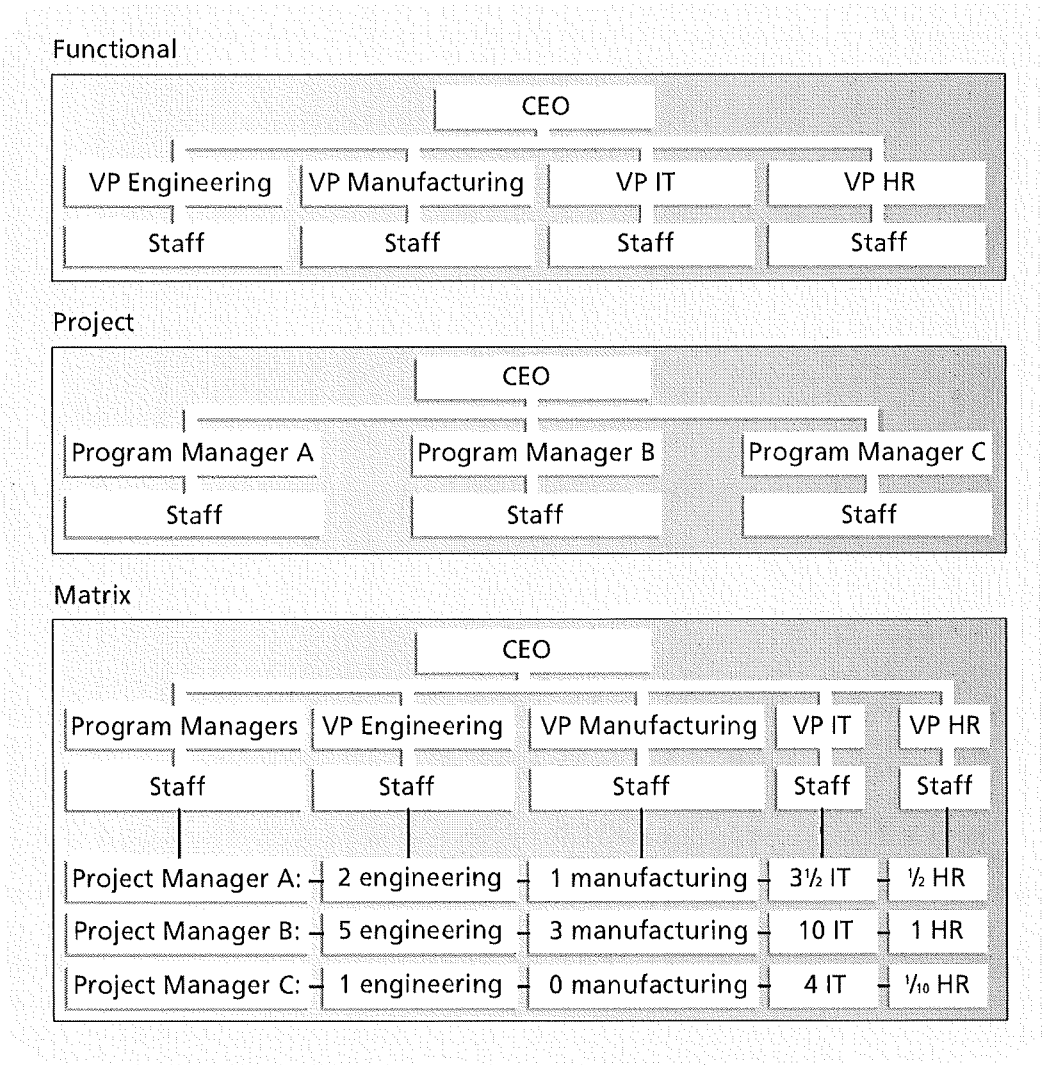

FIGURE 2-3 Functional, project, and matrix organizational structures

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

A **matrix organizational structure** represents the middle ground between functional and project structures. Personnel often report both to a functional manager and one or more project managers. For example, IT personnel at many companies often split their time between two or more projects, but they report to their manager in the IT department. Project managers in matrix organizations have staff from various functional areas working on their projects, as shown in Figure 2-3. Matrix organizational structures can be strong, weak, or balanced, based on the amount of control exerted by the project managers. Problems can occur if project team members are assigned to several projects in a matrix structure and the project manager does not have adequate control of their time.

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

TABLE 2-1 Organizational structure and its influences on projects

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

also ask for a separate budget to pay for project-related trips, meetings, and training or to provide financial incentives to the people supporting the project.

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

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

Organizational Culture

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

According to Stephen P. Robbins and Timothy Judge, authors of a popular textbook on organizational behavior, there are 10 characteristics of organizational culture:

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

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

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

STAKEHOLDER MANAGEMENT

Recall from Chapter 1 that project stakeholders are the people involved in project activities or affected by them. Stakeholders can be internal or external to the organization, directly involved in the project, or simply affected by the project. Internal project stakeholders generally include the project sponsor, project team, support staff, and internal customers for the project. Other internal stakeholders include top management, other functional managers, and other project managers. Because organizations have limited resources, projects affect top management, other functional managers, and other project managers by using those resources. Thus, while additional internal stakeholders may not be directly involved in the project, they are still stakeholders because the project affects them in some way. External project stakeholders include the project's customers (if they are external to the organization), competitors, suppliers, and other external groups potentially involved in the project or affected by it, such as government officials or concerned citizens. Because the purpose of project management is to meet project requirements and satisfy stakeholders, it is critical that project managers take adequate time to identify,

Email Templates

Send if you are able to connect with student

Title: Nice to Meet You –<<section number>>

Attachment: Personalized Week 1 Academic Plan

Hi <<Student's name>>,

It was very nice meeting you, and I am glad we were able to connect. I appreciate you giving me the opportunity to get to know you on an individualized level. I hope you feel more confident and reassured that I will be with you every week.

As we discussed during our call, attached is your Personalized Week 1 Plan. Please review the attached plan and let me know if you have any questions. Based on our conversation, I tried to tailor it to you and your schedule. I hope this helps you get started.

Let's work together to help you successfully complete this course week by week. I am committed to your success! Now join me by hitting, "Reply All" to this email with the response, "I am committed to completing Week 1." Remember, your Student Services Success Coach and I are always available to assist you!

Thanks,

Send if you are unable to reach student via phone:

Title: Welcome and Sorry I Missed You <<section number>>

Attachment: Academic Plan Week 1

Hi <<Student's name>>,

My name is <<your name>> and I am your SLS 1105 instructor. I just wanted to welcome you to the course! I am sorry I wasn't able to reach you by phone, but I will try connecting with you soon. I wanted to reassure you that you are not alone in this course and I will be with you for the next 12 weeks, along with your Student Services Success Coach. Together, we will complete one week at a time!

Please be sure to contact me as soon as possible, so we can design a plan to help you successfully complete this course. This will be a customized plan specifically tailored for you and your needs. In the meantime, attached is an Academic Week 1 Plan.

