INFORMATION TECHNOLOGY PROJECT MANAGEMENT

Providing Measurable Organizational Value

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PREFACE

Welcome to *Information Technology Project Management—Providing Measurable Organizational Value*. This book was written to help people understand the processes, tools, techniques, and areas of knowledge needed to successfully manage information technology (IT) projects.

The idea of project management has been around for a long, long time. In fact, it was around before the great pyramids of Egypt were created. Today, project management has emerged as its own field, supported by a body of knowledge and research across many disciplines. Although still relatively new, the fields of Management Information Systems (MIS) and Software Engineering have their own bodies of knowledge that include various tools, techniques, and methods supported by a continually growing base of research.

Unfortunately, the track record for IT projects has not been as successful as one might expect, although the situation appears to be improving. One reason for this improvement has been a greater focus on a project management approach to support the activities required to develop and deliver information systems. Just as building a system is more than sitting down in front of a computer and writing code, project management is more than just creating fancy charts or diagrams using one of the more popular project management software packages.

We can, however, build a system that is a technical success but an organizational failure. Information systems—the products of IT projects—are planned organizational change. Information technology is an enabler for new products, services, and processes that can change existing relationships between an organization and its customers or suppliers, as well as among the people within the organization.

This change can represent a threat to many groups. Therefore, people may not always be receptive to a new information system, regardless of how well it was built or how up-to-date the technology, tools, and techniques. On the other hand, people in an organization may rightfully resist an information system that does not function properly or meet their envisioned needs. Therefore, we must take an approach that does not consider the technical. side over the organizational side or vice versa. Attention to both the technical and organizational sides of IT projects must be balanced in order to deliver a successful project.

But what is a successful project? Many people and authors define project success in terms of the project being completed on time and within budget. I will not argue that completing a project by its intended deadline and within its allocated resources is not important. I will, however, argue that on time and on-budget are important, but not necessarily sufficient conditions for project success. For example, would a project that was expected to be completed within six months and cost no more than $1 million be considered unsuccessful if the project required an extra day or an extra dollar to complete?

You may think this is trivial, but at exactly what point in terms of schedule or budget does the project become unsuccessful?

We can also turn things around and ask whether finishing the project early and under-budget makes the project successful. Of course any organization would like to spend less money and have its system delivered early, but what if the system does not perform as required? More specifically, what value will the organization receive by spending six months and $1 million on this particular project? Therefore, an organization expects to receive some kind of organizational value from the implemented system when it makes an IT investment.

As you will see throughout this text, a project's measurable organizational value, or MOV, defines a project's value to the organization and becomes the project's measure of success. Moreover, a project's MOV also provides a foundation for integrating project management and IT concepts, tools, and techniques, as well as for various decisions that are made from the project's conceptualization to its closure.

APPROACH

In writing this book, I have tried to create a balance between concept and application. Many project management books tend to cover a broad set of topics with little practical application. Others tend to focus on the tools and techniques, but fall short in showing how everything ties together.

This book was written with the student in mind. Many years ago—more than I would care to admit—when I was a student, one of my instructors said that the problem with many textbooks was that they were written by professors for other professors. That statement stuck with me over the years. When I began writing this text, I wanted to be sure that it was written with the student in mind.

Learning and understanding how to apply new concepts, tools, and techniques can be challenging enough without being made more complex by obscure writing. As you will find out, learning concepts is relatively easy when compared to putting them into good practice. This book is intended for both undergraduate and graduate students. While it has no specific prerequisites, you should have at least an introductory class in information systems or programming under your belt. You should find that the concepts of IT project management will compliment courses in systems analysis and design.

Those of you who are undergraduates will not be thrust into the role of a project manager immediately after graduation. My goal is to help prepare you for the next several progressions of your career. For example, your first assignment may be to work on a project as a programmer or analyst. The knowledge that you will gain from this text will give you a good idea of how your work fits into the big picture so that you can be a more valuable project team member. More challenging and interesting assignments and opportunities for advancement will follow as you continue to gain more knowledge and experience. Eventually, this may lead to a leadership role where your knowledge and experience will be put to the optimal test.

On the other hand, you may have already acquired some experience and now find yourself in the role of a project manager. This text will provide you not only with the big picture, but also with a foundation for applying directly the tools, processes, and methods to support the management and delivery of a successful IT project.

This book follows a generic Information Technology Project Methodology (ITPM). Most students who read this book will never have been on a real IT project. I have written this book based on a flexible methodology that attempts to bridge the questions: How do I get started?, What do I do next?, How do we know when we're

finished? This methodology provides a structure for understanding how projects are initiated, conceptualized, planned, carried out, terminated, and evaluated. This methodology will take you through the different phases of the project life cycle and introduce the concepts and tools that are appropriate for each specific phase or stage of the project. In addition, you will find the methodology and central theme of this text is that IT projects should provide measurable value to organizations.

The text provides an integrated approach to IT project management. It incorporates the nine areas outlined in the Project Management Institute's Project Management Body of Knowledge (PMBOK). The concepts associated with information systems management and software engineering when integrated with PMBOK provide an important base of knowledge that builds a foundation for **IT** project management. This integration helps to distinguish IT projects from other types of projects such as construction or engineering.

The text also integrates a knowledgc management approach. The area of knowledge management is an area of growing interest and development. Knowledge management is a systematic process for acquiring, creating, synthesizing, sharing, and using information, insights, and experiences to create business value. Here, the concept of learning cycles provides a unique approach for defining and creating new knowledge in terms of lessons learned. These lessons learned can be stored in a repository and made available throughout the organization. Best practices can be developed from the lessons learned and integrated or made a part of an organization's **IT** project methodology. Over time, the generic ITPM introduced in this text can evolve and become a valuable asset to an organization as it becomes aligned with the organization's culture and business. In turn, this

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- *Chapter 4: The Human Side of Project Management* describes the formal and informal organization so that the project manager and team can conduct a stakeholder analysis to better understand the organizational landscape. Project team selection and the roles of the project manager are discussed, as is the concept of learning cycles to support a knowledge management approach to IT project management.
- *Chapter 5: Defining and Managing Project Scope* introduces and describes the project management knowledge area called project scope management. The project's scope defines what the project team will and will not deliver to the project sponsor or client. Scope management processes also ensure that the project's scope is properly defined and that controls are in place in order to manage scope throughout the project.
- *Chapter 6: The Work Breakdown Structure and Project Estimation* describes the project management tool called the work breakdown structure (WBS), which breaks up the project's scope into work packages that include specific deliverables and milestones. Several traditional project estimation approaches will be introduced, as will several software engineering techniques and metrics for software estimation.
- *Chapter 7: The Project Schedule and Budget* introduces several project management tools, including Gantt charts, activity on the node (AON), critical path analysis, program evaluation and review technique (PERT), and precedence diagramming, that can be used to develop the project schedule. A project budget can then be developed based upon the activities defined in the WBS, the project schedule, and the cost of the resources assigned or required.
- *Chapter 8: Managing Project Risk* describes the concept of risk management and introduces a framework for defining and understanding the integrative nature of risks associated with an IT project. Several qualitative and quantitative approaches and tools will be introduced for analyzing and assessing risks so that appropriate risk strategies can be formulaled.
- *Chapter 9: Pmject Communication, Tracking, and Reporting* focuses on developing a communication plan for reporting the project's progress to various project stakeholders. This chapter includes an introduction to the concept of earned value and a system of project metrics to monitor and control the project.
- *Chapter 10: IT Project Quality Management* provides a brief history of the quality movement, the people involved, and their philosophies and teachings as an underpinning to support the project quality objective. Several quality systems to support IT project quality will also be discussed. These include the International Standards Organization (ISO), TickIT, Six Sigma, and the Capability Maturity Model (CMM). Together, the concepts, teachings, philosophies, and quality system approaches provide a basis for developing the IT project quality plan.
- *Chapter 11: Managing Organizational Change, Resistance, and Conflict* describes the nature and impact of change associated with the delivery of an information system on the people within an organization. Several organizational change theories will be introduced so that a change management plan can be formulated and executed in order to ease the transition from the current system to the system that will be implemented.

Chapter 12: Project Implementation, Closure, and Evaluation describes the tactical approaches for installing and delivering the project's product—the information system. In addition, the processes for bringing closure to the project and evaluating the project team and the project's MOV are discussed.

Appendix A: An Introduction to Function Point Analysis provides a more detailed discussion on counting function points than is provided in Chapter 6.

ORGANIZATION AND SUPPORT

The beginning of each chapter includes an opening vignette or story that describes a particular situation faced by a project manager and team undertaking an IT project. This scenario will set the stage for the concepts and tools introduced in the chapter and make the learning of the material more meaningful. From a student's perspective, this will attempt to answer the "so what?" and "why do I have to know this?" questions that should be addressed.

For many chapters there is a Web-based practicum that includes a set of integrated hands-on case assignments. The case assignments allow the student to play the role of a project team member who has been hired by a newly formed consulting firm. The Web site provides all the background for the company. The cases lead the student through the various stages of planning an IT project for a client. They include several deliverables such as the project charter, project plan, scope management plan, risk plan, and implementation plan, and they require the student to apply the concepts and techniques covered in the book.

More specifically, each case assignment will include both a hands-on and a critical thinking component. For example, the hands-on component of the case assignment may ask students to develop a project plan using Microsoft Project. However, the student would then be asked to answer questions about how specific concepts discussed in the book relate to the hands-on component. The hands-on component allows students to develop a particular skill, while the critical thinking component allows them to reflect upon how their actions may affect the project in different ways.

The supporting Web site for the Web-based project management community will host a discussion or chat area that allows students, instructors, project management experts, and even the author to discuss and share ideas from around the world.

In addition, the Web site will host various student support materials. For example, it links to various IT and project management-related Web sites and articles to support the material included in the text. A trial version of Microsoft Project 2002 has also been included with the text.

An instructor's manual, test bank, and presentation slides are available. A section of the Web site has been partitioned just for instructors to support the sharing of teaching ideas and experiences.

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Dr. Marchewka has taught a number of courses at both the undergraduate and graduate levels and has been a guest lecturer at the Rotterdam School of Management, Erasmus University in the Netherlands. His current research interests include IT project management, electronic commerce, knowledge management, and organizational security and business continuity. His articles have appeared in journals such as *Information Resources Management Journal, Information Technology & People, Journal of International Information Management,* and *Journal of Informatics Education and Research.*

Jack Marchewka is also an instrument-rated commercial pilot, who enjoys his family, flying, golf, guitars, good BBQ, riding his motorcycle, and a good laugh.

CHAPTER 1

The Nature of Information Technology Projects

CHAPTER OBJECTIVES

Chapter 1 provides an overview of information technology project management (ITPM). After studying this chapter, you should understand and be able to:

- Describe the software crisis and how the often dismal track record for information technology (IT) projects provides a motivation for changing how we view and manage IT projects.
- Explain the socio-technical, project management, and knowledge management approaches that support ITPM.
- Define what an IT project is and describe its attributes.
- Define the discipline called project management.
- Describe the role and impact IT projects have on an organization.
- Identify the different roles and interests of project stakeholders.
- Describe the project life cycle, the systems development life cycle, and their relationship.
- Identify the Project Management Body of Knowledge (PMBOK) and its core knowledge areas.

GLOBAL TECHNOLOGY SOLUTIONS

Tim Williams placed the phone gently back in its cradle. He sat for a moment, not sure whether he felt excitement or sheer terror. Or, could it be he was feeling both? Kellie Matthews, his partner in Global Technology Solutions (GTS), had just told Tim that Husky Air, a business air charter company, was very interested in having them develop an information system. This was the moment Tim had been waiting for—

their first client! Before Husky Air will sign a contract, however, they need to know what GTS will deliver, how much it will cost, and when the project will be completed.

As the project's manager, Tim knows that getting this contract is important. Husky Air would be the company's first and, so far, only client. Tim also understands that a successful project could lead to other work with Husky Air. Moreover, a verbal or written recommendation would provide additional credibility to help GTS get its foot in the door with other potential clients.

While working together in the information services department at a large company, Tim and Kellie decided that a small, independent consulting firm could be successful developing smaller IT-based systems. The lure of being their own bosses and the potential for financial and personal rewards were too great to resist. Tim and Kellie cashed in their stock options, and GTS was born. They decided that Kellie would develop new business and manage the day-to-day operations of GTS, while Tim would deliver and manage the projects. New employees with specific skill sets would be hired as needed to support particular projects.

Although both Tim and Kellie had worked in IT for several years, neither of them had ever managed a consulting project before. Aside from the questions posed by Husky Air (What will you deliver? How much will it cost? How long will it take?), Tim felt a bit overwhelmed because he knew the success or failure of this project would have an immediate impact on the viability of the new firm.

Things to Think About:

1. If you were in Tim's shoes, what feelings do you think you would experience?
2. What questions would you have?
3. What might help reduce your anxiety and uncertainty as an inexperienced project manager?
4. Where do you begin a new project?

INTRODUCTION

The new millennium provides a vantage point from which to look back at our past and ahead to our future. Many people at the end of the century emptied their bank accounts, stockpiled food and water, and even went so far as to head for the hills for fear that computers would crash and civilization would fall into mass confusion. Fortunately, the reported Y2K computer-related problems were few and not especially critical. Was the problem hyped? Not really. Was there really a problem? Yes! Many companies spent millions of dollars to change and test the dates in their computer systems so the passing of January 1,2000 would have no effect. Just ask one of the many IT professionals who worked hard and long on a Y2K project. You may even know, or be, one of those people.

What made the Y2K problem fascinating was that just about everyone was in this together and the project had an immovable deadline. As a result, the field of information technology received a great deal of attention in the media and the boardroom. Even though it was shortsightedness that created the problem, the few reported Y2K problems prompted some to believe this was the IT profession's shining hour. Moreover, the risks and costs associated with the Y2K problem captured the attention of senior management. As a result, people at different levels, including senior management, and in

different functional areas became more involved with and interested in information technology. The good news is that the world of IT moved from the back office to the boardroom. The bad news is that IT may be doomed to repeat past mistakes.

After Y2K, it appeared that companies now had the time and money to start on their IT projects that had been on hold. Electronic commerce and the integration of enterprise resource planning (ERP) packages were at the top of the IT project list for many organizations. The demand for skilled IT professionals and project managers to head up these new initiatives had never been stronger. It seemed as though recruiters couldn't hire experienced professionals and university graduates fast enough to meet the demand.

Unfortunately, this golden time for IT did not last. The tragic events of September 2001 had a profound impact on the world and the global economy. As a result, many organizations were forced to make some difficult choices in order to survive. Seasoned professionals and new graduates who once commanded high salaries and choice assignments found themselves facing a tough job market. The bubble had burst. If nothing else, we learned that things can change quickly and without warning.

As you read this, think about what is going on in the field of IT right now. Is the demand for IT professionals and IT projects strong? Or, are there fewer jobs and projects available? If the demand for IT projects and professionals to work on these projects is strong, many organizations will probably have to choose from among projects that have been sitting on the backburner for some time. On the other hand, if time, money, and resources for many organizations are limited, then only a few, select IT projects can be funded.

In both good times and bad, senior management will make a certain level of funding available for IT projects. The budgeted amount will depend upon such things as the economy, competitor's actions within the industry, and the organization's strategic plan. Regardless whether an organization's budget for IT projects shrinks or grows, the resources available for any given period will be relatively fixed. Quite often the total funding requirements for the proposed projects will be greater than the available budget. As a result, any project that receives funding will do so at the expense of another project. The competition for funding IT projects proposed by the various business units within an organization will be especially keen when the budget is tight. Projects that do not receive any funding will either have to wait or fall by the wayside. Therefore, the decision to fund specific projects will always be an important management decision because it will have a major impact on the organization's performance.

The decision to fund or invest in an IT project should be based on the value that the completed project will provide the organization. Otherwise, what is the point of spending all that time, effort, and money? Although senior management must make the difficult decision as to which IT projects receive funding and which ones do not, others must plan and carry out the project work. Which situation is worse: Successfully building and implementing an information system that provides little or no value to the organization, or implementing an information system that ***could*** have provided value to the organization, but was developed or managed poorly? It is probably moot. In either situation everyone with a direct or indirect interest in the project's outcome loses.

How This Book Is **Organized**

The goal of this book is to help you to plan and manage information technology projects. We will focus on a number of different theories, but the main focus will be on

applying the methods, tools, techniques, and processes for planning and managing an IT project from start to finish. If you are a project manager (or will be one soon), this book will help you to understand and apply project management principles in order to better manage your IT project. If you are just starting out in the field, this book will help you to understand the big picture of what an IT project is all about. This knowledge will help you to become a better team member and prepare you for the next several progressions in your career.

Many of the principles of project management can be applied to just about any project, but IT projects are unique in several ways. Throughout the text, we will discuss what makes IT projects different from other types of projects and how the principles and methods of system development can be integrated to define the IT project management discipline. Although many of the concepts for developing an information system will be integrated throughout, this is not a systems analysis and design text. More specifically, we will not delve too deeply into the systems analysis and design techniques that are used during systems development. We will leave that for other books and classes.

The remainder of this chapter provides a foundation for project initiation by providing an understanding of the nature of information technology projects. Before getting too involved with definitions and concepts, however, it is important to understand the motivation behind IT project management. In the next section we will focus on the software crisis, which for many people has become a call to arms for more effective management of IT projects. Then, we will introduce and define projects and project management. Subsequently, we will look at the relationship between the project life cycle and the systems development life cycle. At the end of the chapter, you will be introduced to the nine areas that make up the Project Management Body of Knowledge (PMBOK) that will be integrated throughout the remaining chapters of this text.

THE SOFTWARE CRISIS

Although IT is becoming more reliable, faster, and less expensive, the costs, complexities, and risks of IT projects continue to increase. In 1995, a consulting firm called The Standish Group conducted a survey of 365 IT managers. The widely cited report, appropriately called ***CHAOS,*** was startling.

For example, although the United States spent over $250 billion each year on IT application development projects, 31 percent of these projects were canceled before complelion. Almost 53 percent were completed, hut they were over-budget and over-schedule and did not meet the original specifications. The average cost overrun for a medium-size company surveyed was 182 percent of the original estimate, while the average schedule overrun was 202 percent. That is, the results of the survey, summarized in Table 1.1, suggest that a medium-sized project originally estimated to cost about $1 million and to take a year to develop, actually cost $1,820,000, took just over two years to complete, and only included 65 percent of the envisioned features and functions! Sadly, 48 percent of the IT managers surveyed believed there were more failures at the time than five and ten years earlier.

Why IT Projects Fail

The ***CHAOS*** report also provides some interesting insight as to why some projects succeed while others fail. According to the survey, user involvement, executive

Table 1.1 Summary of the CHAOS Study Results

Company Size	Average Cost of Development	Average Cost Overruns	Average Schedule Overrun	Original Features and Functions Included	Successful Projects [a]	Challenged Projects [b]	Impaired Projects [c]
Large	$2,322,000	178%	230%	42%	9%	61.5%	29.5%
Medium	$1,331,000	182%	202%	65%	16.2%	46.7%	37.18
Small	$ 434,000	214%	239%	74%	28%	50.4%	21.6%

[a] Completed on-time and on-budget

[b] Completed, but over-budget, over schedule, and includes fewer features and functions than originally envisioned

[c] Cancelled before completion

SOURCE: Adapted from The Standish Group, *CHAOS* (West Yarmouth, MA: 1995), http://www.standishgroup.com/visitor/chaos.htm.

management support, and a clear statement of requirements ranked at the top of the list of factors essential for IT project success. On the other hand, lack of user involvement and incomplete requirements appear to be the two main factors for projects being challenged or canceled before completion.

Tables 1.1 and 1.2 summarize some of the key findings of the CHAOS report. First, larger projects report a success rate of only 9 percent and appear to be much more risky than medium and smaller projects. Technology, business models, and cycle times are changing too quickly to develop systems that take much more than a year to complete. This data also supports the need to break up large projects into smaller, more manageable ones that can be completed in less than a year. Companies such as Sears, Roebuck and Co., for example, have new, stricter IT project deadlines that require all web-based projects be completed within three months (Hoffman and King 2000).

In addition, one can look at the project factors for successful and not-so-successful projects to see what may be happening on those projects. User involvement leads the list as the most important factor in project success. This should come as no surprise since the client's expertise is needed to identify problems and opportunities and to define requirements. Moreover, active participation by the client keeps them interested in and excited about the project. Individuals will also begin to take ownership of a project if they feel that they have a stake in the project's success or failure. Effective communication between the techies and non-techies allows for a clearer definition of the project's goals and requirements. Working together, developers and users have more realistic expectations because they themselves set those expectations together. Management is then more compelled to support a popular project.