If you would like to speak with me, please let me know the best time to call you.

Also, check out the other resources that are always available to you:

Faculty in Touch Hotline (FiT) – Need help right away, call (877) 347-3097. Click on "Live Tutoring" under the Course Home for available times.

Academic Tutoring and Success Center – Request a tutor or success coach to help you. Click on "Tutoring" under Course Home. (**https://sites.google.com/site/myacademicsuccesscenter/Home**)

Smarthinking – Access live tutors and feedback on your writing. Click on "Tutoring" under Course Home.

I look forward to hearing from you and helping you get started as soon as possible.

Thanks,

Welcome Call Talking Points

1. Make students feel welcome; set the student at ease
    - What program are they enrolled in?
    - What motivated them to come to Everest? What are their goals?

2. Reassure students that they are not alone and they have a support system
    - Instructors, Student Services Success Coach, Tutoring options, Everest CARES

3. Assess what happened the first time they took the course:
    - What were some positive feelings they had?
    - What were some things that went well?
    - What were some of the struggles they had?
    - What would they like to improve on?
    - Were they aware of all the resources available to them? Did they use any of them?
    - What would they have liked their instructor to have done to help them more?
    - What do they expect from their instructor?
    - Why do they think they did not pass the course?
    - What are they going to do differently this time? (Faculty may need to suggest tactics or actions based on what difficulties students share.)

4. Asses their time management skills:
    - What is their schedule for the week including work, family and other responsibilities?
    - When are they planning on logging in?
    - When are they going to complete the assigned work for the week?

5. Create a game plan:
    - Make sure that they have the correct textbook since it changed this term: *FOCUS on College Success*
    - Remind them that you will work together and take it week by week, one assignment at a time – let them know you are available to help
    - Based on what the student just told you, focus on a few points to help create a schedule to complete the work for Week 1
    - Breakdown each of the assignments and what needs to be turned in
    - After the call, complete the **Personalized Week 1 Academic Plan** and send to student

understand, and manage relationships with all project stakeholders. Using the four frames of organizations to think about project stakeholders can help you meet their expectations. See Chapter 13, Project Stakeholder Management, for more information.

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

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

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

MEDIA SNAPSHOT

The media have often reported on mismanaged IT projects. A classic example and popular case study is the baggage handling system at Denver International Airport (DIA). The system was supposed to reduce flight delays, shorten waiting times at luggage carousels, and save money, but instead it caused huge problems. The airport was originally scheduled to open with one baggage handling system for all three concourses in October 1993, but it did not open until February 1995, with separate systems for each concourse and varying degrees of automation. One important reason for this famous project disaster was the failure to recognize the project's complexity.

The system's original $186 million construction costs grew by $1 million each day during months of modifications and repairs. Only United, DIA's dominant airline, used it

continued

for outgoing flights. The automated baggage system never worked as designed, and United abandoned it in 2005. "The system never worked for incoming flights, which have been handled by human hands for years. No other airline tried to use the system at all. Jim Kyte, United's general manager for customer service in Denver, said the pressure to cut costs as the airline struggles to emerge from bankruptcy, along with the sharply rising fuel prices this year, ultimately forced the issue."[5]

The Importance of Top Management Commitment

People in top management positions, of course, are key stakeholders in projects. A very important factor in helping project managers successfully lead projects is the level of commitment and support they receive from top management. Without this commitment, many projects will fail. Some projects have a senior manager called a **champion** who acts as a key proponent for a project. The sponsor can serve as the champion, but often another manager can more successfully take on this role. As described earlier, projects are part of the larger organizational environment, and many factors that might affect a project are out of the project manager's control. Several studies cite executive support as one of the key factors associated with virtually all project success.

Top management commitment is crucial to project managers for the following reasons:

- Project managers need adequate resources. The best way to kill a project is to withhold the required money, human resources, and visibility. If project managers have top management commitment, they will also have adequate resources and not be distracted by events that do not affect their specific projects.
- Project managers often require approval for unique project needs in a timely manner. For example, on large IT projects, top management must understand that unexpected problems may result from the nature of the products being developed and the specific skills of people on the project team. The team might need additional hardware and software halfway through the project for proper testing, or the project manager might need to offer special pay and benefits to attract and retain key project personnel. With top management commitment, project managers can meet these needs.
- Project managers must have cooperation from people in other parts of the organization. Because most IT projects cut across functional areas, top management must help project managers deal with the political issues that often arise. If certain functional managers are not responding to project managers' requests for necessary information, top management must step in to encourage the functional managers to cooperate.
- Project managers often need someone to mentor and coach them on leadership issues. Many IT project managers come from technical positions and are inexperienced as managers. Senior managers should take the time to give advice on how to be good leaders. They should encourage new project managers to take classes to develop leadership skills and allocate the time and funds for managers to do so.

IT project managers work best in an environment in which top management values IT. Working in an organization that values good project management and sets standards for its use also helps project managers succeed.

BEST PRACTICE

A major element of good practice concerns **IT governance**, which addresses the authority and control for key IT activities in organizations, including IT infrastructure, IT use, and project management. (The term *project governance* can also be used to describe a uniform method of controlling all types of projects.) The IT Governance Institute (ITGI) was established in 1998 to advance international thinking and standards in directing and controlling an organization's use of technology. Effective IT governance helps ensure that IT supports business goals, maximizes investment in IT, and addresses IT-related risks and opportunities. A 2004 book by Peter Weill and Jeanne Ross called *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*[6] includes research indicating that firms with superior IT governance systems have 20 percent higher profits than firms with poor governance. (See the ITGI's Web site at *www.itgi.org* for more information, including many case studies and best practices in this area.)

A lack of IT governance can be dangerous, as evidenced by three well-publicized IT project failures in Australia—Sydney Water's customer relationship management system, the Royal Melbourne Institute of Technology's academic management system, and One.Tel's billing system. Researchers explained how these projects were catastrophic for their organizations, primarily due to a severe lack of IT governanee, which the researchers dubbed *managerial IT unconsciousness* in a subsequent article:

"All three projects suffered from poor IT governance. Senior management in all three organizations had not ensured that prudent checks and balances were in place to enable them to monitor either the progress of the projects or the alignment and impact of the new systems on their business. Proper governance, particularly with respect to financial matters, auditing, and contract management, was not evident. Also, project-level planning and control were notably absent or inadequate—with the result that project status reports to management were unrealistic, inaccurate, and misleading."[7]

The Need for Organizational Commitment to Information Technology

Another factor that affects the success of IT projects is the organization's commitment to IT in general. It is very difficult for an IT project to be successful if the organization itself does not value IT. Many companies have realized that IT is integral to their business and have created a vice president or equivalent position for the head of IT, often called the Chief Information Officer (CIO). Some companies assign people from non-IT areas to work on large projects full-time and increase involvement from end users of the systems. Some CEOs even take a strong leadership role in promoting the use of IT in their organizations.

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

- *Elizabeth Obermiller, director of ERM systems for BNSF Railway*: "Our success was driven by the ongoing executive commitment and passionate and talented teams, who were able to implement a planned and phased

approach with advanced application of analytics to monitor, measure and drive success."

- *John Reinke, a senior vice president of Uniprise, a UnitedHealth Group*: "We are excited to receive this award for our partnership with eLoyalty to implement a new, cutting-edge call center technology application called Behavioral Analytics™. This technology allows us to engage in deeper, more personally relevant phone conversations with each consumer who speaks with a customer care professional. Health care consumers often face complex and emotional issues, and this is a great example of how technology can help improve their experience."[8]

The Need for Organizational Standards

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

As you saw in Chapter 1, some organizations invest heavily in project management by creating a project management office or center of excellence, which assists project managers in achieving project goals and maintaining project governance. Rachel Hollstadt, founder and CEO of a project management consulting firm, suggests that organizations consider adding a new position, a Chief Project Officer (CPO). Some organizations develop career paths for project managers; some require that all project managers have Project Management Professional (PMP) certification and that all employees have some type of project management training. The implementation of such standards demonstrates an organization's commitment to project management.

PROJECT PHASES AND THE PROJECT LIFE CYCLE

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

of software code, produced or provided as part of a project. (See Chapter 5, Project Scope Management, for detailed information on deliverables.)

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

Project phases vary by project or industry, but general phases in traditional project management are often called the concept, development, implementation, and close-out phases. The *PMBOK® Guide, Fifth Edition* calls these phases starting the project, organizing and preparing, carrying out the project work, and finishing the project. These phases should not be confused with the project management process groups of initiating, planning, executing, monitoring and controlling, and closing, as described in Chapter 3. The first two traditional project phases (concept and development) focus on planning, and are often referred to as **project feasibility**. The last two phases (implementation and close-out) focus on delivering the actual work, and are often referred to as **project acquisition**. A project should successfully complete each phase before moving on to the next. This project life cycle approach provides better management control and appropriate links to the ongoing operations of the organization. Chapter 4, Project Integration Management, provides more information on project selection.

Figure 2-4 provides a summary framework for the general phases of the traditional project life cycle. In the concept phase of a project, managers usually develop some type of business case, which describes the need for the project and basic underlying concepts. A preliminary or rough cost estimate is developed in this first phase, and an overview of the required work is created. A work breakdown structure (WBS) outlines project work by decomposing the work activities into different levels of tasks. The WBS is a deliverable-oriented document that defines the total scope of the project. (You will learn more about the WBS in Chapter 5, Project Scope Management.) For example, if Tom Walters had followed the project life cycle in the opening case instead of moving full steam ahead with the tablet project, he could have created a committee of faculty and staff to study the concept of increasing the use of technology on campus. This committee might have developed a business case and plan that included an initial, smaller project to investigate alternative ways of increasing the use of technology. The committee might have estimated that it would take six months and $20,000 to conduct a detailed technology study. The WBS at this phase of the study might have three levels and partition the work to include a competitive analysis of what five similar campuses were doing, a survey of local students, staff, and faculty, and a rough assessment of how using more technology would affect costs and enrollments. At the end of the concept phase, the committee would be able to deliver a report and presentation on its findings. The report and presentation would be examples of deliverables.

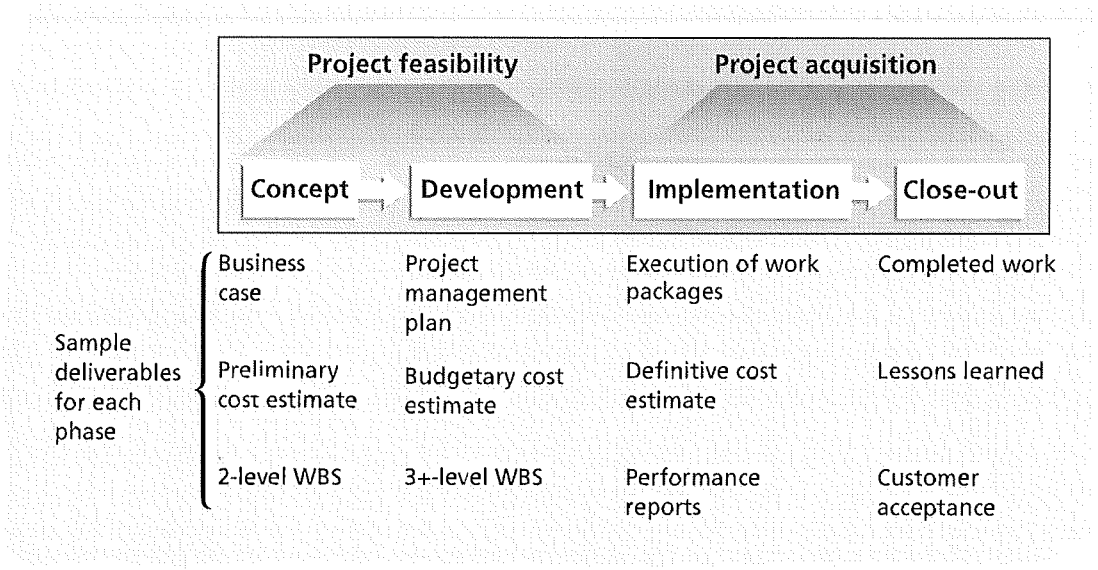

FIGURE 2-4 Phases of the traditional project life cycle

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

The third phase of the traditional project life cycle is implementation. In this phase, the project team creates a definitive or very accurate cost estimate, delivers the required work, and provides performance reports to stakeholders. Suppose Tom Walters' college took the idea of requiring students to have tablets through the development phase. During the implementation phase, the project team would need to obtain the required hardware and software, install the necessary network equipment, deliver the tablets to the students, create a process for collecting fees, and provide training to students, faculty, and staff. Other people on campus would also be involved in the implementation phase. Faculty would need to consider how best to take advantage of the new technology. The recruiting staff would have to update their materials to reflect this new feature of the college. Security would need to address new problems that might result from students carrying around

expensive equipment. The project team usually spends the bulk of its efforts and money during the implementation phase of projects.

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

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

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

Product Life Cycles

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

All products follow some type of life cycle—cars, buildings, even amusement parks. The Walt Disney Company, for example, follows a rigorous process to design, build, and test new products. Disney assigns project managers to oversee the development of all new products, such as rides, parks, and cruise lines. Likewise, major automotive companies follow product life cycles to create new cars, trucks, and other products. Most IT professionals are familiar with the concept of a product life cycle, especially for developing software.