On the other hand, lack of user input or involvement ranks at or near the lop in factors affecting challenged and impaired projects. One can almost picture the chain of events. Without close support of the key users, the project team will have a difficult time understanding the goals of the project and defining the requirements. As a result, suspicion and hostility may arise, and there can easily be an "us versus them" situation. Without effective communication and a clear direction, changes to the project's requirements always seem to appear, and both groups may set unrealistic expectations. Chaos sets in. Management begins to find fewer reasons to support an

Table **1.2** Summary of Factor Rankings for Successful, Challenged, and Impaired Projects

Rank	*Factors for Successful Projects*	*Factors for Challenged Projects*	*Factors for Impaired Projects*
1	User involvement	Lack of user input	Incomplete requirements
2	Executive management support	Incomplete requirements	Lack of user involvement
3	Clear statement of requirements	Changing requirements & specifications	Lack of resources
4	Proper planning	Lack of executive support	Unrealistic expectations
5	Realistic expectations	Technology incompetence	Lack of executive support
6	Smaller project milestones	Lack of resources	Changing requirements specifications
7	Competent staff	Unrealistic expectations	Lack of planning
8	Ownership	Unclear objectives	Didn't need it any longer
9	Clear vision & objectives	Unrealistic time frames	Lack of IT management
10	Hard-working, focused team	New technology	Technology illiteracy

SOURCE: Adapted from The Standish Group, CHAOS (West Yarmouth, MA: 1995), http://\nvw.standishgroup.com/visitor/chaos.htm.

unpopular project and more and more resources are diverted away from it. The project is barely successful, or a failure.

Improving the Likelihood of Success

How can we improve the chances for IT project success and avoid repeating past mistakes? Here are three approaches that will be focal points throughout this book.

A Socio-Technical Approach In the past, organizations have attempted to improve the chances of IT project success by focusing on the tools, techniques, and methodologies of IT development. A purely technical approach, however, focuses attention on the technology. We can easily end up developing an application that no one asked for or needs. Applications to support electronic commerce, supply chain management, and integration require that at least equal attention be paid to the organizational side. The days of being good order takers are over. We can no longer be content with defining a set of user requirements, disappearing for several months, and then knocking on the user's door when it is time to deliver the new system. IT professionals must understand the business and be actively creative in applying the technology in ways that bring value to the organization. Similarly, the clients must become stakeholders in the project. This means actively seeking and encouraging their participation, involvement, and vision. The successful application of technology and the achievement of the project's goal must be an equal responsibility of the developers and users.

TAXPAYERS PAY $50 BILLION A YEAR FOR IRS MISTAKES

A *Computerworld* investigation reports that delays in overhauling the federal tax system have cost the U.S. government approximately $50 billion a year in uncollected taxes. Although the Internal Revenue Service (IRS) had spent hundreds of millions of dollars in an attempt to modernize its computer systems, critics claim that much of that money has been wasted because of mismanagement and primitive development practices. Government and private groups believe that there are several reasons for the problems:

- Failure to redesign the business processes before beginning systems development
- No overall systems architecture or development plan
- Primitive and sometimes "chaotic" software development methodologies
- Failure to manage information systems as investments
- Lack of information security

Both Congress and the General Accounting Office have directed the IRS to carry out the following recommendations:

- Put in place a rigorous process for selecting, prioritizing, controlling, and evaluating major information systems investments
- Improve system development practices from ad hoc to ones that can be repeated and improve the likelihood of success
- Develop organization-wide plans that focus on an integrated systems architecture, security, data architecture, and configuration management

SOURCE: Adapted from Gary H. Anthes, "IRS Project Failures Cost Taxpayers $50B Annually," *Computerworld,* October 14, 1996, http://www.computerworld.com/news/1996/story/0,11280,10332,00.html.

A Project-Management Approach One suggestion of the CHAOS study was the need for better project management. But, isn't building an information system a project? Haven't organizations used project management in the past? And aren't they using project management now? While many organizations have applied the principles and tools of project management to IT projects, many more—even today—build systems on an ad hoc basis. Success or failure of an IT project depends largely on who is, or is not, part of the project team. Applying project management principles and tools across the entire organization, however, should be part of a methodology—the step-by-step activities, processes, tools, quality standards, controls, and deliverables that are defined for the entire project. As a result, project success does not depend primarily on the team, but more on the set of processes and infrastructure in place. A common set of toots and controls also provides a common language across projects and the ability to compare projects throughout the organization.

In addition, other reasons for project management to support IT projects include:

Resources—When developing or purchasing an information system, all IT projects are capital projects that require cash and other organizational resources. Projects must be estimated accurately, and cost and schedules must be controlled effectively. Without the proper tools, techniques, methods, and controls in place, the project will drain or divert resources away from other projects and areas of the organization. Eventually, these uncontrolled costs could impact the financial stability of the organization.

Expectations—Today, organizational clients expect IT professionals to deliver quality products and services in a professional manner. Timely status updates and communication, as well as sound project management practices, are required.

Competition—Internal and external competition has never been greater. An internal IT department's services can easily be outsourced if the quality or

COUNTER THINKING?

Many people find it easier to avoid failure than accept it. Yet, failure can be helpful and, at times, even desirable. Failure can be a valuable experience because one can learn more from failure than from success since the benefits of taking risks often outweigh the consequences of failure. In addition, Harold Kerzner makes three points about failure:

1. A company is not taking enough business risks if its projects are 100 percent successful.
2. Terminating a project early can be viewed as successful if the resources originally dedicated to the project can be reassigned to more profitable activities or the technology needed for the project does not exist or cannot be invented cost-effectively within a reasonable time period.
3. Excellence in project management requires a continuous stream of successfully managed projects. But you can still have project failures.

SOURCE: **Adapted** from **Alan S.** Horowitz, "The **Sweet Smell** of Failure," *Computerworld,* http://www.compulerworld.com/home/online9676.nsf/all/980209; **Harold** Kerzner, ***In Search of Excellence in Project Management: Successful Practices in High Performance Organizations*** **(New** York: John Wiley, 1998).

cost of providing IT services can be bettered outside the organization. Today, competition among consultants is increasing as they compete for business and talent.

Efficiency and *Effectiveness*—Peter Drucker, the well-known management guru, defined **efficiency** as doing the thing right and **effectiveness** as doing the right thing. Many companies report that project management allows for shorter development time, lower costs, and higher quality. Just using project management tools, however, does not guarantee success. Project management must become accepted and supported by all levels within the organization, and continued commitment in terms of training, compensation, career paths, and organizational infrastructure must be in place. This support will allow the organization to do the right things and do them right.

A Knowledge-Management Approach *A* socio-technical approach and a commitment to project management principles and practices are important for success. However, excellence in IT project management for an individual or an organization takes time and experience. **Knowledge management** is a relatively new area. It is a systematic process for acquiring, creating, synthesizing, sharing, and using information, insights, and experiences to transform ideas into business value. Although many organizations today have knowledge management initiatives under way, and spending on knowledge management systems is expected to increase, many others believe that knowledge management is just a fad or a buzzword.

What about learning from experience? Experience can be a great teacher. These experiences and the knowledge gained from these experiences, however, are often fragmented throughout the organization. Chances are that if you encounter what appears to be a unique problem or situation, someone else in your organization has already dealt with that problem, or one very similar. Wouldn't it be great to just ask that person what they did? What the outcome was? And, would they do it again the same way? Unfortunately, that person could be on the other side of the world or down the hall—and you may not even know!

Knowledge and experience, in the form of lessons learned, can be documented and made available through the technologies accessible today, technologies such as the World Wide Web or local versions of the web called intranets. **Lessons learned**

that document both reasons for success and failure can be valuable assets if maintained and used properly. A person who gains experience is said to be more mature. Similarly, an organization that learns from its experiences can be more mature in its processes by taking those lessons learned and creating best practices — simply, doing things in the most efficient and effective manner. In terms of managing IT projects, managing knowledge in the form of lessons learned can help an organization develop best practices that allow all of the project teams within the organization to do the right things and then to do them right. As summarized in the ***CHAOS*** report:

> There is one aspect to be considered in any degree of project failure. All success is rooted in either luck or failure. If you begin with luck, you learn nothing but arrogance. However, if you begin with failure and learn to evaluate it, you also learn to succeed. Failure begets knowledge. Out of knowledge you gain wisdom, and it is with wisdom that you can become truly successful (Standish Group 1995, 4).

THE CONTEXT OF PROJECT MANAGEMENT

What Is a **Project?**

Although the need for effectively managing projects has been introduced, we still require a working definition of a project and project management. The Project Management Institute (PMI), an organization that was founded in 1969, has grown to become the leading non-profit professional association in the area of project management. In addition, PMI establishes many project management standards and provides seminars, educational programs, and professional certification. It also maintains the ***Guide to the Project Management Body of Knowledge (PMBOK Guide).*** The ***PMBOK Guide*** (Project Management Institute 2000) provides widely used definitions for project and project management.

> ***A project*** is a temporary endeavor undertaken to accomplish a unique purpose (4).
>
> ***Project management*** is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project *(6)*.

Attributes of a Project Projects can also be viewed in terms of their attributes: time frame, purpose, ownership, resources, roles, risks and assumptions, interdependent tasks, organizational change, and operating in an environment larger than the project itself.

Time Frame Because a project is a temporary endeavor, it must have a definite beginning and end. Many projects begin on a specific date and the date of completion is estimated. Some projects, on the other hand, have an immovable date when the project must be completed. In this case, it is necessary to work backwards to determine the date when the project must start. Keep in mind that your career should not consist of a single project, but a number of projects.

Purpose Projects are undertaken to accomplish something. An IT project can produce any number of results — a system, a software package, or a recommendation

based on a study. Therefore, a project's goal must be to produce something tangible and of value to the organization. A project must have a goal to drive the project in terms of defining the work to be done, its schedule, and its budget, and to provide the project team with a clear direction.

Because it sets expectations that will directly influence the client's level of satisfaction, the project's goal must be clearly defined and agreed upon. The definition for project management suggests that project activities ***must meet or exceed stakeholder needs and expectations.*** Expectations and needs, however, cannot be met if the project's goal is not achieved. It is, therefore, important to keep in mind that a project should only be undertaken to provide some kind of value to the organization. Moreover, a specific and measurable project goal can be evaluated after the project is completed.

Ownership The project must provide something of value to an individual or group who will own the project's product after it is completed. Determining who owns this product is not always easy. For example, different groups may fight over who does or does not own the system, the data, the support, and the final cost of implementing and maintaining the system. Although a project may have many stakeholders (i.e., people or groups who have a vested interest in the project's outcome), a project should have a clearly defined sponsor. The sponsor may be the end user, customer, or the client who has the ability and desire to provide direction, funding, and other resources to the project.

Resources IT projects require time, money, people, and technology. Resources provide the means for achieving a project's goal and also act as a constraint. For example, the project's scope, or work to be accomplished, is determined directly by the project's goal—that is, if we know what we have to accomplish, we can then figure out how to accomplish it. If the project sponsor asks that an additional feature be added to the system, however, this request will undoubtedly require additional resources in terms of more work on the part of the project team. The use of a project resource has an associated cost that must be included in the overall cost of the project.

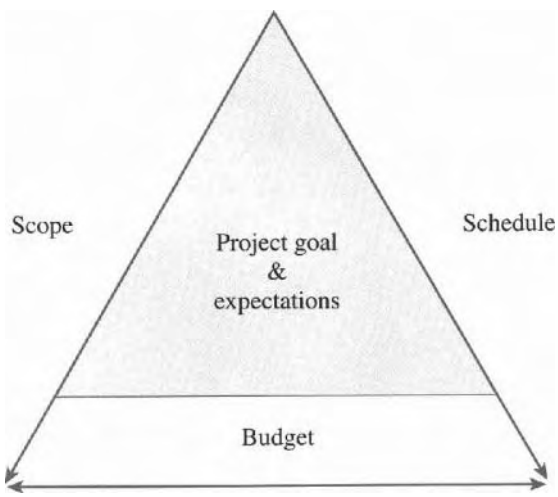

Figure 1.1 The Scope, Schedule, and Budget Relationship—the Triple Constraint

In the past, computer technology was relatively more expensive than the labor needed to develop a system. Today, the labor to build a system is relatively more expensive than the technology. As IT salaries increase, the cost of IT projects will become even more expensive. Therefore, if team members must do additional work, their time and the costs associated with time spent doing unscheduled work must be added to the project's schedule and budget. In other words, if scope increases, the schedule and budget of a project must increase accordingly. If the project's schedule and resources are fixed, then the only way to decrease the cost or schedule of the project may be to reduce the project's scope. Scope, schedule, and budget must remain in a sort of equilibrium to support a particular project goal. This relationship, sometimes referred to as the triple constraint, is illustrated in Figure 1.1. It should be a consideration whenever making a decision that affects the project's goal, scope, schedule, or budget.

Roles Today, ***IT*** projects require different individuals with different skill sets. Although these skills may be different on different projects, a typical project may include the following:

Project Manager—The project manager is the team leader and is responsible for ensuring that all of the project management and technical development processes are in place and are being carried out within a set of specific requirements, defined processes, and quality standards.

Project Sponsor—The project sponsor may be the client, customer, or organizational manager who will act as a champion for the project and provide organizational resources and direction when needed.

Subject Matter *Expert(s) (SME)*—The subject matter expert may be a user or client who has specific knowledge, expertise, or insight in a specific functional area needed to support the project. For example, if the organization wishes to develop a system to support tax decisions, having a tax expert on the project team who can share his/her knowledge will be more productive than having the technical people try to learn everything about tax accounting while developing the system.

Technical *Expert(s) (TE)*—Technical expertise is needed to provide a technical solution to an organizational problem. Technical experts can include systems analysts, network specialists, programmers, graphic artists, trainers, and so forth. Regardless of their job title, these individuals are responsible for defining, creating, and implementing the technical and organizational infrastructure to support the product of the IT project.

Risks and Assumptions All projects have an element of risk, and some projects entail more risk than others. Risk can arise from many sources, both internal and external to the project team. For example, **internal risks** may arise from the estimation process or from the fact that a key member of the project team could leave in the middle of the project. **External risks,** on the other hand, could arise from dependencies on other contractors or vendors. **Assumptions** are what we use to estimate scope, schedule, and budget and to assess the risks of the project. There are many unknown variables associated with projects, and it is important to identify and make explicit all of the risks and assumptions that can impact the IT project.

Interdependent Tasks Project work requires many interdependent tasks. For example, a network cannot be installed until the hardware is delivered, or certain requirements cannot be incorporated into the design until a key user is interviewed. Sometimes the delay of one task can affect other subsequent, dependent tasks. The project's schedule may slip, and the project may not meet its planned deadline.

Organizational Change Projects are planned organizational change. Change must be understood and managed because implementation of the IT project will change the way people work. The potential for resistance, therefore, exists, and a system that is a technical success could end up being an organizational failure.

Operating in an Environment Larger than the Project Itself Organizations choose projects for a number of reasons, and the projects chosen can impact the organization (Laudon and Laudon 1996). It is important that the project manager and team understand the company's culture, environment, politics, and the like.

These organizational variables will influence the selection of projects, the IT infrastructure, and the role of IT within the organization. For example, a small, family-owned manufacturing company may have a completely different corporate culture, strategy, and structure than a start-up electronic commerce company. As a result, the projects selected, the technical infrastructure, and the role of IT for each organization will be different. The project team must understand both the technical and organizational variables so that the project can be aligned properly with the structure and strategy of the organization. Moreover, understanding the organizational variables can help the project team understand the political climate within the organization and identify potential risks and issues that could impede the project.

THE PROJECT LIFE CYCLE AND IT DEVELOPMENT

The **project life cycle** (PLC) is a collection of logical stages or phases that maps the life of a project from its beginning to its end in order to define, build, and deliver the product of a project—that is, the information system. Each phase should provide one or more deliverables. A **deliverable** is a tangible and verifiable product of work (i.e., project plan, design specifications, delivered system, etc.). Deliverables at the end of each phase also provide tangible benefits throughout the project and serve to define the work and resources needed for each phase.

Projects should be broken up into phases to make the project more manageable and to reduce risk. **Phase exits, stage gates,** or **kill points** are the phase-end review of key deliverables that allow the organization to evaluate the project's performance and to take immediate action to correct any errors or problems. Although the deliverables at the end of a stage or phase usually are approved before proceeding to the next stage, **fast tracking** or starting the next phase before approval is obtained can sometimes reduce the project's schedule. Overlapping of phases can be risky and should only be done when the risk is deemed acceptable.

Like all living things, projects have life cycles where they are born, grow, peak, decline, and then terminate (Gido and Clements 1999; Meredith and Mantel 2000). Although project life cycles may differ depending upon the industry or project, all project life cycles will have a beginning, a middle, and an end (Rosenau 1998; Gido and Clements 1999). Figure 1.2 provides a generic life cycle that describes the common phases or stages shared by most projects.

Define Project Goal

Defining the project's overall goal should be the first step of the project. This goal should focus on providing business value to the organization. A well-defined goal gives the project team a clear focus and drives the other phases of the project. In addition, most projects seem to share the following characteristics:

The effort, in terms of cost and staffing levels, is low at the start of the project, but then increases as the project work is being done, and then decreases at the end as the project is completed.

Risk and uncertainty are the highest at the start of a project. Once the goal of the project is defined and the project progresses, the probability of success should increase.

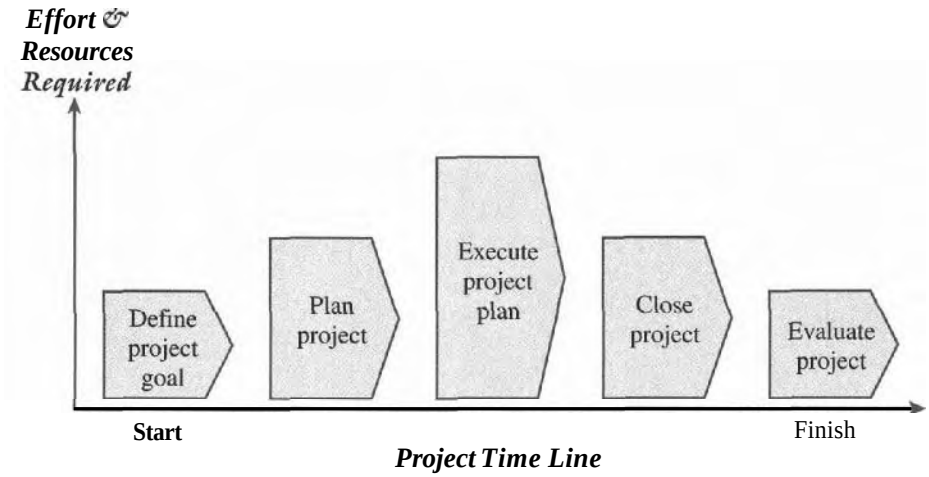

Figure **1.2** A Generic Project Life Cycle

- The ability for stakeholders to influence the scope and cost of the project is highest at the beginning of the project. The cost of changing the scope and correcting errors becomes more expensive as the project progresses.

Plan **Project**

Once the project's goal has been defined, developing the project plan is a much easier task. A project plan essentially answers the following questions:

- What are we going to do?
- Why are we going to do it?
- How are we going to do it?
- Who is going to be involved?
- How long will it take?
- How much will it cost?
- What can go wrong and what can we do about it?
- How did we estimate the schedule and budget?
- Why did we make certain decisions?
- How will we know if we are successful?

In addition, the deliverables, tasks, resources, and time to complete each task must be defined for each phase of the project. This initial plan, called a **baseline plan,** defines the agreed upon scope, schedule, and budget and is used as a tool to gauge the project's performance throughout the life cycle.

Execute Project Plan

After the project's goal and plan have been defined, it's time to put the plan into action. As work on the project progresses, scope, schedule, budget, and people must be actively managed to ensure that the project achieves its goal. The project's progress must be documented and compared to the project's baseline plan. In addition, project performance must be communicated to all of the project's stakeholders. At the end of this phase, the project team implements or delivers a completed product to the organization.

Close Project

As was mentioned, a project should have a definite beginning and end. The closing phase of a project ensures that all of the work is completed as planned and as agreed to by the project team and the sponsor. Therefore, there should be some kind of formal acknowledgement by the sponsor that they will accept (and pay for!) the product delivered. This closure is often capped with a final project report and presentation to the client that documents that all promised deliverables have been completed as specified.

Evaluate Project

Sometimes the value of an IT project is not readily known when the system is implemented. For example, the goal of a project to develop an electronic commerce site should be to make money—not to build or install hardware, software, and web pages on a particular server platform. The technology and its subsequent implementation are only a means to an end. Therefore, the goal of the electronic commerce site may be to produce $250,000 within six months. As a result, evaluating whether the project met its goal can be made only after the system has been implemented.