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

A **systems development life cycle (SDLC)** is a framework for describing the phases of developing information systems. Some popular models of an SDLC include the waterfall model, the spiral model, the incremental build model, the prototyping model, and the Rapid Application Development (RAD) model. These life cycle models are examples of a

predictive life cycle, meaning that the scope of the project can be articulated clearly and the schedule and cost can be predicted accurately. The project team spends a large portion of the project attempting to clarify the requirements of the entire system and then producing a design. Users are often unable to see any tangible results in terms of working software for an extended period. Below are brief descriptions of several predictive SDLC models.[9]

- The waterfall life cycle model has well-defined, linear stages of systems analysis, design, construction, testing, and support. This life cycle model assumes that requirements will remain stable after they are defined. The waterfall life cycle model is used when risk must be tightly controlled and when changes must be restricted after the requirements are defined. The waterfall approach is used in many large-scale systems projects where complexity and cost are so high that the more rigid steps of the approach help to ensure careful completion of all deliverables.
- The spiral life cycle model was developed based on refinements of the waterfall model as applied to large government software projects. It recognizes the fact that most software is developed using an iterative or spiral approach rather than a linear approach. The project team is open to changes and revisions later in the project life cycle, and returns to the requirements phase to more carefully clarify and design the revisions. This approach is suitable for projects in which changes can be incorporated with reasonable cost increases or with acceptable time delays. Figure 2-5 illustrates the differences between the waterfall and spiral life cycle models.

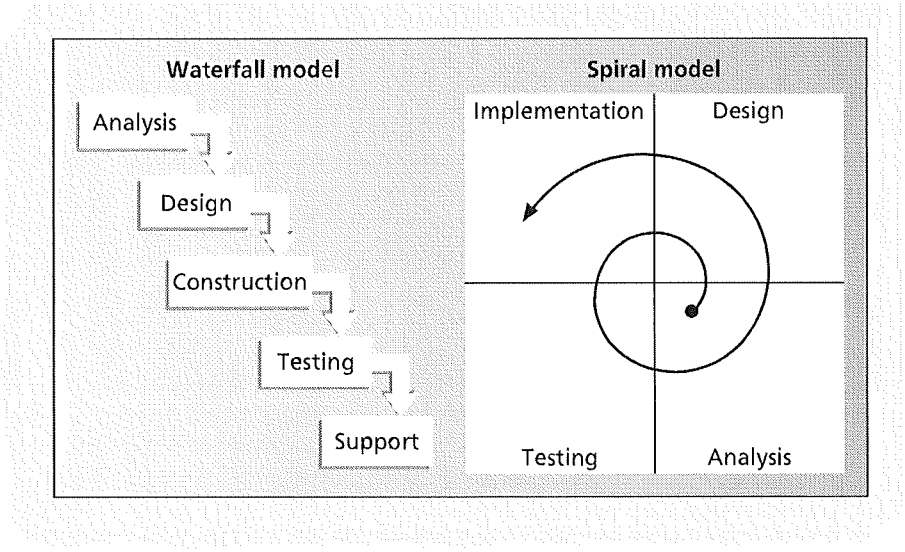

FIGURE 2-5 Waterfall and spiral life cycle models

- The incremental build life cycle model provides for progressive development of operational software, with each release providing added capabilities. This type of approach is often used by organizations like Microsoft, which issues a

specific release of a software package while working on future revisions that will be distributed later in another release with a higher "build" or version number. This approach helps to stage the priorities of the package's features and functions with user priorities or the costs, time, and scope of the system revisions.

- The prototyping life cycle model is used for developing software prototypes to clarify user requirements for operational software. It requires heavy user involvement, and developers use a model to generate functional requirements and physical design specifications simultaneously. Developers can throw away or keep prototypes, depending on the project. This approach is often used in systems that involve a great deal of user interface design, such as Web site projects, in systems that automate previously manual functions, or in systems that change the nature of how something is done, such as mobile applications.
- The RAD life cycle model uses an approach in which developers work with an evolving prototype. This life cycle model also requires heavy user involvement and helps produce systems quickly without sacrificing quality. Developers use RAD tools such as CASE (computer-aided software engineering), JRP (joint requirements planning), and JAD (joint application design) to facilitate rapid prototyping and code generation. These tools are often used in reporting systems in which programmers enter parameters into software to generate reports for user approval. When approved, the same parameters will generate the final production system without further modification by the programmer.

In contrast to the predictive models, the **adaptive software development (ASD)** life cycle model assumes that software development follows an adaptive approach because the requirements cannot be clearly expressed early in the life cycle. An adaptive approach is also used to provide more freedom than the prescriptive approaches. It allows development using a more free-form approach to create components that provide the functionality specified by the business group. Important attributes of this approach are that the projects are mission driven and component based, using time-based cycles to meet target dates. Requirements are developed using an iterative approach, and development is risk driven and change tolerant to address and incorporate risks rather than mitigate them. More recently, the term **agile software development** has become popular to describe new approaches that focus on close collaboration between programming teams and business experts. The last section of this chapter provides more information on agile project management, and Chapter 3 includes a brief case study of an agile project. (See the companion Web site for Suggested Readings related to agile development and other software development methodologies.) Agile approaches are used in rapid software development and to handle frequent system changes and maintenance to production systems. Because many of these changes might be relatively minor, the more traditional project approaches would take much longer and cost more. Agile techniques have an iterative, short-cycle focus on delivery of working software.

These life cycle models are all examples of SDLCs. Many Web sites and introductory management information systems textbooks describe each of the models in detail. The type of software and complexity of the information system in development determines

which life cycle model to use. It is important to understand the product life cycle to meet the needs of the project environment.

Most large IT products are developed as a series of projects. For example, the systems planning phase for a new information system can include a project to hire an outside consulting firm to help identify and evaluate potential strategies for developing a particular business application, such as a new order processing system or general ledger system. The planning phase can also include a project to develop, administer, and evaluate a survey of users to get their opinions on the current information systems used in the organization. The systems analysis phase might include a project to create process models for certain business functions in the organization. This phase can also include a project to create data models of existing company databases related to the business function and application. The implementation phase might include a project to hire contract programmers to code a part of the system. The close-out phase might include a project to develop and run several training sessions for users of the new application. All of these examples show that large IT projects are usually composed of several smaller projects. It is often good practice to view large projects as a series of smaller, more manageable ones, especially when extensive uncertainty is involved. Successfully completing one small project at a time will help the project team succeed in completing the larger project.

Because some aspects of project management need to occur during each phase of the product life cycle, it is critical for IT professionals to understand and practice good project management throughout the product life cycle.

The Importance of Project Phases and Management Reviews

Due to the complexity and importance of many IT projects and their resulting products, it is important to take time to review the status of a project at each phase. A project should successfully pass through each of the main project or product phases before continuing to the next. Because the organization usually commits more money as a project continues, a management review should occur after each phase to evaluate progress, potential success, and continued compatibility with organizational goals. These management reviews, called **phase exits** or **kill points**, are very important for keeping projects on track and determining if they should be continued, redirected, or terminated. Recall that projects are just one part of the entire system of an organization. Changes in other parts of the organization might affect a project's status, and a project's status might likewise affect events in other parts of the organization. By breaking projects into phases, top management can make sure that the projects are still compatible with other needs of the organization.