However, the project can be evaluated in other ways as well. The project team should document its experiences in terms of lessons learned—those things that it would do the same and those things it would do differently on the next project, based on its current project experiences, This post mortem should be documented, stored electronically, and shared throughout the organization. Subsequently, many of these experiences can be translated into best practices and integrated into future projects.

In addition, both the project team and the project itself should be evaluated at the end of the project. The project manager may evaluate each project team member's performance in order to provide feedback and as part of the organization's established merit and pay raise processes and procedures. Often, however, an outside third party, such as a senior manager or partner, may audit the project to determine whether the project was well-managed, provided the promised deliverables, followed established processes, and met specific quality standards. The project team and project manager may also be evaluated in terms of whether they acted in a professional and ethical manner.

The IT Product Life Cycle

Although projects follow a project life cycle, information systems development follows a product life cycle. The most common product life cycle in IT is the **Systems Development Life Cycle** (SDLC), which represents the sequential phases or stages an information system follows throughout its useful life. The SDLC establishes a logical order or sequence in which the system development activities occur and indicates whether to proceed from one system development activity to the next (McConnell 1996). Although there is no generally accepted version of the SDLC, the life cycle depicted in Figure 1.3 includes the generally accepted activities and phases associated with systems development. Keep in mind that these concepts are generally covered in great detail in system analysis and design books and courses. For some, this may be a quick review, while for others it will provide a general background for understanding how IT project management and information system development activities support one another.

Planning, analysis, design, implementation, and maintenance and support are the five basic phases in the systems development life cycle.

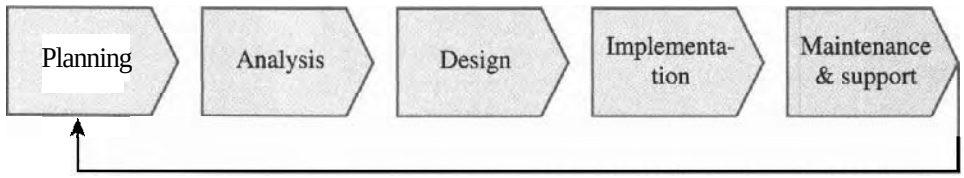

Figure **1.3** Systems Development Life Cycle

Planning The planning stage involves identifying and responding to a problem or opportunity and incorporates the project management and system development processes and activities. Here a formal planning process ensures that the goal, scope, budget, schedule, technology, and system development processes, methods, and tools are in place.

Analysis The analysis phase attempts to delve into the problem or opportunity more fully. For example, the project team may document the current system to develop an "as is" model to understand the system currently in place. In general, systems analysts will meet with various stakeholders (users, managers, customers, etc.) to learn more about the problem or opportunity. This work is done to identify and document any problems or bottlenecks associated with the current system. Generally, the "as is" analysis is followed by a requirements analysis. Here the specific needs and requirements for the new system are identified and documented. Requirements can be developed through a number of means--interviewing, joint applications development (JAD), conducting surveys, observing work processes, and reading company reports. Using process-oriented, data-oriented, and/or object-oriented modeling techniques, the current system, user requirements, and logical design of the future system called the "to be" system are represented and documented (Dennis and Haley 2000).

Design During the design phase, the project team uses the requirements and "to be" logical models as input for designing the architecture to support the new information system. This architecture includes designing the network, hardware configuration, databases, user interface, and application programs.

Implementation Implementation includes the development or construction of the system, testing, and installation. In addition, training, support, and documentation must be in place.

Maintenance and Support Although maintenance and support may not be a true phase of the current project, it is still an important consideration. Once the system has been implemented, it is said to be in production. Changes to the system, in the form of maintenance and enhancements, are often requested to fix any discovered errors (i.e., bugs) within the system, to add any features that were not incorporated into the original design, or to adjust to a changing business environment. Support, in terms of a call center or help desk, may also be in place to help users on an as-needed basis.

Eventually, the system becomes part of the organizational infrastructure and becomes known as a legacy system. At this point, the system becomes very similar to a car. Let's say you buy a brand new car. Over time, the car becomes less and less new, and parts have to be replaced as they wear out. Although, a system does not wear out like a car, changes to the system are required as the organization changes. For

example, a payroll system may have to be changed to reflect changes in the tax laws, or an electronic commerce site may have to be changed to reflect a new line of products that the company wishes to introduce. As the owner of an older or classic car, you may find yourself replacing part after part until you make the decision to trade in the old junker for something newer and more reliable. Similarly, an organization may find itself spending more and more on maintaining a legacy system. Eventually, the organization will decide that it is time to replace this older system with a newer one that will be more reliable, require less maintenance, and better meets its needs. Subsequently, a new life cycle begins.

Putting the SDLC into Practice

There are basically two ways to implement the SDLC. Today, an IT project will follow either a structured approach or a newer approach called Rapid Applications Development (RAD).

Structured Approach to Systems Development *A* structured approach to systems development has been around since the 1960s and 1970s when large mainframe applications were developed. These applications were built when (1) systems were relatively simple and independent from each other, (2) computer hardware was relatively more expensive than the labor, and (3) development and programming tools were primitive compared to today (Satzinger, Jackson, Burd 2002).

The **Waterfall method** in Figure 1.4 follows the SDLC in a very sequential and structured way. Planning overhead is minimized because it is all done up-front and a tangible system is not produced until the end of the life cycle (McConnell 1996). The idea of a waterfall is a metaphor for a cascading of activities from one phase to the next. This approach stresses a sequential and logical flow of development activities. For example, the design activities begin only after the analysis and requirement activities are complete. Subsequently, the actual development, or programming activities, will not start until the design phase is complete. Although one can go back to a previous stage, it is not always easy or desirable.

This approach is suitable when developing structured systems and assumes, or at least hopes, that the requirements defined in the analysis stage do not change very much over the remainder of the project. In addition, because it will provide a solid structure that can minimize wasted effort, this method may work well when the project team is inexperienced or less technically competent (McConnell 1996).

Rapid Applications Development (RAD) On the other hand, one can take a less-structured approach to developing systems. Today, taking less time to conceive,

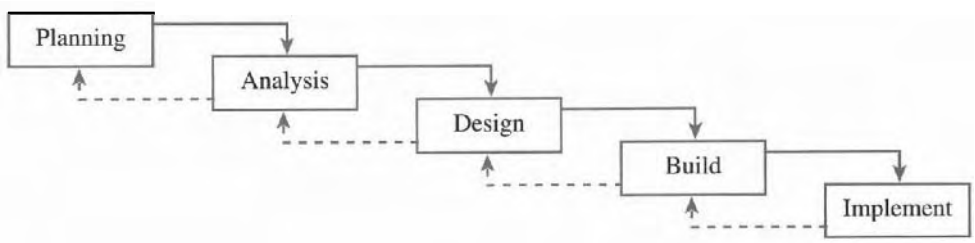

Figure 1.4 Waterfall Model

develop, and implement an information system can provide the organization with a competitive advantage. In addition, as evidenced by the CHAOS study, larger projects that take longer to develop are riskier than smaller and shorter projects. Satzinger, Jackson, and Burd (2002,533) define RAD as "a collection of development approaches, techniques, tools, and technologies, each of which has been proven to shorten development schedules under some conditions." This means that different development approaches, tools, techniques, and so forth can be mixed and matched depending on the project. For some projects, it means that the Waterfall approach is the most appropriate; however, RAD often follows one of the following iterative approaches:

Prototyping — Prototyping is an iterative approach to systems development where the developer and user work together very closely to develop a partially or fully functional system as soon as possible, usually within a few days or weeks. The prototype application will go through a number of iterations as functional requirements are defined or changed. This approach is most useful when the requirements of the new system are difficult to define or when working with a new technology where the capabilities of that technology are unknown or not understood very well. A prototype may be either a throwaway system or a fully usable system. A throwaway prototype may be used to discover or refine system requirement specifications that can be used as a model for developing the real system. On the other hand, the prototype may become the actual system after it has gone through a number of refinements over time.

Spiral Development — Another way to expedite the SDLC is the spiral approach first proposed by Barry Boehm (1988). The spiral model provides a risk-oriented approach where a software project is broken up into a number of miniprojects where each addresses one or more major risks until all major risks have been addressed (McConnell 1996). A risk can be defined as a poorly understood requirement or architecture or as a potential problem with the technology or system performance. The basic idea is to begin development of the system on a small scale where risks can be identified. Once identified, the development team then develops a plan for addressing these risks and evaluates various alternatives. Next, deliverables for the iteration are identified, developed, and verified before planning and committing to the next iteration. Subsequently, completing each iteration brings the project closer to a fully functional system. Reviews after each iteration provide a means of controlling the overall risk of the project. Major problems or challenges will surface early in the project and, therefore, provide the potential to reduce the total cost of the project. The disadvantages to the spiral development approach center on its complexity (Satzinger, Jackson, Burd 2002). These types of projects are more complex to manage because many people may be working on a number of different parallel activities.

Extreme Programming *(XP)*—Kent Beck introduced the idea of XP in the mid-1990s. Under XP, the system is transferred to the users in a series of versions called releases. A release may be developed using several iterations and should be developed and tested within a few weeks or months. Each release is a working system that only includes one or several functions that are part of the full system specifications. XP includes a number of activities where the user requirements are first documented as a user story. The user stories are then documented using an object-oriented model

called the class diagram, and the release is developed over the course of several iterations. A set of acceptance tests for each user story is then developed. Releases that pass the acceptance test are then considered complete. XP provides the continuous testing and integration of different software modules and components while supporting active user involvement. In addition, XP often incorporates team programming where two programmers work together on the same workstation. Small teams of developers often work in a common room where workstations are positioned in the middle and workspace for each team member is provided around the perimeter. Developers often are prohibited from working more than 40 hours a week in order to avoid burnout and the mistakes that often occur because of fatigue (Satzinger, Jackson, Burd 2002).

The PLC versus the SDLC

You may be still wondering about the difference between the project life cycle and the systems development life cycle. Although they may seem to be quite similar, the difference is that the product life cycle focuses on the processes of managing a project, while the SDLC focuses on creating and implementing a product—the information system. In this text we will focus primarily on the PLC, although the SDLC and the particular approach we choose will have a direct bearing on the project's scope (i.e., the deliverables that the project team must provide) and the work activities needed to produce those deliverables. Consequently, the number of activities, their sequence, time-to-complete, and resources required will directly determine the project's schedule and budget.

As illustrated in Figure 1.5, the SDLC is really part of the PLC because many of the activities for developing the information system occur during the execution phase. The last two stages of the PLC, closing and evaluating the project, occur after the implementation of the information system.

The integration of project management and system development activities is one important component that distinguishes IT projects from other types of projects. A

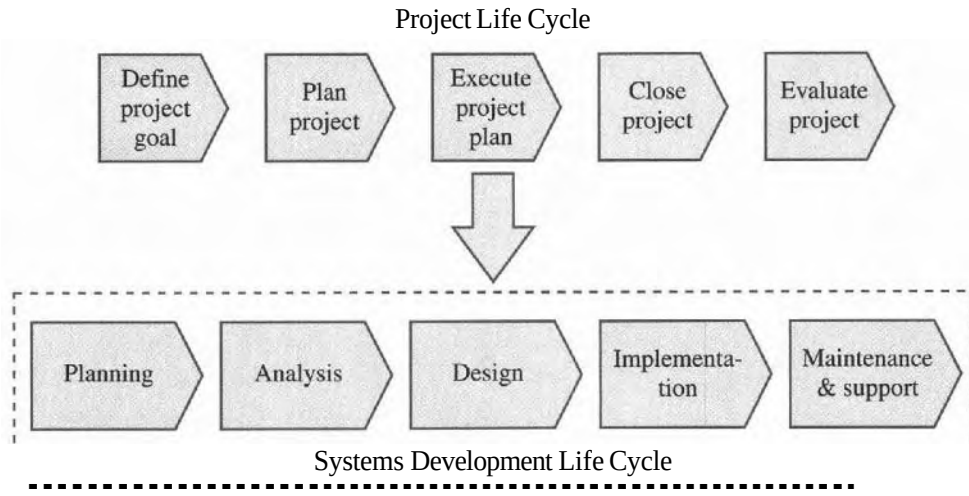

Figure 1.5 PLC and **SDLC**

methodology will be presented in Chapter 2 and will illustrate how the project life cycle and systems development life cycle can be combined to manage the process and product of IT projects. This methodology will provide a foundation for the concepts, processes, tools, and techniques throughout this text.

THE PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK)

As was mentioned earlier, the Guide to the Project Management Body of Knowledge is a document available from the Project Management Institute (PMI)—an international, nonprofit, professional organization with more than 55,000 members worldwide. The original document was published in 1987, and the updated version provides a basis for identifying and describing the generally accepted principles and practices of project management. However, as PMBOK is quick to point out, "generally accepted" does not mean these principles and practices work the same way on each and every project. It does mean that many people over time believe that these principles and practices are useful and have value. Determining what is appropriate is the responsibility of the team and comes from experience. (Perhaps experiences that can be documented and shared?)

This text will use the PMBOK Guide as a foundation but will also integrate a number of concepts and ideas that are part of the body of knowledge that makes up the field of information systems. Ideally, you will then understand not only what many IT project managers and organizations throughout the world think are important, but also the language and the processes.

PMI provides a certification in project management through the Project Management Professional (PMP) certification exam. This text can also help you prepare for the PMP certification exam. To pass, you must demonstrate a level of understanding and knowledge about project management, satisfy education and experience requirements, and agree to and adhere to a professional code of ethics.

Project Management Knowledge Areas

The Guide to the Project Management Body of Knowledge defines nine knowledge areas for understanding project management. These nine knowledge areas are illustrated in Figure 1.6 and will be covered in more detail in later chapters.

Project Integration Management—Integration focuses on coordinating the project plan's development, execution, and control of changes.

Project Scope Management—A project's scope is the work to be completed by the project team. Scope management provides assurance that the project's work is defined accurately and completely and that it is completed as planned. In addition, scope management includes ways to ensure that proper scope change procedures are in place.

Project Time Management—Time management is important for developing, monitoring, and managing the project's schedule. It includes identifying the project's phases and activities and then estimating, sequencing, and assigning resources for each activity to ensure that the project's scope and objectives are met.

Project Cost Management—Cost management assures that the project's budget is developed and completed as approved.

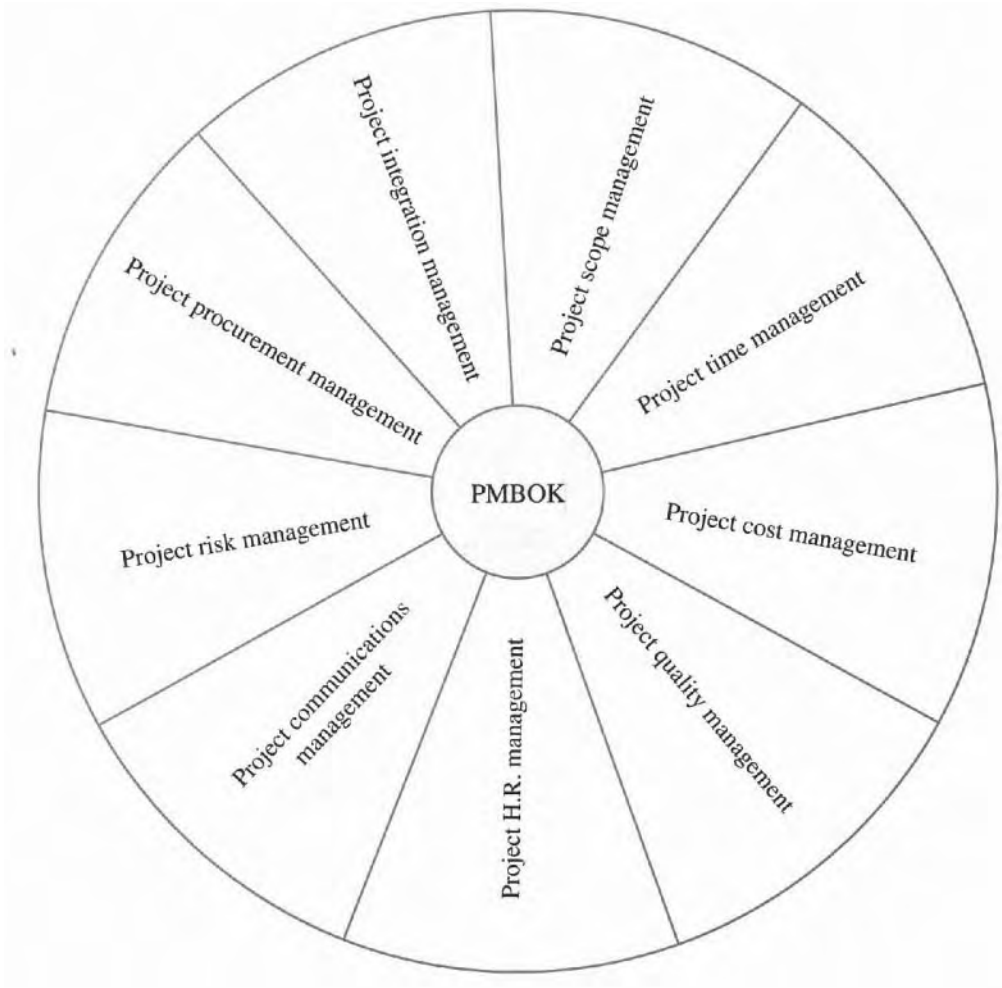

Figure **1.6** Project Management Body of **Knowledge** (PMBOK)

Project Quality *Management*—Quality management focuses on planning, developing, and managing a quality environment that allows the project to meet or exceed stakeholder needs or expectations.

Project Human Resource Management—People are the most important resource on a project. Human resource management focuses on creating and developing the project team as well as understanding and responding appropriately to the behavioral side of project management.

Project Communications *Management*—Communication management entails communicating timely and accurate information about the project to the project's stakeholders.

Project Risk Management—All projects face a certain amount of risk. Project risk management is concerned with identifying and responding appropriately to risks that can impact the project.

Project Procurement Management—Projects often require resources (people, hardware, software, etc.) that are outside the organization. Procurement management makes certain that these resources are acquired properly.

CHAPTER SUMMARY

This chapter provides an introduction to the text and to the area of information technology project management (ITPM). As evidenced by the *CHAOS* report published by The Standish Group, many IT projects are late and over-budget and include only a fraction of the functionality originally envisioned. Although many factors contribute to a project's success or failure, the product and process associated with the development of an information system must be actively managed. This management includes taking a socio-technical approach that focuses not only on the technology, but also on the organizational side. In addition, individuals and organizations can learn and share their experiences. These experiences, in the form of lessons learned, can be used to develop new ideas and best practices that can be implemented in an organization's systems development and project management policies and methods.

The *Guide to the Project Management Body of Knowledge (PMBOK Guide)* defines a project as a temporary endeavor undertaken to accomplish a unique purpose and project management as the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations. Projects can also be viewed in terms of their attributes. These attributes include the project's time frame, purpose, ownership, resources, roles, risks and assumptions, tasks, and the impact the project will have on the organization. Projects also operate in an environment larger than the project itself. The company's culture, environment, politics, strategy, structure, policies, and processes can influence the selection of projects, the IT infrastructure, and the role of IT within the organization. Similarly, the selection of projects, the IT infrastructure, and the role of IT within the organization can influence the organizational variables.

The project life cycle (PLC) is a collection of logical stages or phases that maps the life of a project from its beginning to its end. It also helps in defining, building, and delivering the product of a project. Projects are broken up into phases to make the project more manageable and to reduce risk. In addition, each phase should focus on providing a deliverable—a tangible and verifiable product of work. A generic project life cycle was introduced. Its phases included (1) defining the project goal, (2) planning the project, (3) executing or carrying out the project, (4) closing the project, and (5) evaluating the project. Although projects follow a project life cycle, information systems development follows a product life cycle.

The Systems Development Life Cycle (SDLC) represents the sequential phases or stages an information system follows throughout its useful life. The SDLC described in this chapter includes the following phases: (1) planning, (2) analysis, (3) design, (4) implementation, (5) maintenance and support. In addition, the SDLC can be implemented using a structured approach (the Waterfall model) or by means of more iterative approaches. By following a rapid applications development (RAD) approach, systems developers can combine different approaches, tools, and techniques in order to shorten the time needed to develop an information system. The SDLC is really a component of the PLC, and choice of a particular approach for systems development will influence the activities, their sequence, and the estimated time to complete. In turn, this will directly impact the project's schedule and budget.

The *Guide to the Project Management Body Knowledge* outlines nine knowledge areas for understanding project management. These nine areas include: (1) project integration management, (2) project scope management, (3) project time management, (4) project cost management, (5) project quality management, (6) project human resources management, (7) project communications management, (8) project risk management, and (9) project procurement management. Along with a number of concepts and principles that make up the body of knowledge for information systems, these nine PMBOK areas will be integrated in the chapters throughout this text.

REVIEW QUESTIONS

1. Describe the software crisis in your own words.
2. How is a successful project defined in the *CHAOS* study?
3. How is a challenged project defined in the *CHAOS* study?
4. How is an impaired project defined in the *CHAOS* study?
5. Why are many IT projects late, over budget, and with fewer features and functions than originally envisioned?
6. What is the socio-technical approach to systems development?
7. What are the benefits to using a project management approach to developing information systems?

8. What is a methodology? What are the advantages of following a methodology when developing an information system?
9. How does sharing experiences in the form of lessons learned lead to best practices in managing and developing information systems?
10. What is a project?
11. What is project management?
12. What are the attributes of a project?
13. Describe the relationship among scope, schedule, and budget.
14. Describe the different roles and skill sets needed for a project.
15. Describe three risks that could be associated with an IT project.
16. Why should assumptions associated with a project be documented?
17. Discuss the statement: Projects operate in an environment larger than the project itself.
18. Describe the project life cycle.
19. What are phase exits, stage gates, and kill points? What purpose do they serve?
20. What is fast tracking? When should fast tracking be used? When is fast tracking not appropriate?
21. Describe the Systems Development Life Cycle (SDLC).
22. Describe the Waterfall model for systems development. When should the Waterfall model be used?
23. Describe the prototyping approach to systems development. When is prototyping appropriate?
24. Describe the Spiral approach for iterative development. What advantages does this model have in comparison with the Waterfall model?
25. Describe extreme programming (XP). How does XP accelerate the SDLC?
26. What is knowledge management? Although many people believe knowledge cannot be managed, why do you think many companies are undertaking knowledge management initiatives?
27. Although the ***Guide to the Project Management Body of Knowledge*** describes the generally accepted principles and practices of project management, why wouldn't these principles and practices work for every project?

EXTEND YOUR KNOWLEDGE

1. Using the web or library, find an article that describes either a successful or an unsuccessful IT project. Discuss whether any of the project factors listed in Table 1.2 had any bearing on the project.
2. Design a template that could be used by a project team to document its experiences and lessons learned. Describe or show how these experiences could be catalogued and shared with other members and other teams.
3. Using the web or library as a resource, write a one-page position paper on knowledge management. You should provide a definition of knowledge management and your opinion as to whether an organization should invest in a knowledge management initiative.

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CHAPTER 2

Conceptualizing and Initializing The IT Project

CHAPTER OVERVIEW

Chapter 2 describes how IT projects are conceptualized and initialized. After studying this chapter, you should understand and be able to:

- Define what a methodology is and describe the role it serves in IT projects.
- Identify the phases and infrastructure that make up the IT project methodology introduced in this chapter.
- Develop and apply the concept of a project's measurable organizational value (MOV).
- Describe and be able to prepare a business case.
- Distinguish between financial models and scoring models.
- Describe the project selection process as well as the Balanced Scorecard approach.

GLOBAL TECHNOLOGY SOLUTIONS

Tim Williams sat across from Kellie Matthews as the waiter brought their orders and refilled the water glasses. After the waiter left, Tim handed a folder with GTS embossed on the cover to Kellie. "I've been giving this a great deal of thought," Tim said as he reached for the peppershaker. Kellie began to look over the contents of the folder while Tim waited.

"It's a methodology that I'm working on to help us organize the Husky Air project," Tim explained. "In fact," he added, "I think we can use it as a blueprint for all of our projects. Of course, I'm trying to make it flexible so we can add to it or change it over time as we learn better ways of doing things."

Kellie thought for a moment. "Will it restrict the project team's creativity?" she asked. "Husky Air's management is counting on us to come up with some innovative

solutions for them. I know I've always hated the feeling of being constrained by too many rules."

Tim was ready with his answer: "Think of this methodology as a road map. If you were planning a trip, the first thing you would have to do is decide on a destination based upon your interests. For our purposes, that would be similar to defining the project's goal. Once you decide where you're going, you then need to figure out how to get there and how much it will cost."

"Some kind of plan?" Kellie interjected.

"Exactly!" exclaimed Tim. "A travel plan would help you figure out whether to drive, fly, take a train, or use a combination to get to your destination. It really depends on where you're going and how much you want to spend."

Kellie reflected for a moment. "But when I'm on vacation, I like to be spontaneous!" she said. "Planning every minute of a vacation takes the fun out of it."

"Aha!" Tim replied. "You see that's the difference between a methodology and a plan. The methodology would help you to plan your plan."

"What?" said Kellie, "Are you playing a game with words?"

Tim grinned. "No, not really," he answered. "Let's say you went on vacation and had a terrible time. And maybe you even spent more than you budgeted for your vacation."

"I've had a few of those experiences," Kellie reflected.

"So the next time you decide to take a vacation, you might want to do things differently," Tim explained. "What you might do is organize the way you plan your vacation. First, you may try to come up with a better way of choosing a vacation spot. Then, you go about picking a mode of travel and reserve your accommodations. Finally, you figure out what you want to see and do while on your vacation. You may schedule your vacation by the minute, or you can have a list of places to visit or see while you're there—it really depends on what would make your vacation enjoyable."

The waiter returned and refilled their water glasses. Kellie thought for a moment. "I guess we really owe it to our client to have a game plan," she said. "After all, we can't really just wander in any direction and hope we'll somehow end up at our destination. They're paying us by the hour, and time is money. Besides, we owe it to them to meet their needs in the most efficient and effective way possible. So, what's our first step? We're meeting with Husky Air's management tomorrow morning."

"Glad you asked," Tim smiled. "If you take a look at the methodology, you'll see that the first thing we need to do is prepare a business case. That's where we'll figure out our destination—I mean, the overall goal of this project. Once we know where we're headed, we can identify several options for Husky Air. After one is approved, we'll develop a project charter and plan that defines the detailed schedule and budget. That will tell us what needs to be done, when, by whom, and how much it will cost. In addition, the methodology will help make sure that our plan is being followed, or changed when necessary."

"Sounds good," said Kellie, "But there's just one more thing."

"What's that?" asked Tim.

Kellie grinned. "It's your turn to buy lunch."

Things to Think About:

1. What are the advantages of having and following a project methodology?
2. Why should a methodology be flexible?
3. What perceptions might a client have if GTS has a methodology in place? If they don't?

INTRODUCTION

This chapter will introduce a framework for an IT project methodology that will be integrated into this text. A methodology provides a game plan for planning and managing the IT project and recommends the phases, steps, tools, and techniques to be followed and used throughout the project life cycle. All projects, however, are unique. A project methodology must be flexible in order to be useful. Moreover, a methodology should evolve to include the best practices that are derived from an organization's lessons learned. Over time, the methodology will better fit the organization and may even provide some kind of competitive advantage.

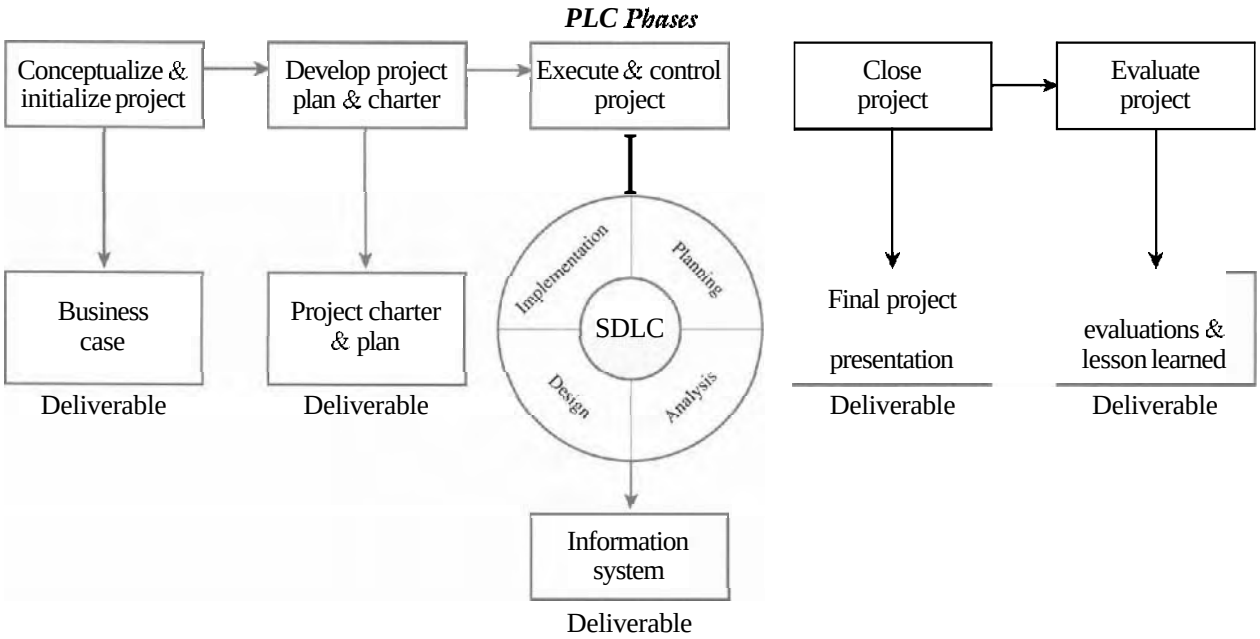
After the IT project methodology is introduced, the remainder of this chapter will focus on conceptualizing and initializing the project. Through high-level strategic planning, the overall project goal is defined. Defining this goal (and getting agreement) may be the most difficult part of the methodology and the project itself. The project's goal, if achieved, should provide direct and measurable value to the organization. A project, however, will have specific objectives that support this overall goal. These objectives, in tenns of project's scope, schedule, budget, and product quality, are important, but not necessarily sufficient, conditions for defining the project's success or lack of success. A project should have only one goal, but may have several objectives.

Once the project's goal is defined, the IT project methodology introduced in this chapter recommends that the project team develop a **business case.** A business case is a deliverable that documents the project's goal, as well as several alternatives or options. The feasibility, costs, bencfits, and risks for each alternative are analyzed and compared, and a recommendation to approve and fund one of the alternatives is made to senior management. The first phase of the IT project methodology, as in all of its phases, ends with a review of the project by the client or sponsor.

Most organizations have limited resources, and a particular project may have to compete with other projects within the organization for those resources. As a result, only one or a few select projects that make up the IT project portfolio can be funded at any given time. Therefore, many organizations have a formal selection process for taking on a project. This chapter will review some of the common techniques and tools for selecting IT projects. If a project has a clear and measurable goal that brings value to the organization, it will have a greater likelihood of being selected. Approval of the business case provides authority to proceed to the next phase of the methodology. This next phase focuses on developing a project charter and plan that details the organization of the project as well as the its schedule and budget.

AN INFORMATION TECHNOLOGY PROJECT METHODOLOGY (ITPM)

A **methodology** provides a strategic-level plan for managing and controlling IT projects. Think of a methodology as a template for initiating, planning, and developing an information system. Although information systems may be different, it is the product, and not necessarily the process, of managing the project that makes them different. As you can see in Figure 2.1, the methodology recommends the phases, deliverables, processes, tools, and knowledge areas for supporting an IT project. The key word is *recommends* because different types of projects, such as electronic commerce (EC), customer relations management (CRM), or data warehousing applications, may require different tools and approaches.



IT Project Management Foundation

PM processes:	Initiating, planning, executing, controlling, closing
PM objectives:	Scope, schedule, budget, quality
Tools:	Project management, information systems development
Infrastructure:	Organizational, project, technical
PMBOK areas:	Integration mgmt, scope mgmt, time mgmt, cost mgmt, quality mgmt, H.R. mgmt, communications mgmt, risk mgmt, procurement mgmt

Figure 2.1 An Information Technology Project Methodology

Methodologies provide the project team with a game plan for implementing the project and product life cycles. The team can then focus on the tasks at hand, instead of always worrying about what they are supposed to do next. In addition, a methodology also provides a common language that allows the project team, project sponsor, and others within the organization to communicate more effectively. By standardizing a methodology throughout the organization, management can compare different projects more objectively because each project's planned and actual progress is reported the same way. Ideally, this will allow management to make better-informed and more objective decisions with respect to which projects get selected and whether funding should continue to support a particular project.

A good methodology should be flexible and adapt to the needs of the project organization over time. For example, whether a structured or rapid applications development (RAD) approach is used depends upon the project and application system. During the analysis and design phases of the systems development life cycle, a team may use one modeling approach or a combination (i.e., process modeling, data modeling, or object-oriented modeling).

The development and modeling approach used, however, depends on a number of factors. These factors may include the organization's experiences, the knowledge

THE PROJECT MANAGEMENT OFFICE

In the past, many companies did not use a project management approach in the development of IT projects, and as a result, most IT projects were late and over budget. Companies these days are trying to establish a project management culture, and establishing a project office is one way of developing that culture while improving results and cutting cost. In fact, Forrester Research, Inc. in Cambridge, Massachusetts, has conducted a study of thirty companies that suggests the mission of project offices is "to bring order out of the chaos of project management." The study also suggests that the biggest challenges focus on managing multiple projects, cross-functional projects, global projects, overlapping projects, interdependent projects, project resource allocation, politics, sponsorship, and culture.

The role of a project office is to provide support and collect data while providing tools and methodologies. Collecting information about projects company-wide gives the project office a means to study the company's portfolio of IT projects. Eventually, this historical information can be used as a basis for estimating and conducting reality checks for projects. Many view these project offices as centers of excellence for project management. Some benefits of a project office include:

- Pointing out minefields in project processes, such as estimating costs.

  Enforcing priorities and/or controls that keep the project on track.

  Coordinating cross-functional projects that may stumble as a result of politics that arise when intra-organizational boundaries are crossed.

  Providing a standardized way for all projects to be planned, managed, and reported.

  Showing the real value of projects by comparing projected costs and benefits with actual results.

  Coordinating more or larger projects than the organization could handle in the past.

  Allowing IT to support its requests for additional staff or resources.

SOURCE: Adapted from Kathleen Melymuka, "Here Comes the Project Office," *Computerworld,* August, 2, 1999, http://www.computerworld.com/news/1999/story/0,11280,36545,00.html.

and skill sets of the project team, the IT and organizational infrastructure to support the development effort and the application, and the nature of the project itself—that is, the project's size, degree of structure, development time frame, and role within the organization. Many IS development methodologies have been proposed, but most focus on the ***product*** of the development effort. As discussed in Chapter 1, whether or not an organization follows a formal IS development methodology, the development effort should lit within, or be part of, an overall project management methodology.

Although many IT projects fail or experience significant challenges, a methodology can incorporate the experiences of and lessons learned by the project team members. Developing and implementing an IT product then becomes more predictable and the likelihood of success increases. Over time, an organization's methodology incorporates a set of best practices that fits the organization and the projects it undertakes. These best practices should lead to fewer wasted resources and projects that provide true value to the organization. The organization will find more opportunities for competitive advantage as efficiency and effectiveness increase.

Phase 1: Conceptualize and Initialize

The first stage of the IT project methodology focuses on defining the overall goal of the project. A project is undertaken for a specific purpose, and that purpose must be to add tangible value to the organization. Defining the project's goal is the most important step in the IT project methodology. As you will see, the project's goal aids in defining the project's scope and guides decisions throughout the project life cycle. It will also be used at the end of the project to evaluate the project's success.

Alternatives that would allow the organization to meet its goal must be identified. Then, the costs and benefits, as well as Feasibility and risk, of each alternative must be analyzed. Based upon these analyses, a specific alternative is recommended for funding. Finally, the project's goal and the analysis olalternatives that support the goal are summarized in a deliverable called the business case. Senior management will use the business case during the selection process to determine whether the proposed project should be funded. The details of developing the project goal and business case will be discussed in more detail later in this chapter.

Phase 2: Develop the Project Charter and Detailed Project Plan

The **project charter** is a key deliverable for the second phase of the IT project methodology. It defines how the project will be organized and how the project alternative that was recommended and approved for funding will be implemented. The project charter provides another opportunity to clarify the project's goal and defines the project's objectives in terms of scope, schedule, budget, and quality standards. In addition, the project charter identifies and gives authority to a project manager to begin carrying out the processes and tasks associated with the systems development life cycle (SDLC). The project plan provides all the tactical details concerning who will carry out the project work and when. The project charter and plan answer the following questions:

- Who is the project manager?
- Who is the project sponsor?
- Who is on the project team?
- What role does everyone associated with the project play?
- What is the scope of the project?
- How much will the project cost?
- How long will it take to complete the project?
- What resources and technology will be required?

  What approach, tools, and techniques will be used to develop the information system?

  What tasks or activities will be required to perform the project work?

  How long will these tasks or activities take?

  Who will be responsible for performing these tasks or activities?

  What will the organization receive for the time, money, and resources invested in this project?

In addition, the project's scope, schedule, budget, and quality objectives are defined in detail. Although some may wish to combine the business case with the project charter and plan, the IT project methodology presented in this text recommends that the business case and project charter/plan remain separate. There are a number of reasons to justify separation.

First, much time and effort must be devoted to understanding the "big picture." This process involves high-level strategic planning. Defining and agreeing to the project's goal and making a recommendation are not easy, nor is getting agreement on which projects should be funded. However, once the project's goal and recommended strategy are defined and agreed to, it will help define the details of the project, that is, who does what and when. The locus of the *conceptualize and initialize phase* is to determine whether a proposed project should and can be done.

The second reason is that the project charter and plan are the products of tactical planning. Here, the details will define how the project's goal will be achieved by defining the approach and tasks to support the SDLC. Combining strategic planning with tactical planning can confuse the project's goal and objectives with how they should be achieved. It then becomes easy for people to fall into a trap where they worry too much about how they are going to get someplace when they have not even decided where they are going!

The third reason to separate the phases is time. It is better to pull the plug on a project with a high probability of failure or without the expected business value as early as possible. Why spend the time, money, and resources on developing a detailed plan for a project that should not be undertaken? Therefore, a project should be *doable* and *worth* doing before an organization spends resources determining *how* the project should be done. Reviews at the end of each phase provide the decision-making controls to ensure that resources are committed appropriately.

Phase 3: Execute and Control the Project

The third phase of the IT project methodology focuses on execution and control—carrying out the project plan to deliver the IT product and managing the project's processes to achieve the project's goal. It is during this phase that the project team uses a particular approach and set of systems analysis and design tools for implementing the systems development life cycle (SDLC).

In addition, the project manager must ensure that the environment and infrastructure to support the project includes:

- Acquisition of people with the appropriate skills, experience, and knowledge
- The technical infrastructure for development
- IS development methods and tools
- A proper work environment
- Scope, schedule, budget, and quality controls
- A detailed risk plan
- A procurement plan for vendors and suppliers
- A quality management plan
- A change management plan
- A communications plan
- A testing plan
- An implementation plan
- A human resources system for evaluation and rewards

Phase 4: Close Project

After the information system has been developed, tested, and installed, a formal acceptance should transfer control from the project team to the client or project sponsor. The project team should prepare a final project report and presentation to document and verify that all the project deliverables have been completed as defied in the project's scope. This gives the project sponsor confidence that the project has been completed and makes the formal approval and acceptance of the project go more smoothly.

At this time, the final cost of the project can be determined. Subsequently, the consultant may invoice the client for any remaining payments, or the accounting department may make any final internal charges to appropriate accounts. In addition,

the project manager and team must follow a set of processes to formally close the project. These processes include such things as closing all project accounts, archiving all project documents and files, and releasing project resources.

Phase 5: Evaluate Project Success

The final phase of the methodology should focus on evaluating four areas. First, a postmortem," or final project review, should be conducted by the project manager and team. This review should focus on the entire project and attempt to assess what went well and what the project team could have done better. Subsequently, the lessons learned from the project team's experience should be documented and shared with others throughout the organization. In addition, the project manager and team should identify best practices that can be institutionalized throughout the organization by incorporating them into the methodology. As a result, the methodology evolves and better suits the organization's processes, culture, and people.

The second type of evaluation should take place between the project manager and the individual project team members. Although this performance review may be structured in terms of the organization's performance and merit review policies and procedures, it is important that each member of the team receive honest and useful feedback concerning his or her performance on the project. Areas of strength and opportunities for improvement should be identified so that plans of action can be developed to help each person develop to his or her potential.

In addition, an outside third party should review the project, the project manager, and project team. The focus of this review should be to answer the following questions:

- What is the likelihood of the project achieving its goal?
- Did the project meet its scope, schedule, budget, and quality objectives?
- Did the project team deliver everything that was promised to the sponsor or client?
- Is the project sponsor or client satisfied with the project work?
- Did the project manager and team follow the processes outlined in the project and system development methodologies?
- What risks or challenges did the project team face? And how well did they handle those risks and challenges?
- How well did the project sponsor, project team, and manager work together? If there were any conflicts, how well were they addressed and managed?
- Did the project manager and team act in a professional and ethical manner?