Take another look at the opening case. Suppose Tom Walters' college conducted a study sponsored by the college president on increasing the use of technology. At the end of the concept phase, the project team could have presented information to the faculty, president, and other staff members that described different options for increasing the use of technology, an analysis of what competing colleges were doing, and results of a survey of local stakeholders' opinions on the subject. This presentation at the end of the concept phase would represent one form of a management review. Suppose the study reported that 90 percent of surveyed students, faculty, and staff strongly opposed the idea of requiring all students to have tablets, and that many adult students said they would attend other colleges if they were required to pay for the additional technology. The college would

probably decide not to pursue the idea any further. Had Tom taken a phased approach, he and his staff would not have wasted the time and money it took to develop detailed plans.

In addition to formal management reviews, it is important to have top management involvement throughout the life cycle of most projects. It is unwise to wait until the end of project or product phases to have management inputs. Many projects are reviewed by management on a regular basis, such as weekly or even daily, to make sure they are progressing well. Everyone wants to be successful in accomplishing goals at work, and having management involvement ensures that a company can accomplish its project and organizational goals.

✓ WHAT WENT RIGHT?

Having specific deliverables and kill points at the end of project or product phases helps managers make better decisions about whether to proceed, redefine, or kill a project. Improvement in IT project success rates reported by the Standish Group has been due in part to an increased ability to know when to cancel failing projects. Standish Group Chairman Jim Johnson made the following observation: "The real improvement that I saw was in our ability to—in the words of Thomas Edison—know when to stop beating a dead horse. ... Edison's key to success was that he failed fairly often; but as he said, he could recognize a dead horse before it started to smell. ... In information technology we ride dead horses—failing projects—a long time before we give up. But what we are seeing now is that we are able to get off them; able to reduce cost overrun and time overrun. That's where the major impact came on the success rate."[10]

Another example of the power of management oversight comes from Huntington Bancshares, Inc. This company, like many others, has an **executive steering committee**, a group of senior executives from various parts of the organization who regularly review important corporate projects and issues. The Ohio-based, $26 billion bank holding company completed a year-long Web site redesign using XML technology to give its online customers access to real-time account information as well as other banking services. The CIO, Joe Gottron, said there were "four or five very intense moments" when the whole project was almost stopped due to its complexity. The executive steering committee met weekly to review the project's progress and discuss work planned for the following week. Gottron said the meetings ensured that "if we were missing a beat on the project, no matter which company [was responsible], we were on top of it and adding additional resources to make up for it."[11]

Managers in the motorcycle industry also understand the importance of overseeing their IT projects. For example, Harley-Davidson Motor Company used to focus only on producing and selling high-quality motorcycles. In 2003, however, management realized that it had to improve its IT operations and control to stay in business and adhere to new government laws, such as the accounting reporting regulations of the Sarbanes-Oxley Act. Harley-Davidson had no standardized processes for user access, change management, or backup and recovery at that time. "Although complying with Sarbanes-Oxley was going to be a challenge, the company took strong action, utilized COBIT (Control Objectives for Information and related Technology) and passed Sarbanes-Oxley year one compliance. ... One of the major benefits of using COBIT as its overall internal control and compliance model was getting everyone—especially nontechnical motorcycle experts—revved up about control activities and why controls are important."[12]

THE CONTEXT OF INFORMATION TECHNOLOGY PROJECTS

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

The Nature of IT Projects

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

IT projects also support every possible industry and business function. Managing an IT project for a film company's animation department would require different knowledge and skills by the project manager and team members than a project to improve a federal tax collection system or to install a communication infrastructure in a third-world country. Because of the diversity of IT projects and the newness of the field, it is important to develop and follow best practices in managing these varied projects. That way, IT project managers will have a common starting point and method to follow with every project.

Characteristics of IT Project Team Members

Because of the nature of IT projects, the people involved come from very diverse backgrounds and possess different skills. Most trade schools, colleges, and universities did not start offering degrees in computer technology, computer science, management information systems, or other IT areas until the 1970s. Typical of new professions, the information field has borrowed from other professions as it has developed. Even though the field now has numerous higher-education programs, diverse project teams can provide a significant advantage because they can analyze project requirements from a more robust systems view. Many companies purposely hire graduates with degrees in other fields such as business, mathematics, or the liberal arts to provide different perspectives on IT projects. Even with these different educational backgrounds, however, there are common job titles for people working on most IT projects, such as business analyst, programmer, network specialist, database analyst, quality assurance expert, technical writer, security specialist, hardware engineer, software engineer, and system architect. Within the category of programmer, several other job titles describe the specific technologies used, such as Java programmer, XML programmer, and C/C++ programmer.

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

Diverse Technologies

Many of the job titles for IT professionals reflect the different technologies required to hold those positions. Unfortunately, hardware specialists might not understand the language of database analysts, and vice versa. Security specialists may have a hard time communicating with business analysts. It is also unfortunate that people within the same IT job function often do not understand each other because they use different technology. For example, someone with the title of programmer can often use several different programming languages. However, if programmers are limited in their ability to work in multiple languages, project managers might find it more difficult to form and lead more versatile project teams.

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

RECENT TRENDS AFFECTING INFORMATION TECHNOLOGY PROJECT MANAGEMENT

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

Globalization

In his popular book *The World Is Flat*, Thomas L. Friedman describes the effects of globalization, which has created a "flat" world where everyone is connected and the "playing field" is level for many more participants.[13] Lower trade and political barriers and the digital revolution have made it possible to interact almost instantaneously with billions of other people across the planet, and for individuals and small companies to compete with large corporations. Friedman also discusses the increase in "uploading," in which people share information through blogging, podcasts, and open-source software.

IT is a key enabler of globalization. In 2012, more than 1 billion people were using Facebook, or one in seven people. Other social networks, such as Twitter and LinkedIn, also continue to grow. In 2010, 46 percent of the visits to LinkedIn came from outside the United States, but by early 2012, the number had increased to 62 percent.[14] Globalization has significantly affected the field of IT. Even though major IT companies such as Microsoft and

IBM started in the United States, much of their business is global—indeed, companies and individuals throughout the world contribute to the growth of information technologies, and work and collaborate on various IT projects.