Lastly, the project must be evaluated in order to determine whether the project provided value to the organization. The goal of the project should be defined in the first phase of the project. In general, the value an IT project brings to the organization may not be clearly discernable immediately after the project is implemented. Therefore, it may be weeks or even months before that value is known. However, time and resources should be allocated for determining whether the project met its intended goal or not.

IT Project Management Foundation

The box under the phases in Figure 2.1 defines the IT project management foundation. This includes the project management processes, objectives, tools, infrastructure, and knowledge areas that are needed to support the IT project.

Project Management Processes According to the Project Management Body of Knowledge (PMBOK), a process is a series of activities that produce a result. Project management processes describe and help organize the work to be accomplished by the project, while product-oriented processes focus on the creation and delivery of the product of the project. These management and product-oriented processes tend to overlap and are integrated throughout the project's life cycle. Each phase of the methodology should include the following:

Initiatingprocesses — to start or initiate a project or phase once commitment is obtained.

Planningprocesses — to develop and maintain a workable plan to support the project's overall goal.

Executingprocesses — to coordinate people and other resources to execute the plan.

Contvollingprocesses — to ensure proper control and reporting mechanisms are in place so that progress can be monitored, problems identified, and appropriate actions taken when necessary.

Closing processes—to provide closure in terms of a formal acceptance that the project or a project's phase has been completed satisfactorily.

Project Objectives In addition to an overall goal, a project will have several objectives. These objectives support the overall goal and may be defined in terms of the project's scope, schedule, budget, and quality standards. Separately, each of these objectives cannot define success; however, together they must support the project's goal. This relationship is illustrated in Figure 2.2.

Tools Tools support both the processes and product of the project. These project management tools, include tools and techniques for estimation, as well as tools to develop and manage scope, schedule, budget, and quality. Similarly, tools support the development of the information system. For example, computer aided software engineering (CASE) tools and models support the analysis and design phases of development.

Infrastructure Three infrastructures are needed to support the IT project. These include:

An organizational infrastructure — The organizational infrastructure determines how projects are supported and managed within the organization. The organizational infrastructure influences how project resources are allocated, the reporting relationships of the project manager and the project team members, and the role of the project within the organization.

A project *infrastructure*—The project infrastructure supports the project team in terms of the project environment and the project team itself. It includes:

- *The project* environment — The physical workspace for the team to meet and work.
- Roles and responsibilities of the team members — This determines the reporting relationships, as well as the responsibilities and authorities of the individual team members.

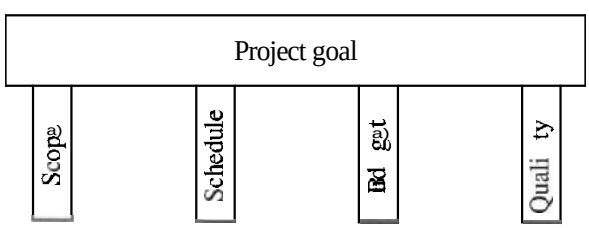


Figure 2.2 Project Objectives

- Processes and controls—Processes and controls provide support for managing all aspects of the project. They ensure that the project's goal and objectives are being met.

A technical *infrastructure*—The technical infrastructure provides the hardware and software tools to support the project team. It may include such things as project management software, e-mail, voice mail, word processing, access to the Internet, and so on. The technical infrastructure allows the project team to do its work.

***Project Management Knowledge** Areas* The Project Management Body of Knowledge (PMBOK) encompasses nine areas generally accepted as having merit for effectively managing projects. These nine areas support both the project processes and product by providing a foundation of knowledge for supporting projects within a particular organization.

As an organization gains more experience with projects over time, the lessons learned from every project contribute to each of these nine areas. Ideally, these lessons will lead to an IT project management knowledge base that can be used to identify best practices that adapt the IT project methodology to an organization's needs, culture, and IT project environment. This base of knowledge can then be institutionalized throughout the organization and its projects.

THE BUSINESS CASE

What Is a Business Case?

Although organizations have increasingly turned to information technology to improve effectiveness and levels of efficiency, many projects have been undertaken without a thorough understanding of their full costs and risks. As a result, numerous IT projects have failed to return benefits that compensate adequately for the time and resources invested.

A business case provides the first deliverable in the IT project life cycle. It provides an analysis of the organizational value, feasibility, costs, benefits, and risks of several proposed alternatives or options. However, a business case is not a budget or the project plan. The purpose of a business case is to provide senior management with all the information needed to make an informed decision as to whether a specific project should be funded (Schmidt 1999).

For larger projects, a business case may be a large, formal document. Even for smaller projects, however, the process of thinking through why a particular project is being taken on and how it might bring value to an organization is still useful.

Because assumptions and new information are sometimes used to make subjective judgments, a business case must also document the methods and rationale used for quantifying the costs and benefits. Different people who work independently to develop a business case can use the same information, tools, and methods, but still come up with different recommendations. Therefore, it is imperative that decision makers who read the business case know and understand how it was developed and how various alternatives were evaluated.

One can also think of a business case as an investment proposal or a legal case. Like an attorney, the business case developer has a large degree of latitude to structure arguments, select or ignore evidence, and deliver the final presentation. The outcome

depends largely on the ability to use compelling facts and logic in order to influence an individual or group with decision-making authority. Thus, a good IT business case should be (1) thorough in detailing all possible impacts, costs, and benefits; (2) clear and logical in comparing the cost/benefit impact of each alternative; (3) objective through including all pertinent information; and (4) systematic in terms of summarizing the findings (Schmidt 1999).

Developing the Business Case

The purpose of a business case is to show how an IT solution can create business value. Although IT projects can be undertaken for any number of reasons, organizational value generally focuses on improving effectiveness and/or efficiency. For example, an IT project may be undertaken to:

- Reduce costs
- Create a new product or service
- Improve customer service
- Improve communication
- Improve decision making
- Create or strengthen relationships with suppliers, customers, or partners
- Improve processes
- Improve reporting capabilities
- Support new legal requirements

Although these are just some of the reasons for proposing an IT project, it is up to management to evaluate, select, and fund projects on the basis of the value they bring to the organization. Therefore, the business case must show explicitly how an investment in IT will lead to an increase in business value. Figure 2.3 depicts the process for developing a business case.

Step 1: Select the Cove Team Rather than have one person take sole responsibility for developing the business case, a core team should be recruited. If possible, developing a business case should include many of the stakeholders affected by the project or involved in its delivery. The core team should, therefore. include managers, business specialists, and users who understand the requirements to be met, as well as IT specialists who understand the opportunities, limitations. and risks associated with IT. In general, there are several advantages for having a core team develop the business case (Schmidt 1999):

Credibility—A team made up of individuals from various organizational areas or departments can provide access to critical expertise and information that may not be readily accessible to others outside that particular area. Moreover, a team can provide different points of view and provide a check for important items that an individual may overlook.

Alignment with organizational goals—Higher-level managers can help connect the business case with the organization's long-term strategic plan and mission. This alignment may be beneficial in understanding and presenting how the expected business value of the IT project will support the overall goals and mission of the organization. Moreover, it may facilitate prioritizing, legitimizing, and assigning value of the IT project to the organization's

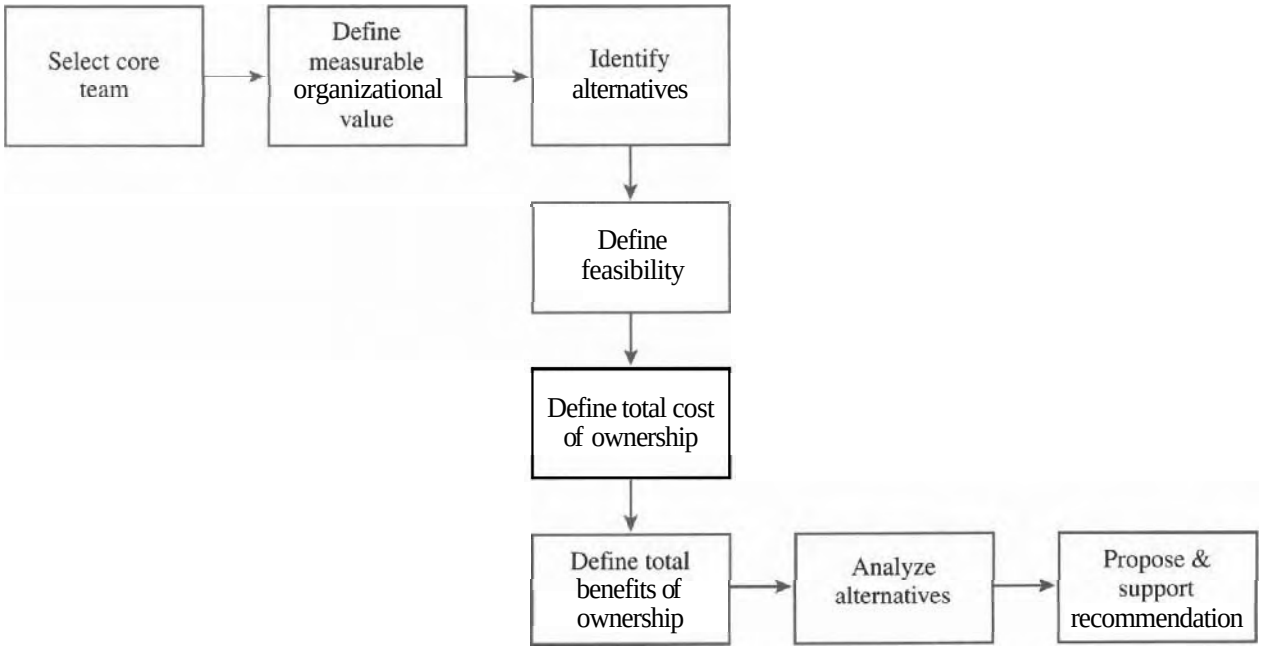


Figure **2.3** The Process for Developing a Business Case

strategic business objectives. In other words, the business case should outline how the successful completion of the proposed project will help the organization achieve its overall mission, goals, and objectives.

Access *to* the real costs—Core members with certain expertise or access to important information can help build more realistic estimates in areas such as salaries, overhead, accounting and reporting practices, training requirements, union rules and regulations, and hiring practices.

In addition, the core team that develops the business case can play a crucial role when dealing with various areas or departments within the organizational boundary. The advantages include:

Ownership—A cross-functional team can spread a sense of ownership for the business case. A project that includes other areas from the outset has a better chance of reducing the political problems associated with territorial domains.

Agreement—If you develop a business case in isolation, it is very likely that you will have to defend your assumptions and subjective judgments in a competitive or political setting. However, if a core team develops the business case, the critics may be more apt to argue the results rather than the data and methods used.

- Bridge building—The core team may serve as an effective tool for handling critics of the business case. One tactic may be to include critics on the core team or to at least allow recognition and consideration for their positions. This may lead to fewer surprises and attacks later on.

Step 2. Define Measurable Organizational Value (MOV) The core team's objective should be to define the problem or opportunity and then identify several altematives

that will provide direct and measurable value to the organization. To provide real value to an organization, however, IT projects must align with and support the organization's goals, mission, and objectives. Therefore, any recommended alternative by the core team must have a clearly defined purpose and must map to the goals and strategy of the organization. The goal of the project then becomes the project's measure of success (Billows 1996; Smith 1999). In the IT project management methodology, the project's overall goal and measure of success is referred to as the project's measurable organizational value (MOV). As the name implies, the MOV must:

- Be measurable—Measurement provides focus for the project team in terms of its actions. Instead of implementing an information system, the project team attempts to achieve a specific performance target. Moreover, an MOV provides a basis for making decisions that affect the project through its remaining phases. Why do additional work or make decisions that affect the project if they do not help you achieve the MOV?
- Provide value to the organization—Resources and time should not be devoted to a project unless they provide some kind of value to the organization. Keep in mind that information technology in itself cannot provide value. Technology is only an enabler—that is, IT enables organizations to do things.
- Be *agreed* upon—A clear and agreed upon MOV sets expectations for the project stakeholders. It is important that all project stakeholders understand and agree to the project's MOV. It is not easy to get everyone to agree to the project's goal so early; but it will be well worth the time and effort in the later stages of the project (Billows 1996).
- Verifiable—At the end of the project, the MOV must be verified to determine if the project was a success.

The MOV guides all the decisions and processes for managing the IT project and serves as a basis for evaluating the project's achievements. In other words, a project cannot be properly planned or evaluated unless the goal of the project is clearly defined and understood. An organization should not undertake projects that are not clearly linked to its overall mission.

The IT value chain depicted in Figure 2.4 suggests that an organizational goal leads to or defines an organizational strategy. In turn, a project's measurable organizational value then supports this organizational strategy. This mapping shows how a project's goal aligns with an organization's strategy and goal. At the end of the project, the project's actual achievements can be compared to its initial MOV to determine whether the project was successful. If the project is a success (i.e., it either met or exceeded its MOV), then one can see explicitly how that project will support the organization.

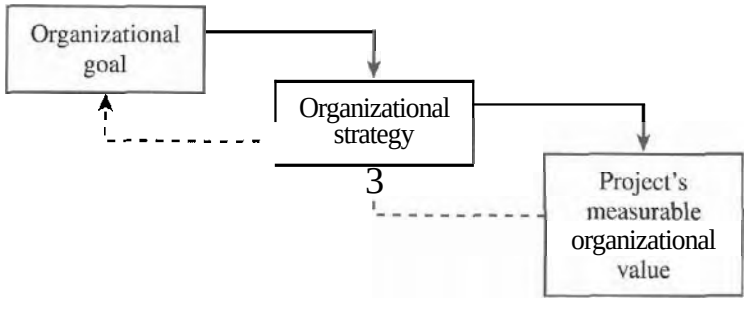


Figure 2.4 The IT Value Chain

For example, if we follow Michael Porter's (Porter 1980; Porter 1985) competitive forces model, one organizational goal may he to prevent customers from leaving or switching to a competitor. Therefore, an organizational strategy to support this goal may be to develop tight linkages with customers. To support this organizational

strategy and goal, the organization may consider developing a business-to-business (B2B) application that will allow customers to check inventory status, place orders, track shipments, receive an invoice, pay an invoice, and receive various reports online.

Will the installation of hardware and a network mean that the B2B application was a success? Will the development and implementation of the application software? What if the project is completed not only on time, but also within budget? A yes answer here is only partially correct. Although all of these achievements are important, they cannot be true measures of a project's success.

More specifically, installing hardware and a network are activities. Having them in vlace is a necessary, but not sufficient, condition for success. In other words, hardware and software can be in place, but unless they support the organizational goal and strategy, their mere installation does not bring much value to the organization. One can also view budget and schedule in the same light. You can have a project that is finished on time and within budget, but unless it brings value to the organization in terms of supporting a goal and strategy, it will not be of much use.

But what if a project goes over schedule and over budget? How will that impact the project's value to the organization? The answer is that it depends. A project that is late and over budget certainly can impact the project's value to the organization, but success or failure really depends on the amount of value a project will provide. For example, should a project that is one day late and a dollar over budget be considered unsuccessful? Probably not. What about a project that is one week late and $1,000 over budget? That depends on how these overruns compare to the original schedule and budget. If the original schedule and budget were two years and $1 million, then most people would agree that the schedule and cost variation is no big deal.

What's more important is the value the project brings to the organization. A consultant friend once told a story of a CEO who was ecstatic because an e-commerce project the company was taking on was only one year late and only $12 million over budget. In this case, schedule and cost did not matter all that much because once the e-commerce site was up and running the company would make the deficit up within six months. The moral of the story is that business value is the most important criteria for IT projects.

A project's MOV should be based on the organization's goal and strategy. An excellent example of an MOV is the following statement that John F. Kennedy made back in the 1960s, "Our goal is to land a man on the moon and return him safely by the end of the decade."

This simple yet powerful statement mobilized an entire nation and fueled the space race with the then Soviet Union. What is interesting about this statement is how clear and measurable the goal becomes:

> A human being is to land on the moon—not an unmanned spacecraft or a spacecraft with a chimpanzee.
>
> We will not just get a human to the moon or get that person just back halfway. This person must make the whole trip and come back safely.
>
> This will all be done before 1970.

What is equally interesting is that Kennedy never told anyone ***how*** to do this. That was NASA's job, not his. The goal was to beat the Soviets to the moon, and the project's MOV defined this explicitly.

But how do we go about developing a project's MOV? There are six basic steps. Let's follow that process using as an example a company that would like to develop and implement a business-to-consumer (B2C) electronic commerce application that it hopes will allow it to expand its current bricks and mortar operations.

Identify the Desired Area of Impact The first step involves identifying the desired impact the IT project will play in supporting the organization. One approach might be to adapt the criteria used by *CIO* magazine's Enterprise Value Awards.[1] The guidelines summarized in Table 2.1 are used by the judges to define IT value and provide a good starting point for developing the MOV and business case. You should feel free to adapt these areas of impact as needed. The important question to answer at this point is why are we thinking of doing this project?

In our B2C example, the project manager would meet with the project sponsor and first determine how the idea for the project came about. Although the reasons could be broad and numerous (i.e., all of our competitors are doing it, it is part of our long-term strategy, we think we can make a lot of money, B2C will make our company look hip), identifying them will provide a background for understanding how and why decisions are made by the sponsor's organization. In this example, we will say that the reasons for considering this project are both strategic and financial because the company wants to expand its current brick and mortar operations. The idea is not to neatly categorize the project, but to understand the nature of the project and how it will impact the organization.

Identify the Desired Value of the IT Project Once the desired area of itnpact is identified, the next step involves determining the desired value the IT project will bring to the organization. This area is can be tricky, but having a process helps. In simplest terms, we can identify the value of an IT project by providing answers to the following four questions:

Better—What does the organization want to do better? (For example, improve quality or increase effectiveness?)

Faster—What does the organization want to do faster? (Increase speed, increase efficiency, or reduce cycle times?)

Cheaper—What does the organization want to do cheaper? (Reduce costs?)

Do more—What does the organization want to do more than it is currently? (Growth or expansion?[2])

The key words to identifying the value an IT project will provide an organization are *better, faster, cheaper,* and do more. The first three criteria—better, faster, and cheaper—focus on quality, effectiveness, and efficiency, while doing more of something focuses on growth. For example, if an organization has identified increasing profits as its desired area of impact, it makes sense that it would like to make more money than it currently does. Therefore, value to this organization would be in the form of growth. On the other hand, another organization may be faced with high inventory costs as a result of having too much inventory in its warehouse. The value that an IT project would bring to this organization would not be from growth; it does not want to do more of what it is currently doing. The value comes from doing something better (e.g., improved quality to reduce waste or rework), faster (e.g., fewer manufacturing bottlenecks or reduced cycle times), or even cheaper (e.g., lower overhead costs).

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[1] Since 1993, *CIO* magazine has conducted a competition to identify and honor organizations that create enterprise value through the innovative use of IT. Entrants must submit an entry following contest guidelines. A team made up of *CIO* editors and consultants selects finalists. Entries are judged on the value of the achievement that an IT investment provides and how it serves the organizations mission.

[2] Value to an organization may also result by doing ***less*** of something. For example, a company may develop a safety program to reduce the number of accidents. Reducing accidents can he viewed as negative growth or as an increase in safety as a result of doing something better (i.e., quality). It just depends on one's viewpoint.

Table 2.1 Potential Areas of Impact for IT Projects

Potential Area	*Examples of Desired Impact*
Strategic	■ Penetration of new markets ■ Transformation of the terms of competition within the market ■ Increased market share
Customer	■ Customers have more choices of products or services ■ Customers receive better products or services ■ Transaction processes are more efficient or effective
Financial	■ Increased profit ■ Increased margins
Operational	■ Lower costs due to streamlined operations ■ Increased operational effectiveness ■ Improvements to supply chain
Social	■ Education ■ Health = Safety Environment

SOURCE: Adapted from *CIO* magazine's Enterprise Value Awards Application Form and Elaine M. Cummings, "Judgment Call," CIO, February 2,2000, http://www.cio.com/awards/eva/index.html.

While the question in the first step focuses on whv an organization wants to take on the project, this second step focuses on the question "how will this project help us achieve what we want to achieve?" At this point, the project manager and client should identify one or two value areas to emphasize. If all four of the value areas appear important, it is a good idea to rank them in order of importance. Keep in mind, however, that not having a clear idea of the desired impact or value of the project may well mean that the problem or opportunity is not clearly understood. The project team may end up treating the symptoms rather than the real problem.

Following our example of the B2C project, the value critical to the organization may be doing more through the project's ability to enable to organization to expand its current operations. Value from improved customer service and improved operations could also support the organization in doing things better, faster, and cheaper as well. This step provides an excellent vehicle for all project stakeholders to discuss and identify the expected value of the project.