It is important for project managers to address several key issues when working on global projects:

- *Communications*: Because people work in different time zones, speak different languages, have different cultural backgrounds, and celebrate different holidays, it is important to address how people will communicate in an efficient and timely manner. A communications management plan is vital. For more details, see the plan described in Chapter 10, Project Communications Management.
- *Trust*: Trust is an important issue for all teams, especially when they are global teams. It is important to start building trust immediately by recognizing and respecting others' differences and the value they add to the project.
- *Common work practices*: It is important to align work processes and develop a modus operandi with which everyone agrees and is comfortable. Project managers must allow time for the team to develop these common work practices. Using special tools, as described next, can facilitate this process.
- *Tools*: IT plays a vital role in globalization, especially in enhancing communications and work practices. Many people use free tools such as Skype, Google Docs, or social media to communicate. Many project management software tools include their own communications and collaboration features in an integrated package. New tools become available quickly. For example, at its Innovate 2011 conference, IBM announced new software offerings called Collaborative Lifecycle Management 3.0, which are built on IBM's Jazz open-development platform. The software supports collaborative interaction among workers throughout the world, making for a more fluid design process.[15] Work groups must investigate options and decide which tools will work best for their projects.

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

- Employ greater project discipline for global projects; otherwise, weaknesses within the traditional project disciplines may be amplified by geographical differences.
- Think globally, but act locally to align and integrate stakeholders at all project levels.
- Consider collaboration over standardization to help balance the goals and project approach.
- Keep momentum going for projects, which will typically have a long duration.
- Consider the use of newer, perhaps more innovative, tools and technology.[16]

Outsourcing

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

Some organizations remain competitive by using outsourcing to their advantage. Many organizations have found ways to reduce costs by outsourcing, even though the practice can be unpopular in their home countries. For example, outsourcing was an important topic in the 2012 U.S. Republican presidential debates, as candidates discussed why Apple hires half a million low-paid workers in the Far East to assemble its products. A *New York Times* article explained that outsourcing is not just about low costs. "One former executive described how [Apple] relied upon a Chinese factory to revamp iPhone manufacturing just weeks before the device was due on shelves. Apple had redesigned the iPhone's screen at the last minute, forcing an assembly line overhaul. New screens began arriving at the plant near midnight. A foreman immediately roused 8,000 workers inside the company's dormitories, according to the executive. Each employee was given a biscuit and a cup of tea, guided to a workstation and within half an hour started a 12-hour shift fitting glass screens into beveled frames. Within 96 hours, the plant was producing over 10,000 iPhones a day. 'The speed and flexibility is breathtaking,' the executive said. 'There's no American plant that can match that.'"[17]

GLOBAL ISSUES

Outsourcing also has disadvantages. For example, Apple benefits from manufacturing products in China, but it had big problems there after its iPhone 4S launch in January 2012 caused fighting between migrant workers who were hired by scalpers to stand in line to buy the phones. When Apple said it would not open its store in Beijing, riots resulted and people attacked security guards. The Beijing Apple Store has had problems before. In May 2011, four people were injured when a crowd waiting to buy the iPad 2 turned ugly. Market analysts blamed Apple for not marketing or distributing its products well in China.[18]

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

Virtual Teams

Several factors, such as the cost and time required for travel or employee relocation, the ability to communicate and work across vast distances, the advantages of hiring people in locations that have a lower cost of living, and worker preferences for flexible work hours, have contributed to a significant increase in virtual project teams. A **virtual team** is a group of people who work together despite time and space boundaries using communication technologies. Team members might all work for the same company in the same country, or they might include employees as well as independent consultants, suppliers, or even volunteers providing their expertise from around the globe.

The main advantages of virtual teams include:

- Lowering costs because many virtual workers do not require office space or support beyond their home offices.
- Providing more expertise and flexibility or increasing competitiveness and responsiveness by having team members across the globe working any time of day or night.

- Improving the balance between work and life for team members by eliminating fixed office hours and the need to travel to work.

Disadvantages of virtual teams include:

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

Like any team, a virtual team should focus on achieving a common goal.
Research on virtual teams reveals a growing list of factors that influence their success:

- *Team processes*: It is important to define how the virtual team will operate. For example, teams must agree on how and when work will be done, what technologies will be used, how decisions will be made, and other important process issues.
- *Leadership style*: The project manager's leadership style affects all teams, especially virtual ones.
- *Trust and relationships*: Many virtual teams fail because of a lack of trust. It is difficult to build relationships and trust from a distance. Some project managers like to have a face-to-face meeting so team members can get to know each other and build trust. If such a meeting is not possible, phone or video conferences can help.
- *Team member selection and role preferences*: Dr. Meredith Belbin defined a team role as "a tendency to behave, contribute and interrelate with others in a particular way."[19] It is important to select team members carefully and to form a team in which all roles are covered. All virtual team members must also understand their roles on the team. (Visit *www.belbin.com* for more information on this topic.)
- *Task-technology fit*: IT is more likely to have a positive impact on individual performance if the capabilities of the technologies match the tasks that the user must perform.
- *Cultural differences*: It is important to address cultural differences, including how people with authority are viewed, how decisions are made, how requests or questions are communicated, and how workers prefer to operate (in collaboration or individually). These cultural differences vary from location to location and affect many aspects of the team.
- *Computer-mediated communication*: It is crucial to provide reliable and appropriate computer-mediated communication to virtual team members, including e-mail, instant messaging, text messaging, and chat rooms. If you rely on these technologies to bring the virtual team together, you need to ensure that they actually work, or you risk increasing the distance that can exist across virtual boundaries.

- *Team life cycles*: Just as projects and products have life cycles, so do teams. Project managers must address the team life cycle, especially when assigning team members and determining deliverable schedules.
- *Incentives*: Virtual teams may require different types of incentives to accomplish high-quality work on time. They do not have the benefit of physical contact with their project managers or other team members, so it is important to provide frequent positive incentives, such as a thank-you via e-mail or phone, or even a bonus on occasion. Negative incentives, such as payment withholding or fines, can also be effective if virtual team members are not being productive.
- *Conflict management*: Even though they might never meet, virtual teams will still have conflicts. It is important to address conflict management, as described in more detail in Chapter 9, Project Human Resource Management.

Several studies have tried to determine factors that are correlated positively to the effectiveness of virtual teams. Research suggests that team processes, trusting relationships, leadership style, and team member selection provide the strongest correlations to team performance and team member satisfaction.[20]

Agile Project Management

The section on product life cycles earlier in this chapter mentions the agile approach, and increased interest in the topic makes it worthy of more coverage. The term *agile* has been used for several years in the software development community, and it recently has become a popular term in project management. **Agile** means being able to move quickly and easily, but some people feel that project management, *as they have seen it used*, does not allow people to work quickly or easily. Early software development projects often used a waterfall approach, as defined earlier in this chapter. As technology and businesses became more complex, the approach was often difficult to use because requirements were unknown or continuously changing. Agile today means using a method based on iterative and incremental development, in which requirements and solutions evolve through collaboration. Agile can be used for software development or in any environment in which the requirements are unknown or change quickly. In terms of the triple constraint, an agile approach sets time and cost goals but leaves scope goals flexible so the project sponsors or product owners can prioritize and reprioritize the work they want done. An agile approach makes sense for some projects, but not all of them.