Develop an Appropriate Metric Once there is agreement as to the value the IT project will bring to the organization, the next step is to develop a metric or set of metric that (1) provides the project team with a target or directive, (2) sets expectations among all stakeholders, and (3) provides a means for evaluating whether the project is a success later on. In general, tangible benefits to the organization are easier to define than intangible ones; however, this can be done with some creativity. For example, knowing whether profits increased should be fairly straightforward, but customer satisfaction may require surveys or interviews. Often evaluation requires benchmarking so that a before and after comparison can be made.

To develop a metric, the project manager and sponsor should agree on a specific number or range of numbers. When not obvious, the target metric should indicate whether an increase or decrease from the organization's current state is desired. The metrics may be expressed as dollars, percentages, or numbers. For example, an organization that wishes to increase profits may state this as a 20 percent increase or an increase of $1 million from the last month, quarter, or fiscal year. On the other hand, an organization that would like to grow its customer base may set a goal of one hundred new customers. Therefore, the metrics to support an MOV may be one or a combination of the following:

Money (in dollars, euros, etc.)	(increase or decrease)
Percentage (%)	(increase or decrease)
Numeric Value	(increase or decrease)

The company in our example would like to grow strategically, that is, expand its current base of operations. There are a number of relevant metrics that could be used. The question is how will this company determine whether this project is a success. Keep in mind that the organization will make a significant investment by the time the project is completed. Will the B2C application be successful when the Web site is finished and anyone with an Internet connection can view the site? It is important to have a working Web site, but that alone will not make up for the investment and subsequent maintenance and support for keeping the site up and running. What about using a hit counter so that the organization can tell how many times the B2C site was visited? Having traffic to the Web site is also important, but people who just visit will not keep the company in business nor will visitors justify the investment and cost of keeping the B2C Web site up and running.

It should now be obvious that the company must make money from its B2C Web site. Only a profit can justify the time, effort, and resources needed to develop and support the application. The questions then become how much profit and are there any other metrics that should be considered. Assume that management has determined that a 20 percent return will be adequate for covering all expenses and for providing the desired return. Also assume that management is interested in developing new customers. Therefore, the company has set a target of five hundred new customers. Why a 20 percent return and five hundred new customers? Those numbers are not developed by the project manager or project team on their own. The 20 percent return and five hundred new customers' metrics can only be determined by the project sponsor. The project manager and project team only guide the process.

Set a Time Frame for Achieving the MOV Once you have agreement on the target metrics that will provide the desired impact to the organization, the next step is to agree on a specific time frame. For example, a company may focus on increasing profits or reducing costs, but the question is when will these results be achieved. Keep in mind that the scheduled completion of the project is not the same thing as the agreed upon time frame for achieving the MOV. Scope, schedule, budget, and quality are project objectives. The MOV is the project goal. Rarely will the installation of an information system provide the desired or expected value right away. A project with an immovable deadline may, however, have a specific date as part of the MOV. For example, there may be cause for putting a deadline date in the MOV in 01/01/10000, when all the dates in computers, or whatever they are using then, have to be changed once more.

The project manager and sponsor should also agree upon how and when the project's MOV will be evaluated. Continuing with the example, let's say that management would like to see a 20 percent return and five hundred new customers within one year after the system goes online. But what happens after the first year? Perhaps the company would like to maintain this growth annually over the useful life of the system. There is, however, no reason why different targets cannot be set for different time periods. For example, a 20 percent return and five hundred new customers may be sufficient for the first year, but these targets may change as word spreads and more and more people know about the B2C Web site. Therefore, the company may establish a target of a 25 percent return and one thousand new customers in the second year, while a 30 percent return with 1,500 new customers is set for the third year. The MOV should be flexible to accommodate the expectations and needs of the project sponsor.

Verify and Get Agreement from the Project Stakeholders The next step in developing the MOV is to ensure that it is accurate and realistic. In short, will the successful completion of this project provide the intended value to the organization? And is the MOV realistic? The development of the MOV requires a close working rela-

tionship between the project manager and the sponsor. The project manager's responsibility is to guide the process, while the sponsor must identify the value and target metrics. This joint responsibility may not always be easy, especially when several sponsors or individuals need to agree upon what will make an IT project successful or what exactly will bring value to the organization. Still, it is better to spend the time arguing and getting consensus now rather than during later phases of the project. While the project manager is responsible for guiding the process. he or she needs to be confident that the MOV can be achieved. Being challenged is one thing; agreeing to an unrealistic MOV is another. The latter can be detrimental to your career, the project team, and everyone's morale.

Summarize the MOV in a Clear, Concise Statement or Table Once the impact and value to the organization are verified and agreed upon by all the project stakeholders, the MOV should be summarized in a single statement or table. Summarizing the MOV (1) provides an important chance to get final agreement and verification, (2) provides a simple and clear directive for the project team, and (3) sets explicit expectations for all project stakeholders. The easiest way to summarize the MOV in a statement form is to complete the following statement:

This project will he successful if _____

For example, using a single statement format, the MOV would be:

> MOV: The B2C project will provide a 20 percent retum on investment and five hundred new customers within the first year of its operation.

However, if the MOV includes a growth component, a table format may be clearer. For example, the project's MOV over three years could be summarized as shown in Table 2.2.

Notice that the MOV does not include any explicit statements about technology. More specifically, it does not mention that a particular relational database vendor's product will be used or that the system will be programmed in a particular language. It is up to the project team to figure out how to build the system and determine what technology will be employed to achieve the project goal. At this point in the project, we are concerned with the organization—not with the technology!

The project team's directive will be to achieve the MOV, not just develop and implement a B2C Web site. Although information technology will play an important role, the designers and developers of the information system cannot be expected to know everything or be solely responsible for achieving the project goal.

In the past, purely technical approaches were often applied to organizational problems. A system would be built, but did it really support or have a significant, positive impact on the organization? Judging from the ***Chaos*** study, most IT projects have not lived up to management's expectations. In short, the technical people may understand and be very good at working with the technology, but achieving this MOV will also require an organizational approach and commitment. A cross-functional project team that includes a number of non-technical experts will be required so that the burden of achieving this MOV does not rest squarely on the shoulders of the technical experts. Therefore, the selection of the project team becomes a crucial project management decision.

Table ***2.2*** Sample MOV Using Table Format

Year	*MOV*
1	20% return on investment 500 new customers
2	25% return on investment 1,000 new customers
3	30% return on investment 1,500 new customers

Step 3: Identify Alternatives Since no single solution generally exists for most organizational problems, it is imperative to identify several alternatives before dealing directly with a given business opportunity. The alternatives, or options, identified in the business case should be strategies for achieving the MOV.

It is also important that the alternatives listed include a wide range of potential solutions as well as a base case alternative that describes how the organization would perform if it maintained the status quo—i.e., if it did not pursue any of the options described in the business case. In some situations, maintaining the status quo may be the best alternative. It is important to be open to and objective on all viable options.

The base case should also delve into the realistic costs of maintaining the current system over time. Include such things as increased maintenance costs of hardware and software, as well as the possibility for more frequent system failures and downtime. However, if the demand for service decreases, maintaining a legacy system may be a more viable alternative than a proposed new system.

On the other hand, other options may provide the best solution. These options should consider a spectrum of choices that include:

- Changing the existing business processes without investing in IT
- Adopting or adapting an application developed by a different area or department within the organization
- Reengineering the existing system
- Purchasing an off-the-shelf application package from a software vendor
- Custom building a new application using internal resources or outsourcing the development to another company

Step 4: Define Feasibility and Assess Risk Each option or alternative must be analyzed in terms of its feasibility and potential risk. Feasibility should focus on whether a particular alternative is doable and worth doing. Risk, on the other hand, focuses on what can go wrong and what must go right. Analyzing the feasibility and risk of each alternative at this point may act as a screening process for ruling out any alternatives that are not worth pursuing. Feasibility may be viewed in terms of:

- Economic feasibility – Although a cost/benefit analysis will be conducted to look at the alternatives in greater depth, some alternatives may be too costly or simply not provide the benefits envisioned in the problem statement. At this point, an organization may evaluate an alternative in terms of whether funds and resources exist to support the project. For example, although you may be in a market for a new car, the reality of your limited income rules out the fancy sports car. Conducting an economic feasibility should serve as a reality check for each option or alternative.
- Technical *feasibility*—Technical feasibility focuses on the existing technical infrastructure needed to support the IT solution. Will the current infrastructure support the alternative? Will new technology be needed? Will it be available? Does the current IT staff have the skills and experience to support the proposed solution? If outsourcing, does the vendor or company have the skills and experience to develop and implement the application?
- Organizational *feasibility*—Organizational feasibility considers the impact on the organization. It focuses mainly on how people within the organization will adapt to this planned organizational change. How will people and the way they do their jobs be impacted? Will they accept this change willingly? Will business be disrupted while the proposed solution is implemented?
- Other feasibilities — Depending on the situation and the organization, a business case may include other issues, such as legal and ethical feasibility.

Risk should focus on:

Identification—What can go wrong? What must go right?

Assessment—What is the impact of each risk?

Response—How can the organization avoid or minimize the risk?

Step 5: Define Total Cost of Ownership The decision to invest in an IT project must take into account all of the costs associated with the application system. **Total Cost of** Ownership (TCO) is a concept that has gained widespread attention in recent years and generally refers to the total cost of acquiring, developing, maintaining, and supporting the application system over its useful life. TCO includes such costs as:

Direct or *up-front* costs—Initial purchase price of all hardware, software, and telecommunications equipment, all development or installation costs, outside consultant fees, etc.

Ongoing costs—Salaries, training, upgrades, supplies, maintenance, etc.

Indirect *costs*—Initial loss of productivity, time lost by users when the system is down, the cost of auditing equipment (i.e., finding out who has what and where), quality assurance, and post implementation reviews.

It is important to note that TCO goes beyond the original purchase or development costs. In fact, the TCO is really an organized list of all possible cost impacts. When preparing the business case, it is also important to document all data sources, assumptions, and methods for determining the various costs.

Step 6: Define Total Benefits of Ownership Similarly, the **Total Benefits of Ownership (TBO)** must include all of the direct, on-going, and indirect benefits associated with each proposed alternative. The TBO should address the benefits of an alternative over the course of its useful life. Benefits can arise from:

Increasing high-value work—For example, a salesperson may spend less time on paperwork and more time calling on customers.

Improving accuracy and *efficiency*—For example, reducing errors, duplication, or the number of steps in a process.

Improving decision-making—For example, providing timely and accurate information.

Improving customer sewice—For example, new products or services, faster or more reliable service, convenience, etc.

Tangible benefits associated with an IT project are relatively easy to identify and quantify. They will usually arise from direct cost savings or avoided costs. On the other hand, intangible benefits may be easy to identify, but they are certainly more difficult to quantify. It is important to try and quantify all of the benefits identified. One way to quantify intangible benefits is to link them directly to tangible benefits that can be linked to efficiency gains. For example, a corporate telephone directory on an intranet not only improves communication, but also can cut paper, printing, and labor costs associated with creating and distributing a paper-based telephone book.

Another way to quantify intangible benefits is to estimate the level of service. For example, one could determine how much someone is willing to pay for a particular service or compare prices of products or services that have or do not have a particular feature. Moreover, if an electronic data interchange (EDI) application allows a

company to collect its accounts receivable more quickly, it can estimate the value of this benefit by determining the return it could earn by investing that money.

Step 7: Analyze Alternatives Once costs and benefits have been identified, it is important that all alternatives be compared with each other consistently. Understanding the financial and numeric tools and techniques required by financial people and senior management is critical, even for the technically savvy. Being able to communicate effectively using their terms and tools increases one's credibility and the chances of getting projects approved and funded. There are several ways to analyze the proposed alternatives. The most common are financial models and scoring models.

Financial models focus on either profitability and/or cash flows. Cash flow models focus on the net cash, may be positive or negative, and are calculated by subtracting the cash outflows from the cash inflows. In general, one could view the benefits associated with a particular alternative as a source of cash inflow and the costs as the source of outflows. Using a tool such as an electronic spreadsheet application, one could conduct a sensitivity analysis to view how changes in the initial investment or net cash flows would impact the risk of a particular project alternative.

The most commonly used cash flow models include payback, breakeven, return on investment, net present value, and scoring.

Payback The payback method determines how long it will take to recover the initial investment. For example, if a company spends $100,000 developing and implementing an application system and then receives a net cash return of $20,000 a year, the payback period for that investment would be:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Net Cash Flow}}$$
$$= \frac{\$100,000}{\$20,000}$$
$$= 5 \text{ years}$$

Although the payback period is fairly straightforward to calculate and understand, it does not consider the time value of money or cash flows beyond the payback period. Still, the payback period is useful for highlighting the risk of a particular investment because a riskier investment will have a longer payback period than a less risky investment. Depending on the situation and the organization's policy, net cash flow may be either before tax or after tax.

Breakeven Similar to the payback method, the breakeven method attempts to determine the point at which a project would begin to recoup its original investment. This method is useful if a certain number of transactions allow the original investment to be recovered. For example, let's say that you would like to create a Web site to sell golf putters that you manufacture. If you spent $100,000 to create the site, how many golf putters would you have to sell to break even if you sell each putter for $30? To determine this point, you have to look at the cost of selling a putter. These costs may include the following:

Materials (putter head, shaft, grip, etc.)	$12.00
Labor (0.5 hours at $9.00/hr)	$ 4.50
Overhead (rent, insurance, utilities, taxes, etc.)	$ 8.50
Total	$25.00

If you sell a golf putter for $30 and it costs $25 to make it, you have a profit margin of $5. The breakeven point is computed as follows:

$$\text{Breakeven Point} = \frac{\text{Initial Investment}}{\text{Net Profit Margin}}$$
$$= \frac{\$100,000}{\$5}$$
$$= 20,000$$

Therefore, you would have to sell 20,000 putters over your Web site to break even.

Like the payback period method, the breakeven method is generally easy to compute and can provide a measure of risk. In general, riskier project alternatives will have a higher breakeven point than less risky project alternatives.

Return on Investment In a strict financial sense, **return on investment** (ROI) is an indicator of a company's financial performance. From a project management point of view, ROI provides a measure of the value expected or received from a particular alternative or project. It is calculated by dividing the net income, or return, of a project alternative by its total cost. So, if a project alternative, for example, is expected to cost $100,000 but provide $115,000 in expected benefits, its ROI would be:

$$\text{Project ROI} = \frac{\text{total expected benefits} - \text{total expected costs}}{\text{total expected costs}}$$
$$= \frac{\$115,000 - \$100,000}{\$100,000}$$
$$= 15\%$$

The above formula shows the expected ROI for a project alternative; a completed project's ROI would use the actual costs and benefits derived and can be compared to its expected ROI to provide a comparison at the end of the project. The usefulness of a project's ROI depends on two important assumptions. First, there must be the ability to define accurately the total costs and benefits expected or realized. Second, the returns must arise as a direct result of the initial investment. For example, if you purchased a lottery ticket for $1 and won $1 million, you can determine the ROI directly because the $1 million return can be related to the $1 lottery ticket you purchased. Even though the chances of winning a lottery are pretty slim, the ROI calculated as ($1,000,000 – $1) ÷ $1 = 99,999,900 percent would be quite acceptable for most people. In complex business situations, however, ROI analysis may be difficult because intervening variables and conditions may have an indirect influence.

Regardless, with ROI one can see the relationship between a project's costs and benefits. A project's ROI will increase as the benefits increase and/or the expected costs decrease. When comparing two or more projects or alternatives, those with the higher ROI would be the most desirable (all other things being equal). Many organizations even have a required ROI, whereby no project or alternative may be considered unless a certain ROI value can be achieved. The idea is that it is not worth investing time and resources in a project that does not provide a certain level of value to the organization and its shareholders.

Net Present Value **Net Present Value (NPV)** focuses on the time value of money. For example, if you borrow $20 today, you may have to agree to pay back

the original $20 plus another $2 at the end of the month. Someone may also he willing to give you either $18 today or $20 at the end of the month. If you could take the $18 and invest it, ending up with $20 at the end of the month, you might feel indifferent as to whether you collected $18 today or $20 at the end of the month. The point here is that there is a cost associated with time when it comes to money.

It is going to take time and resources (i.e., costs) before any particular project or alternative is completed and provides the returns we originally envisioned. NPV takes this into account by discounting streams of cash flows a particular alternative or project returns in the future so that we can determine if investing the time, money, and resources is worth the wait. Very simply put, only a project or alternative with a positive NPV should be considered. Let's say that one alternative is an application system that is expected to cost $200,000 and will be completed in the current year (Year 0). In addition, over the following four years the project's benefits will provide inflows of cash, while the costs to build, maintain and support this application will require outflows of cash. The expected cash flows for the next five years may look something like:

	Year 0	Year 1	Year 2	Year 3	Year 4
Total Cash Inflows	$0	$150,000	$200,000	$250,000	$300,000
Total Cash Outflows	$200,000	$85,000	$125,000	$150,000	$200,000
Net Cash Flow	($200.000)	$65,000	675,000	$100,000	$100,000

To discount the net cash flows, a discount rate is required. This rate is sometimes called a cutoff rate or hurdle rate because it basically defines the organization's required rate of return. In short, the discount rate is the minimum return a company would expect from a project if the company were to make an equivalent investment in an opportunity of similar risk. This discount rate is usually set by management. The NPV is calculated using the formula:

$$NPV = -I_o + \sum \left(\frac{\text{Net Cash Flow}}{(1+r)^t} \right)$$

Where:
I = total cost (or investment) in the project
r = discount rate
t = time period

Therefore, if we use a discount rate of 8 percent, we can discount the net cash flow for each period and add them up to determine the NPV.

Time Period	Calculation	Discounted Cash Flow
Year 0	($200,000)	($200,000)
Year 1	$65,000 ÷ (1 + .08)^1	$60,185
Year 2	$75,000 ÷ (1 + .08)^2	$64,300
Year 3	$100,000 ÷ (1 + .08)^3	$79,383
Year 4	$100,000 ÷ (1 + .08)^4	$73,503
Net Present Value (NPV)		$77,371

This alternative would be acceptable because a NPV of $77,371 is positive. One can compare the NPV for different alternatives and projects. In general, the project or

alternative with a higher NPV would be more desirable. Remember, increasing the discount rate will decrease the NPV.[1]

Scoring models provide a method for comparing alternatives or projects based on a weighted score. Scoring models also allow for quantifying intangible benefits or for different alternatives using multiple criteria. Using percentage weights, one can assign values of importance to the different criteria. The weights must sum to 100 percent, and when multiplied by a score assigned to each criterion they allow a composite score that is the weighted average. For example, one could compare several alternatives using the following formula:

$$\text{Total Score} = \sum w_i c_i$$

Where:
w_i = criterion weight
c_i = criterion score
$0 \leq w_i \leq 1$

Table **2.3** compares three project alternatives using this system. The scoring model in Table **2.3** highlights several important ideas:

The scoring model can combine both qualitative and non-qualitative items. Whether one assigns more weight to intangible or intangible criteria depends on the philosophy of management or the client.

Weights and scores ran be largely subjective. This scoring is a two-edged sword. People use their judgment, or gut feelings, in assigning weights and scores, but may not necessarily have the same judgments. Thus, getting agreement among individuals may be difficult. One suggestion is to have different individuals assign weights and scores to the different criteria and then average these individual responses to create a composite score. Even if people don't agree, at least they have an opportunity to express their opinions. Another suggestion would be to use a relative score whenever possible. For example, let's say that the NPVs for the three alternatives were as follows:

	Alternative		
	A	**B**	**C**
NPV	$200	$400	$1,000

Since Alternative C has the highest NPV, we can determine a relative score (on a basis of 0 to 10) for each alternative as follows:

Alternative	NPV	Calculation	Relative Score
A	$1,000	($1,000 ÷ $1,000) × 10	10
B	$400	($400 ÷ $1,000) × 10	4
C	$200	($20 ÷ $1,000) × 10	2

[1] Closely related to the concept of Net Prcscnt Value is the popular concept called Internal Rate of Return (IRR). The IRR focuses on streams of cash flows and is the discount rate where the total present value of future cash flows equals the cost of the investment. In short, it is the rate where the NPV is equal to zero. Therefore, alternatives or projects with higher IRR are more desirable. Management may set a minimum desired IRR that an alternative or project must meet in order lo he considered. IRR can be readily computed with a financial calculator or by using specific spreadsheet or program functions; otherwise, the exact IRR must be interpolated.

Table 2.3 Comparison of Project Alternatives

Criterion		*Weight*	*Alternative A*	*Alternative B*	*Alternative C*
Financial	ROI	15%	2	4	10
	Payback	10%	3	5	10
	NPV	15%	2	4	10
Organizational	Alignment with strategic objectives	10%	3	5	8
	Likelihood of achieving project's MOV	10%	2	6	9
Project	Availability of skilled team members	5%	5	5	4
	Maintainability	5%	4	6	7
	Time to develop	5%	5	7	6
	Risk	5%	3	5	5
External	Customer satisfaction	10%	2	4	9
	Increased market share	10%	2	5	8
Total Score		**100%**	**2.65**	**4.85**	**8.50**

Note: Risk scores have a reverse scale—i.e., higher scores for risk imply lower levels of risk.

The scores used in this example range from 0 to 10; but there is nothing sacred about this range. One could use a scale of 0 to 100. Consistency rather than any particular scale is the key.

Financial models can be biased towards the short run. Although financial models are important and should be considered, they focus solely on the periods used in discounting cash flows. Scoring models go beyond this limitation because they allow for multi-criteria (Meredith and Mantel 2000).

Some criteria can be reversed-scored. In our example, higher scores for certain criteria make sense. For instance, higher financial performance measures inherently have higher scores. However, a criterion such as risk can be reversed-scored with lower risk alternatives having higher scores. If you reverse-score any criterion, it is beneficial to note these assumptions conspicuously for the reader.

Past experience may help create a more realistic business case. As mentioned before, many of the weights and scores are subjective. Instead of relying on guesswork, past experience with past projects can provide guidelines and a reference for ensuring that the selection models are relevant and realistic. Although the business situation, technology, and data will change over time, the process or method of preparing a business case and analyzing alternatives will remain much the same. Learning from past experience can improve the process and product associated with business cases and thus improves the likelihood of a project being approved and funded.

Step 8: Propose and Support the Recommendation Once the alternatives have been identified and analyzed, the last step is to recommend one of the options. It is important to remember that a proposed recommendation must be supported. If the analysis was done diligently, this recommendation should be a relatively easy task.

The business case should be formalized in a professional-looking report. Remember that the quality and accuracy of your work will be a reflection on you and your organization. A potential client or project sponsor may not give you a second chance. Figure 2.5 provides a template for developing a business case.

PROJECT SELECTION AND APPROVAL

The objective of the business case is to obtain approval and funding for a proposed alternative. However, a proposed project may have to compete against several others.

The criteria for selecting a **project portfolio,** a set of projects that an organization may fund, are very similar to the analysis and subsequent selection of the proposed project alternatives. Similar to portfolio theory in finance, an organization may wish to select a portfolio of IT projects that have varying levels of risk, technological complexity, size, and strategic intent (McFarlan 1981; Marchewka and Keil 1995). An IT project portfolio mainly comprised of projects with low risk or those that do not attempt to take advantage of new technology may lead to stagnation. The organization may not move ahead strategically and the IT employees may fail to grow professionally due to lack of challenge. On the other hand, an organization that focuses too heavily on risky projects employing cutting-edge technology may end up in a precarious position if the IT projects experience serious problems and failures. Learning from mistakes can be useful, unless the same mistakes are repeated over and over. Thus, an organization should attempt to balance its IT project portfolio with projects that have varying degrees of risk, cutting-edge technologies, and structure.

Unfortunately, as Harold Kerzner (Kerzner 2000, 120) points out, "What a company wants to do is not always what it can do." He contends that companies generally have a number of projects that they would like to undertake, but because of

The following provides a suggested outline for developing and writing a business case:

Cover Page
- Title and subtitle
- Author and address
- Date

Executive Summary
- Brief description of the problem or opportunity
- Brief description of organization's goal and strategy
- Brief description of project's MOV and how it ties to the organizational goal and strategy
- Brief description of each option or alternative analyzed
- Brief explanation of which alternative is being recommended and why

Introduction
- Background
- Current situation
- Description of the problem or opportunity
- Project's measurable organizational value
- How achieving the project's MOV will support the organization's goal and strategy
- Objectives of writing this business case

Alternatives
- Description of alternative 1 (Base Case)
- Description of alternative 2 ...
- Description of alternative N

Analysis of Alternatives
- Methodology of how alternatives will be analyzed
  - Data collection methods
  - Metrics used and explanation why they are relevant
- Presentation of results that compares each alternative
  - Metrics
  - Sensitivity analysis
  - Risks
  - Assumptions
- Proposed recommendation
- Required funding and support

Figure 2.5 Business Case Template

limited resources, they must prioritize and fund projects selectively. Depending on the demand for IT professionals or the state of the economy, it is not always feasible to hire new employees or to have them trained in time.

The IT Project Selection Process

Although each organization's selection process is different, this section describes the general process for selecting and funding a given project. The selection process determines which IT projects will be funded in a given period. This period can be for a quarter, year, or a time frame used by the organization. In order to weed out projects that have little chance of being approved, many organizations use an initial screening process in which business cases submitted for review are compared with a set of organizational standards that outline minimum requirements.

Projects that meet the minimum requirements are then forwarded to a decision-making committee of senior managers who have the authority to approve and provide the resources needed to support the project. On rare occasions an individual might make such decisions, but most organizations of any size prefer to use committees. The committee may compare several competing projects based on the costs, benefits, and risks to projects currently under development and to those already implemented. Projects selected should then be assigned to a project manager who selects the project team and then develops a project charter and detailed plan.

The Project Selection Decision

Even though each project proposal should be evaluated in terms of its value to the organization, it is important to reiterate that IT projects should not be undertaken for technology's sake. The decision to approve an IT project requires a number of conditions be met:

- The IT project must map directly to the organization's strategies and goals.
- The IT project must provide measurable organizational value that can be verified at the completion of the project.
- The selection of an IT project should be based upon diversity of measures that include:
  - Tangible costs and benefits
  - Intangible costs and benefits
  - Various levels throughout the organization (e.g., individual, process, department, and enterprise)

One way to select an IT project portfolio is to use the same methods that were used and discussed when analyzing the project alternatives in the business case. Today, however, there are several ways to measure the expected and realized value of IT to an organization. One method that is becoming increasingly popular is the **Balanced Scorecard** approach that was introduced by Robert S. Kaplan and David Norton in a 1992 *Harvard* ***Business Review*** article. Instead of focusing solely on the financial impact of a decision, the Balanced Scorecard approach helps balance traditional financial measures with operational metrics across four different perspectives: finance, customer satisfaction, internal business processes, and the organization's ability to innovate and learn (Kaplan and Norton 1992; Kaplan and Norton 1993).

An organization that utilizes the Balanced Scorecard approach must create a set of measurements, or key performance indicators, for each of the perspectives

illustrated in Figure 2.6. In turn, these measures are used to create a report or scorecard for the organization that allows management to track, or keep score, of the organization's performance. The four perspectives provide a balanced approach in terms of tangible and intangible benefits and long and short term objectives, as well as how each perspective's desired outcomes and drivers impact the other perspectives.

Financial perspective—The Balanced Scorecard approach encourages managers to consider measures other than traditional financial measures for strategic success. Most financial measures are useful for understanding how an organization performed in the past, and some have likened this to steering the ship by watching the wake. Traditional financial measures, however, are still important and can be a cornerstone for ensuring that an organization's strategies are being implemented properly. More importantly, the Balanced Scorecard approach provides a means for linking financial performance with customer focused-initiatives, internal operations, and investments in employees and the infrastructure to support their performance. Although traditional financial measures that include operating income—ROI, NPV, IRR, and so forth—are still useful, many organizations are now using new financial measures as well. One financial measure that has been receiving a great deal of attention and scrutiny recently is **Economic** Value **Added** (EVA). EVA is a measurement tool to determine if an organization is earning

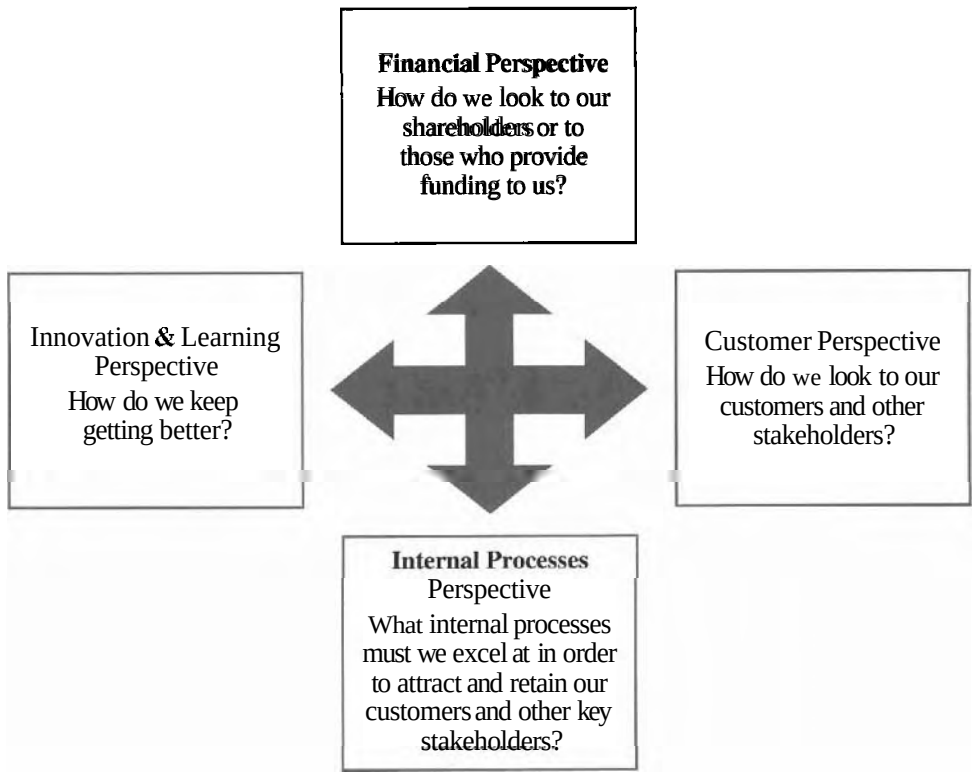

Figure 2.6 A Balanced Scorecard Approach

more than its true cost of capital. Supporters of EVA believe it provides a clearer picture on whether management is creating or destroying shareholder wealth. **EVA** is calculated by considering the cost of debt (e.g., the interest rate a bank would charge) and the cost of equity (e.g., what shareholders could earn elsewhere). Subsequently, a positive **EVA** indicates that positive wealth has been created.

Customer perspective — How an organization performs in its customers' eyes largely determines customer satisfaction. In turn, satisfied customers can mean repeat business and referrals for new business. As a result, measures or targets for customer satisfaction can be linked to financial rewards. They create a value chain for establishing customer-focused initiatives that can be linked to financial performance. Customer-based measurements may focus on areas that determine the level of satisfaction with the products and services of the company and how well those product and services are delivered.

Internal process perspective — The internal process perspective focuses on the processes — both long term and short term — that an organization must excel at in order to achieve its customer and financial objectives. Customer satisfaction can be achieved through improved operational activities by the organization, which in turn leads to improved financial performance. Therefore, internal-based measurements should focus on the efficiency and effectiveness of the organization's processes.

Innovation and *learning perspective*—The abilities, capabilities, and motivations of the people within an organization determine the outcomes of the operational activities, financial performance, and levels of customer satisfaction within the organization. Thus, an organization relies heavily on its people not only to support the other three perspectives, but also to provide continuous improvements in these areas. An organization's ability to innovate and learn at the individual level is critical for supporting the organization as a whole. Therefore, the Balanced Scorecard approach gives considerable support to the importance of investing in the future by investing in people and makes investing in human infrastructure at least as important as investing in technical and physical infrastructures. Measures for the innovation and learning perspective may include training, certifications, and employee satisfaction and retention.

By measuring the value of an IT project across these four areas, the scorecard approach compels an organization's management to consider the impact and context of a project from an organization-wide view. It also limits the potential for overemphasizing traditional financial measurement at the expense of perspectives that include both tangible and intangible benefits. Still, the Balanced Scorecard can fail for a number of reasons (Schneiderman 1999):

The nonfinancial measurement variables are incorrectly identified as the primary drivers for stakeholder satisfaction.

Metrics are not properly defined.

Goals for improvements are negotiated and not based on stakeholder requirements, fundamental process limits, or capabilities.

No systematic way to map high-level goals with subprocess levels where the actual improvement activities reside.

Reliance on trial and error as a methodology for improvement.

There is no quantitative linkage between the nonfinancial and expected financial results.

The Balanced Scorecard approach is an overall performance management system that is useful for selecting all projects in an organization, monitoring their progress, and then evaluating their overall contribution. As illustrated in Figure 2.7, the MOV concept introduced earlier supports the Balanced Scorecard approach.

The MOV can be developed and reviewed in terms of how it supports the four Balanced Scorecard perspectives. However, the MOV concept can also support organizations that use other means of identifying a project's value to the organization.

CHAPTER SUMMARY

A methodology provides a blueprint or template for planning, managing, and controlling a project throughout its life cycle. Although the products of information systems projects are different, many of the processes are the same. In this chapter, a framework for an IT project methodology was introduced. This framework will be used throughout the remainder of this text and provides a basic foundation that will allow organizations to adapt it to their particular needs and from their lessons learned.

In addition, the concept of a project's measurable organizational value or MOV was introduced because it is an important tool for defining a project's goal and value to the organization. The MOV becomes the project's measure of success and must be measurable, agreed upon, and verifiable at the end of the project. A project's MOV must align with the organization's goals and strategies in order to provide value to the organization.

A business case defines the problem or opportunity, MOV, feasibility, costs, and benefits of several alternatives that an organization may choose in order to achieve its goals and strategies. Based on the analysis of the alternatives identified, a recommendation is made to approve and fund a specific project.

The business case is formalized in a report to senior management who may review several proposed projects. The decision to fund a particular project and add it to the organization's project portfolio depends largely on the resources available and the value of the project to the organization. One increasingly popular method for defining value to an organization is the Balanced Scorecard approach. This approach focuses on four perspectives—financial, customer, internal processes, and innovation and learning. Regardless of the selection approach, an organization should make the project selection decision based on a diverse set of measures and in terms of how well the project supports the goals and strategies of the organization.

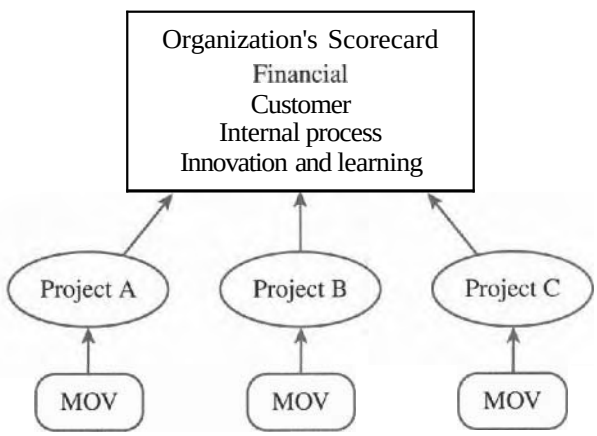

Figure 2.7 MOV and the Organization's Scorecard

REVIEW QUESTIONS

1. What are the advantages of having and following a project methodology?
2. Describe the five phases of the TT project methodology.
3. Why is it important to have deliverables for each phase of the IT project methodology?
4. How can the experiences of and lessons learned by past project team members be incorporated into a project methodology?
5. Describe the conceptualize and initialize phase of the IT project methodology
6. What is a project charter?
7. What are the advantages of developing a detailed project plan after a project has been approved for funding'?
8. Describe the execute and control phase of the IT project methodology.
9. Describe the close project phase of the IT project methodology.
10. Describe the evaluate project success phase of the IT project methodology.
11. Describe the five project management processes
12. Why can a project that is developed under budget and before its deadline still not he considered successful?
13. What kinds of tools would be needed to support an IT project?
14. How does an organizational infrastructure support a project?
15. What is a project infrastructure?
16. Describe a technical infrastructure that would be needed to support a consulting team working at a client site.
17. Discuss how the project management knowledge areas support the IT project methodology.
18. What is a business case?
19. Why should an organization develop a business case?
20. What is the purpose of selecting a core team to develop a business case?
21. What is a project's measurable organizational value (MOV)?
22. Develop a MOV for an organization that is contemplating developing a corporate intranet.
23. Why must a project's MOV be agreed upon?
24. Describe how a project's MOV can support an organization's goals and strategies.
25. Describe how an IT project can bring value to an organization.
26. What is a base case alternative? Why should a business case even consider a base case alternative?
27. Describe Economic Feasibility.
28. Describe Technical Feasibility.
29. Describe Organizational Feasibility.
30. What other types of feasibility issues should an organization consider?
31. How should the risk of each business case alternative be analyzed?
32. What is Total Cost of Ownership?
33. What is Total Benefits of Ownership?
34. What is the difference between tangible and intangible benefits? Give an example of each.
35. What are some ways of quantifying intangible benefits?
36. Describe the payback method. What are some advantages and disadvantages of this method?
37. Describe the breakeven method. What are some advantages and disadvantages of this method?
38. Describe the ROI method. What are some advantages and disadvantages of this method?
39. Describe the NPV method. What are some advantages and disadvantages of this method?
40. What effect does increasing the discount rate have on a project's NPV?
41. What are the advantages of using a scoring model when comparing several project alternatives? Any disadvantages?
42. What is an IT project portfolio?
43. Why shouldn't an organization always take on less challenging projects?
44. Describe the criteria that should be used to make a project selection decision?
45. Describe the Balanced Scorecard approach.
46. Describe the financial perspective of the Balanced Scorecard approach.
47. Describe the customer perspective of the Balanced Scorecard approach.
48. Describe the internal process perspective of the Balanced Scorecard approach.
49. Describe the innovation and learning perspective of the Balanced Scorecard approach.
50. How does the concept of MOV support the Balanced Scorecard approach?

EXTEND YOUR KNOWLEDGE

1. Using the Web or the library as a resource, write a one-page position paper on the Balanced Scorecard approach. Why does this approach seem to be gaining popularity?
2. Determine the Total Cost of Ownership (TCO) and Total Benefits of Ownership (TBO) for purchasing, maintaining, and supporting a personal computer of your choice over the next three years. You may want to use a spreadsheet package to conduct your analysis.
3. Analyze the TCO and TBO that you conducted in Question 2 using the payback, ROT, and NPV methods.
4. Create a scoring model to analyze whether to purchase a new car. Your alternatives are: keep your current mode of transportation, purchase a used car, or purchase a new car. Be sure to include both tangible and intangible costs and benefits.
5. Develop a Balanced Scorecard for an organization contemplating an Internet-based application that would allow its customers to look up their order status online.
6. Suppose a bank's goal is to gain competitive advantage by developing tighter relationships with its customers. Its strategy is to create focused differentiation through a customer relationship management (CRM) system. Develop project MOV and discuss how this MOV supports the goal and strategy of this organization.

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CHAPTER 3

Developing the Project Charter and Baseline Project Plan

CHAPTER OVERVIEW

Chapter 3 focuses on developing the project charter and project plan. After studying this chapter, you should understand and be able to:

- Describe the five project management processes and how they support each phase of the project life cycle.
- Define the project management knowledge area called project integration management and describe its role in project plan development, project plan execution, and overall change control.
- Develop a project charter and describe its relationship to the project plan.
- Identify the steps in the project planning framework introduced in this chapter and describe how this framework links the project's measurable organizational value (MOV) to the project's scope, schedule, and budget.

GLOBAL TECHNOLOGY SOLUTIONS

The quiet drive back to the office was a welcome respite for Tim Williams, even though he was catching the tail end of rush hour traffic. Traffic was moving well below the speed limit, so the time alone gave him a chance to reflect on the activities of the last few weeks. The business case for Husky Air was complete, and Tim had presented it to the company's senior management not more than thirty minutes ago.

Just as Tim was about to turn on the car's radio, his cell phone rang and he was immediately brought back to reality. Tim answered, and heard his business partner Kellie Matthews ask, "So, how did it go?"

"Not bad!" Tim replied. "In fact, senior management approved our recommendation and is willing make funds available for us to go on to the next step."

Kellie laughed and teased, "I guess that means we can pay the office rent next month. So what's our next step?"

The traffic had now come to a complete stop, so Tim didn't feel that talking on his cell phone was a distraction. "Now that we've completed the business case and Husky Air gave us the approval and funds, I would say that the first phase of our project methodology is complete," he said. "The next thing we need to do is develop a project charter and baseline plan that will outline what we're going to do, how we're going to do it, when we're going to do it, and how much it will cost."

"Wow," exclaimed Kelly, "I thought that was all outlined in the business case."

"The business case was a strategic plan, the project charter and baseline project plan are going to be our tactical plan," Tim explained. "This will also be a reality check to make sure that we can deliver the application to our client within the guidelines that were specified in the business case."

"Will this require another approval by Husky Air's management?" asked Kelly.