Many seasoned experts in project management warn people not to fall for the hype associated with Agile. For example, J. Leroy Ward, Executive Vice President at ESI International, said that "Agile will be seen for what it is ... and isn't." According to Ward, "Project management organizations embracing Agile software and product development approaches will continue to grow while being faced with the challenge of demonstrating ROI through Agile adoption. In addition, they will need to disabuse their stakeholders and executives of the expectations set by IT consultants, the media and the vendor community that Agile is the next 'silver bullet.' Organizations that do it right—including selecting the right projects for Agile—will reap significant rewards."[21]

The Manifesto for Agile Software Development

In the business world, the term *agile* was first applied to software development projects. In February 2001, a group of 17 people that called itself the Agile Alliance developed and agreed on the Manifesto for Agile Software Development, as follows:

> We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:
>
> - Individuals and interactions over processes and tools
> - Working software over comprehensive documentation
> - Customer collaboration over contract negotiation
> - Responding to change over following a plan[22]

The person or organization that implements Agile is responsible for interpreting and applying the preceding values. Some people associate Agile with specific techniques such as Scrum.

Scrum

According to the Scrum Alliance, **Scrum** is the leading agile development method for completing projects with a complex, innovative scope of work. The term was coined in 1986 in a Harvard Business Review study that compared high-performing, cross-functional teams to the scrum formation used by rugby teams. The basic Scrum framework is summarized in the following list and illustrated in Figure 2-6:

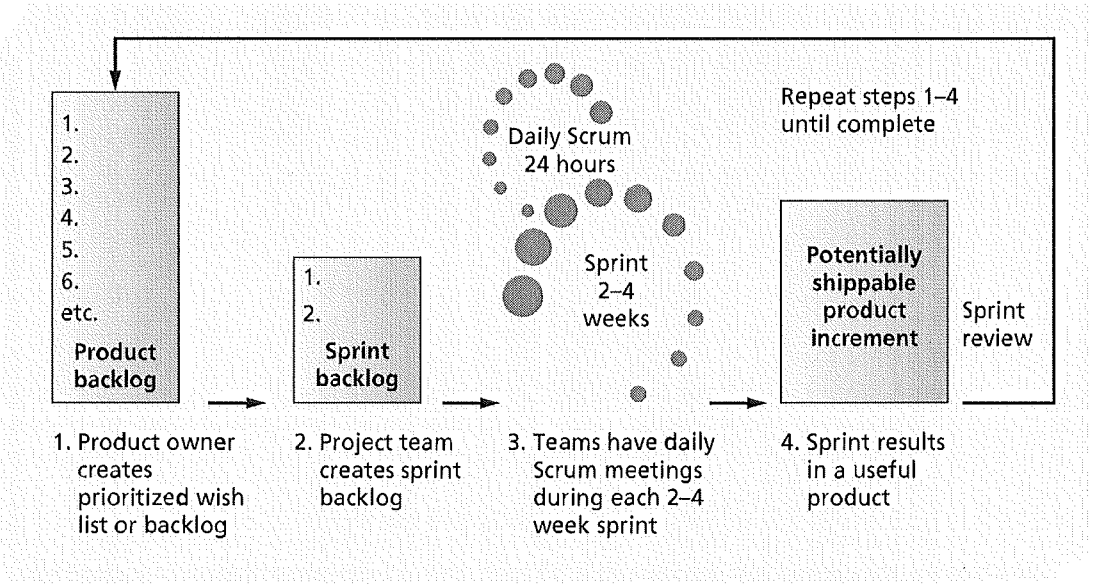

FIGURE 2-6 Scrum framework

- A *product owner* creates a prioritized wish list called a *product backlog*.
- During *sprint planning*, the team pulls a small chunk from the top of that wish list, a *sprint backlog*, and decides how to implement those pieces.

- The team has a certain amount of time, a *sprint*, to complete its work—usually two to four weeks—but meets each day to assess its progress (*daily Scrum*).
- Along the way, the *ScrumMaster* keeps the team focused on its goal.
- At the end of the sprint, the work should be *potentially shippable*, as in ready to hand to a customer, put on a store shelf, or show to a stakeholder.
- The sprint ends with a *sprint review* and *retrospective*.
- As the next sprint begins, the team chooses another chunk of the product backlog and begins working again.

The cycle repeats until enough items in the product backlog have been completed, the budget is depleted, or a deadline arrives. Which of these milestones marks the end of the work is entirely specific to the project. No matter which impetus stops work, Scrum ensures that the most valuable work has been completed when the project ends.[23]

Scrum was initially applied to software development projects, but today other types of projects use this technique to help focus on teamwork, complete the most important work first, and add business value. See *www.scrumalliance.org* and the Suggested Readings on the companion Web site for more information on Scrum and Agile.

Agile, the *PMBOK® Guide*, and a New Certification

The *PMBOK® Guide* describes best practices for *what* should be done to manage projects. Agile is a methodology that describes *how* to manage projects. One could view Agile and the Scrum framework as methods that simply break down a big project into several smaller projects, defining the scope for each one. Project teams can have brief meetings each day to decide how to get the most important work done first without calling the meetings "scrums." As stated earlier in this chapter, several different methods are related to developing information systems and other products. Because projects are unique, someone must decide what processes are needed and how they should be performed. Project teams can follow one specific process, a hybrid of several, or their own customized approach.

The Project Management Institute (PMI) recognized the increased interest in Agile, and introduced a new certification in 2011 called Agile Certified Practitioner (ACP). However, PMI was not compelled to write a new standard for agile project management. As stated on the PMI Web site, "The use of agile as an approach to managing projects has been increasing dramatically over the last several years. Gartner predicts that by the end of 2012, agile development methods will be used on 80 percent of all software development projects. PMI's research has shown that the use of agile has tripled from December 2008 to May 2011. Furthermore, research demonstrates the value that agile can have in decreasing product defects, improving team productivity, and increasing delivery of business value. The PMI-ACP is positioned to recognize and validate knowledge of this important approach."[24] Consult PMI's Web site for more information.

The increased interest in Agile is based partly on the hope that it will somehow make project management easier. Many books, courses, and consultants are capitalizing on this "new" approach. Seasoned project managers understand that they have always had the option of customizing how they run projects, but that project management is not easy,

even when using Agile. Chapter 3 includes a case study that illustrates an agile approach to project management.

As you can see, working as an IT project manager or team member is an exciting and challenging job. It's important to focus on successfully completing projects that will have a positive impact on the organization as a whole.

CASE WRAP-UP

After several people voiced concerns about the tablet idea at the faculty meeting, the president of the college directed that a committee be created to formally review the concept of requiring students to have tablets. Because the college was dealing with several important enrollment-related issues, the president named the vice president of enrollment to head the committee. Other people soon volunteered or were assigned to the committee, including Tom Walters as head of Information Technology, the director of the adult education program, the chair of the Computer Science department, and the chair of the History department. The president also insisted that the committee include at least two members of the student body. The president knew everyone was busy, and he questioned whether the tablet idea was a high-priority issue for the college. He directed the committee to present a proposal at next month's faculty meeting, either to recommend creating a formal project team to fully investigate requiring tablets, or to recommend terminating the concept. At the next faculty meeting, few people were surprised to hear the recommendation to terminate the concept. Tom Walters learned that he had to pay much more attention to the needs of the entire college before proceeding with detailed IT plans.

Chapter Summary

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

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

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

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

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

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

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

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

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

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

Quick Quiz

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

7. Which of the following terms describes a framework of the phases involved in developing information systems?
   a. systems development life cycle
   b. rapid application development
   c. predictive life cycle
   d. extreme programming
8. The nature of IT projects is different from projects in many other industries because they are very _____.
   a. expensive
   b. technical
   c. diverse
   d. challenging
9. What term describes an organization's acquisition of goods and services from an outside source in another country?
   a. globalization
   b. offshoring
   c. exporting
   d. global sourcing
10. _____ is the leading agile development method.
   a. Extreme programming
   b. Sprint
   c. Six sigma
   d. Scrum

Quick Quiz Answers

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

Discussion Questions

1. What does it mean to take a systems view of a project? How does taking this view apply to project management?
2. Explain the four frames of organizations. How can they help project managers understand the organizational context for their projects?
3. Briefly explain the differences between functional, matrix, and project organizations. Describe how each structure affects the management of the project.
4. Describe how organizational culture is related to project management. What type of culture promotes a strong project environment?
5. Discuss the importance of top management commitment and the development of standards for successful project management. Provide examples to illustrate the importance of these items based on your experience on any type of project.

6. What are the phases in a traditional project life cycle? How does a project life cycle differ from a product life cycle? Why does a project manager need to understand both?
7. What makes IT projects different from other types of projects? How should project managers adjust to these differences?
8. Define globalization, outsourcing, virtual teams, and agile project management, and describe how these trends are changing IT project management.

Exercises

1. Summarize the three-sphere model for systems management in your own words. Then use your own project experience or interview someone who recently completed an IT project, and list several business, technology, and organizational issues addressed during the project. Which issues were most important to the project, and why? Summarize your answers in a short paper or presentation.
2. Apply the four frames of organizations to a possible project that involves the development of a new technology like mobile banking, online retail, or social media. Work with two other class members in a virtual environment on this exercise. Write a short paper or presentation that summarizes your analysis and opinions of how working virtually helped or hindered your results.
3. Search the Internet for two interesting articles about software development life cycles, including agile development. Review the Web site *www.agilealliance.org*. What do these sources say about project management? Write a summary of your findings and opinions on this topic, and cite your references.

   Note: For this exercise and others, remember that you can find references cited in this text, suggested readings, and links to general project management Web sites on the companion Web site.
4. Search the Internet and scan IT industry magazines or Web sites to find an example of an IT project that had problems due to organizational issues. Write a short paper summarizing the key stakeholders for the project and how they influenced the outcome.
5. Write a short summary of an article that discusses the importance of top management support for successful IT projects. Your summary should include your opinion on this topic.
6. Research the trend of using virtual teams. Review the information on team role theory from *www.belbin.com* and other related sources. Write a summary of your findings, and cite at least three references. Also include any personal experience and your opinion on the topic. For example, what role(s) would you prefer to play on a team? Do you like working on virtual teams? If you have not yet worked on one, how do you think it would be different from working on a face-to-face team?
7. Research the agile movement as it applies to software development and other types of projects. See how many books and Web sites are available on the topic. Is there evidence to show that agile projects are more successful than others? What agile principles can be applied to all types of projects? Write a short paper that summarizes your findings, and cite at least three references. Also include any personal experience and your opinion on the topic.

Key Terms

adaptive software development (ASD) — A software development approach used when requirements cannot be clearly expressed early in the life cycle

agile — Quick and coordinated in movement; a method based on iterative and incremental development, in which requirements and solutions evolve through collaboration

agile software development — A method for software development that uses new approaches, focusing on close collaboration between programming teams and business experts

champion — A senior manager who acts as a key proponent for a project

deliverable — A product or service, such as a technical report, a training session, a piece of hardware, or a segment of software code, produced or provided as part of a project

executive steering committee — A group of senior executives from various parts of the organization who regularly review important corporate projects and issues

functional organizational structure — An organizational structure that groups people by functional areas such as IT, manufacturing, engineering, and human resources

human resources (HR) frame — A frame that focuses on producing harmony between the needs of the organization and the needs of people

IT governance — The authority and control for key IT activities in organizations, including IT infrastructure, IT use, and project management

kill point — A management review that should occur after each project phase to determine if projects should be continued, redirected, or terminated; also called a *phase exit*

matrix organizational structure — An organizational structure in which employees are assigned both to functional and project managers

offshoring — Outsourcing from another country

organizational culture — A set of shared assumptions, values, and behaviors that characterize the functioning of an organization

outsourcing — An organization's acquisition of goods and services from an outside source

phase exit — A management review that should occur after each project phase to determine if projects should be continued, redirected, or terminated; also called a *kill point*

political frame — A frame that addresses organizational and personal politics

politics — Competition between groups or individuals for power and leadership

predictive life cycle — A software development approach used when the scope of the project can be articulated clearly and the schedule and cost can be predicted accurately

project acquisition — The last two phases in a project (implementation and close-out) that focus on delivering the actual work

project feasibility — The first two phases in a project (concept and development) that focus on planning

project life cycle — A collection of project phases, such as concept, development, implementation, and close-out

project organizational structure — An organizational structure that groups people by major projects

Scrum — The leading agile development methodology for completing projects with a complex, innovative scope of work

structural frame — A frame that deals with how the organization is structured (usually depicted in an organizational chart) and focuses on different groups' roles and responsibilities to meet the goals and policies set by top management

symbolic frame — A frame that focuses on the symbols, meanings, and culture of an organization

systems — Sets of interacting components working within an environment to fulfill some purpose

systems analysis — A problem-solving approach that requires defining the scope of the system to be studied, and then dividing it into component parts for identifying and evaluating its problems, opportunities, constraints, and needs

systems approach — A holistic and analytical approach to solving complex problems that includes using a systems philosophy, systems analysis, and systems management

systems development life cycle (SDLC) — A framework for describing the phases involved in developing and maintaining information systems

systems management — Addressing the business, technological, and organizational issues associated with creating, maintaining, and modifying a system

systems philosophy — An overall model for thinking about things as systems

systems thinking — A holistic view of an organization to effectively handle complex situations

virtual team — A group of people who work together despite time and space boundaries using communication technologies

End Notes

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