"Actually, there will be several more," answered Tim. "In fact, the CEO was pleased that our methodology has approval or review points throughout the project life cycle. He said that Husky Air hired a consulting firm a few years ago to develop an inventory system. The consultants never kept senior management informed after the project was approved. So the CEO was surprised to find out that the project was only half complete when the agreed upon project deadline arrived. Husky Air's management had only two choices: Cancel the project and take the loss, or bite the bullet and continue funding a project that would cost twice as much as originally planned. Needless to say, they never intend on hiring that consulting firm again."

"Well if the client is happy then we should be happy as well," Kelly said.

The traffic started moving again, and Tim said "I'll see you in the office tomorrow morning. We have a lot of work ahead of us."

Kellie agreed, and they both said good-bye before hanging up. Tim relaxed as the traffic started to move again. Even though there was still much work to be done before the actual work on the system would begin, he felt good that they had cleared the first hurdle. "What the heck," he thought. He turned off at the next exit and headed for his favorite Italian restaurant. "It's important to celebrate the small but important successes along the way," he told himself. "Pizza is perfect."

Things to Think About

1. Why is it important to have several status review and decision points throughout the project's life cycle?
2. Aside from ***reality checks*** what other purposes do status reviews and decision points throughout the project's life cycle provide?
3. How does a business case differ from the project charter/project plan?
4. Why is it important to celebrate the small but important successes?

INTRODUCTION

Up to this point, we have looked at IT project management from a very high or strategic level. The first phase of the IT project management methodology focuses on conceptualizing and initializing the project. The primary deliverable or work effort of this phase is the development of a business case. The business case defines the project's goal and value to the organization and includes an analysis and feasibility of several alternatives. Moreover, the business case plays an important role in the project selection process by providing sufficient, reliable information to senior management so that a decision whether the organization should support and fund the project can be made.

The basic question when conceptualizing and initializing the project is, What is the value of this project to the organization? Making the right decision is critical. Abandoning a project that will provide little real value to an organization at this early stage will save a great deal of time, money, and frustration. On the other hand, failure to fund a project that has a great deal of potential value is an opportunity lost.

The development of the business case and its subsequent approval represents an important milestone in the project's life cycle. Approval also represents closure for the first phase of the IT project methodology and the beginning of the next. This second phase, developing the project charter and plan, requires the review and approval of another project deliverable before even more time, resources, and energy are committed. At this point the question becomes, How should we do it? This requires a subtle yet important transition from a strategic mindset to a more tactical one.

Unfortunately, the knowledge, tools, and techniques required to develop a tactical project plan cannot be presented in a single chapter. Therefore, the next several chapters will focus on the human side of project management, defining and managing the project's scope, and on learning how to use or apply a number of estimation methods and project management tools.

Before we get to the details, this chapter provides an overview of the project planning process. This overview will include a more detailed discussion of the five project processes that were briefly introduced in Chapter 2 as part of the IT project methodology. More specifically, it explains how these processes are integrated with the various project management knowledge areas in order to support the development of the project's tactical plan. In fact, it will concentrate on one of the nine knowledge areas called project integration management. This particular area supports and coordinates: (1) project plan development, (2) project plan execution, and (3) overall change control.

The project charter and detailed project plan make up the project's tactical plan. The project charter defines the project infrastructure and identifies the project manager, the project team, the stakeholders, and the roles each will play within the project. In addition, the project charter formalizes the project's MOV, scope, supporting processes and controls, required resources, risks, and assumptions. This project infrastructure provides the foundation for developing a detailed project plan that answers four major questions: How much will the project cost? When will the project be finished? Who will be responsible for doing the work? And, what will we ultimately get at the end of the project?

In addition, a project planning framework will be introduced in this chapter that links the project's MOV to the project's scope, schedule, and budget. This framework outlines the steps necessary to create a detailed project plan so that management can determine whether the project's budget aligns with the cost analysis conducted in the business case. If the budget exceeds the overall cost envisioned in the business case, iterations to change the plan may be necessary to bring the project's scope, schedule, and budget in line. Cost cutting measures may require using less expensive resources or trade-offs in terms of reducing the scope and schedule. If the total cost of the project exceeds the expected organizational value, then the decision to cancel the project may be appropriate before more time, money, energy, and resources are committed to the next phase. However, once the project plan is approved, it then becomes the project's baseline plan that will be executed and used to benchmark actual progress.

PROJECT MANAGEMENT PROCESSES

Processes are an integral component of project management. They support all of the activities necessary to create and implement the product of the project. As described in Chapter 2, project management processes are concerned with defining and coordinating

D'OH!

The Center for Project Management in San Ramon, California examined twenty-four IT projects and compiled a list of ten dumb mistakes. The center then presented this list to fifty conference attendees and asked them to grade their organizations on each mistake. The average grade was between a C+ and D.

1. Mistaking every half-baked idea for a viable project.
2. Overlooking stakeholders, forgetting the champions, and ignoring the nemesis.
3. Not assessing the project's complexity.
4. Not developing a comprehensive project charter.
5. Not developing a comprehensive project plan.
6. Not designing a functional project organization.
7. Accepting or developing unrealistic or unachievable estimates.
8. Accepting status reports that contain mostly noise and not enough signal.
9. Looking back and not ahead.
10. Not following a robust project process architecture.

SOURCE: **Adapted** from "F.Y.I.", *Computerworld,* February *26,* **1996,** http://www.computerworld.com/news/1996/story/0,11280,14953,00.

the activities and controls needed to manage the project. On the other hand, product-oriented processes focus on the tangible results of the project, such as the application system itself. The product-oriented processes require specific domain knowledge, tools, and techniques in order to complete the work. For example, you would need completely different subject matter experts (SME), tools, and methods to build a house than you would to build a spacecraft to land on Mars. As Figure 3.1 suggests, there must be a balance between project management processes and product-oriented processes. An emphasis or sole focus on the project management processes does not provide the expertise or ability to define the project's scope or develop a quality system. However, a more product-oriented focus does not provide the management or controls to ensure that the work is completed as required. Therefore, a balance is needed to complete an IT project successfully.

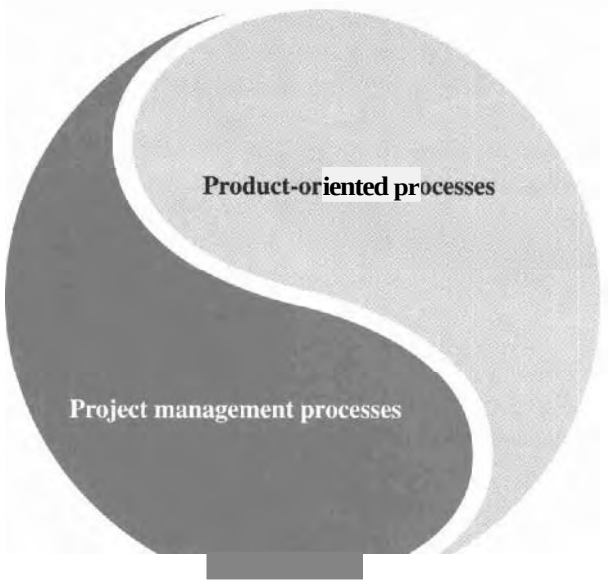

Figure **3.1** Project Processes

Project Management Process Groups

The five process groups were introduced briefly in Chapter 2. As illustrated in Figure 3.2, these process groups overlap within and between the different phases of the project life cycle since the outcome of one process group within a phase becomes the input or catalyst for a process group of the next phase.

Initiating The initiating process signals the beginning of the project or phase. It requires an organization to make a commitment in terms of time and resources. For example, the first phase of the IT project methodology recommends the development of a business case to identify several viable alternatives that can support a particular organization's strategy and goals. In short, the time and effort needed to develop the business case does not come without a cost. One can measure this cost directly in terms of the labor cost and time spent, and indirectly by the time and effort that could have been devoted to some other endeavor.

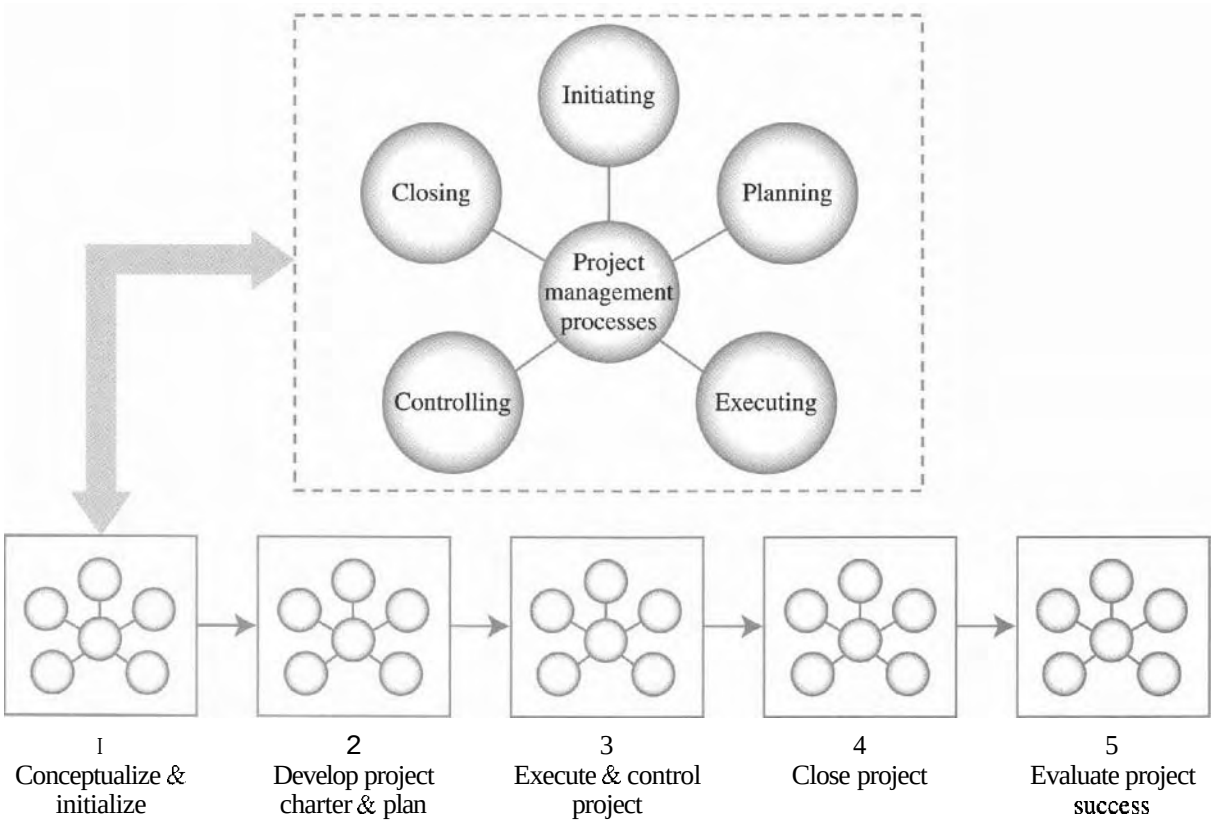

Figure 3.2 Project Management Processes and ITPM Phases

Therefore, some type of organizational commitment is needed even during the earliest stages of a project.

Similarly, a business case recommendation, once approved, becomes a project. This decision requires an even greater commitment in terms of time and resources; however, the next phase, when the actual work on the project commences, requires a commitment of even more time and resources. Although all phases of the project should have some type of initiating process, the first phase of the IT project methodology, conceptualize and initialize, requires the most detail and attention.

Planning Since projects are undertaken to create something of value that generally has not been done before, the planning process is of critical importance. The planning process should be in line with the size and complexity of the project—that is, larger, complex projects may require a greater planning effort than smaller, less complex projects. Although planning is important for each phase of the project, the second phase of the IT project methodology, developing the project charter and project plan, requires the most planning activities. In addition, planning is usually an iterative process. A project manager may develop a project plan, but senior management or the client may not approve the scope, budget, or schedule. In addition, planning is still more of an art than a science. Experience and good judgment are just as important as, and perhaps even more important to quality planning than, using the latest project management software tool. It is important that the project manager and project team

develop a realistic and useful project plan. Supporting processes include scope planning, activity planning, resource planning, cost estimating, schedule estimating, organizational planning, and procurement planning.

Executing Once the project plan has been developed and approved, it is time to execute the activities of the project plan or phase. The product-oriented processes play an important role when completing the project plan activities. For example, the tools and methods for developing and/or implementing a system become critical for achieving the project's end result. Supporting processes include quality assurance, risk management, team development, and an implementation plan. Although executing processes are part of every project phase, the majority of the executing processes will occur during the execute and control phase of the IT project methodology.

Controlling The controlling process group allows for managing and measuring the progress towards the project's MOV and the scope, schedule, budget, and quality objectives. Controls not only tell the project team when deviations from the plan occur, but also measure progress towards the project's goal. Supporting processes include scope control, change control, schedule control, budget control, quality control, and a communications plan. The emphasis on controlling processes will occur during the execution and control phase of the IT project methodology.

Closing The closing process group focuses on bringing a project or project phase to a systematic and orderly completion. The project team must verify that all deliverables have been satisfactorily completed before the project sponsor accepts the project's product. In addition, the final product—the information system—must be integrated successfully into the day-to-day operations of the organization. Closure of a project should include **contract closure** and **administrative closure.** Contract closure ensures that all of the deliverables and agreed upon terms of the project have been completed and delivered so that the project can end. It allows resources to be reassigned and settlement or payment of any account, if applicable. Administrative closure, on the other hand, involves documenting and archiving all project documents. It also includes evaluating the project in terms of whether it achieved its MOV. Lessons learned should be documented and stored in a way that allows them to be made available to other project teams, present and future. Although each phase must include closing processes, the major emphasis on closing processes will occur during the close project phase of the IT project methodology.

PROJECT INTEGRATION MANAGEMENT

The Project Management Body of Knowledge (PMBOK) views project integration management as one of the most important knowledge areas because it coordinates the other eight knowledge areas and all of the project management processes throughout the project's life cycle. It is up to the project manager to ensure that all of the activities and processes are coordinated in order for the project to meet or exceed its MOV. All of these knowledge areas and processes must come together to support the development of the project plan, its execution, and overall change control. As Figure 3.3 illustrates, project integration management includes: (I) project plan development, (2) project plan execution, and **(3)** overall change control. This section describes how these processes and various knowledge areas interact with each other.

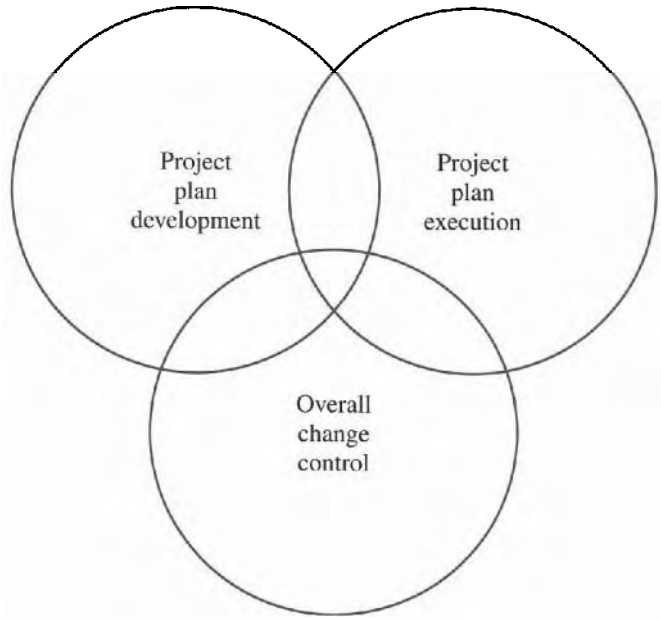

Figure 3.3 Project Integration Management

Project Plan Development

The purpose of project plan development is to create a useable, flexible, consistent, and logical document that will guide the work or activities of the project. In addition, the project plan provides a control mechanism for coordinating changes across the entire project.

As you will soon find out for yourself, project planning is an iterative process. A first cut or draft of the project plan is developed based on the business case and any other information as it becomes available. Historical information from past projects can be a useful resource for understanding how these project plans fared in terms of the accuracy and completeness of their estimates. They can also serve as a source for drawing upon new ideas and lessons learned.

In addition, the policies and procedures of the organization must be taken into account when developing the project plan. For example, formal accounting procedures may have to be followed for the disbursement of funds for such things as travel, training, or payments to vendors. On the other hand, an organization may have either formal or informal policies for such things as hiring and firing employees or conducting performance and merit reviews. Internal project teams may be familiar with these organizational policies, while outside consultants may have to learn them as they go along. Regardless of whether the project team is internal or external to the organization, it is important that the project manager and team learn, understand, and follow these policies, because they can impact the project plan estimates.

Various constraints and assumptions must also be taken into consideration and documented when developing the project plan. **Constraints** are things that can limit the project and usually can have an impact on scope, schedule, budget, or quality. For example, the project may have to be completed by a specific date or within a predefined budget. On the other hand, **assumptions** can be thought of as things that must go right in order for the project plan to be completed as planned. Assumptions can be, for example, a skilled and experienced programmer being available by a specific date or a vendor delivering hardware and/or software in time for a development activity to begin. Constraints and assumptions are closely related to risk. The development of a risk management plan should be part of the project plan.

A method for project planning is a critical element for developing a project plan, all projects should follow a structured process. Various software tools, such as Microsoft Project, can be useful for developing the project plan.

A software tool, however, cannot create the perfect project plan by itself. The project manager should engage various stakeholders throughout the planning process. These stakeholders can be managers or subject matter experts (SME) who can contribute valuable knowledge or expertise to refine the project plan. In short, the project plan should also consider who will be needed, when they will be needed, and how they will be needed to help create the product of the project.

Project Plan Execution

The purpose of the project planning process is to create a document that can be carried out in order to achieve the project's MOV. It is important to have a realistic and usable project plan because the project will expend the majority of its assigned resources executing it. It is, therefore, necessary that the plan be used not only to coordinate the resources that will perform certain scheduled activities, but also to gauge the project's progress towards its goal.

Today, most organizations use some type of project management software tool such as Microsoft Project to manage and control the project. Project management software tools not only help to create and track a project's progress, but also act as an information system for reporting project performance and making decisions.

The project's product will directly determine the skills and knowledge areas needed by the project team members. The project manager must ensure that specific team members either have specific skills or knowledge coming into the project or that they will acquire them in due time through training.

The execution of the project plan must also have some type of work **authorization** system in place. A work authorization system is just a way of sanctioning or authorizing project team members to perform a specific activity or group of related activities to ensure that the right things are done in the proper sequence.

Depending on the size and complexity of the project, the work authorization system can be either formal or informal. For smaller projects, a work authorization system may be nothing more than the project manager giving a project team member verbal approval to begin working on a specific activity outlined in the project plan. On the other hand, activities on larger, more complex projects may require a more formal approval because each team member may be working on a piece of the application system. In turn, their activities may depend upon the activities of someone else or some other group. The project manager must have the larger picture in mind, and specific activities must be verified as being complete before other activities can begin. For example, one set of activities for an IT application system may be the gathering and documenting of requirements during the systems analysis phase. Several individuals or groups may work on this activity together. Design and programming activities should not begin until the information requirements are complete and verified; otherwise, time and resources will be wasted if changes must be made later. Experience has shown that the cost of making changes or correcting errors in the later stages of a project is more expensive.

Status review meetings are a useful tool for coordinating the project processes and activities. Status review meetings are regularly scheduled meetings that the project manager and project team members have with key stakeholders. The purpose of these meetings is to keep everyone informed as to the status of the project. Project status meetings can be formal or informal and can include different levels of stakeholders. Regularly scheduled status meetings not only keep everyone informed, but help focus the project team's attention on meeting key deadlines for deliverables. Meetings with project stakeholders tend to go more smoothly when the project is progressing as planned.

Overall Change Control

Status review meetings provide a catalyst or at least an opportunity for change. For instance, a project stakeholder may introduce an idea that would change or expand the scope of the project. Regardless whether this change increases or decreases the project's value to the organization, the project must have controls in place to manage change. Overall change controls must: (1) ensure that a process is in place to evaluate

the value of a proposed change, (2) determine whether an accepted change has been implemented, (3) include procedures for handling emergencies—that is, automatic approval for defined situations, and (4) help the project manager manage change so that change does not disrupt the focus or work of the project team.

Many organizations have a Change Control Board (CCB) made up of various managers responsible for evaluating and approving change requests. If an organization does not have an overall change control process in place, the project manager should develop one as part of the project charter.

THE PROJECT CHARTER

The **project charter** and baseline project plan provide a tactical plan for carrying out or executing the IT project. More specifically, the project charter serves as an agreement or contract between the project sponsor and project team—documenting the project's MOV, defining its infrastructure, summarizing the project plan details, defining roles and responsibilities, showing project commitments, and explaining project control mechanisms.

Documenting the Project's MOV—Although the project's MOV was included in the business case, it is important that the MOV be clearly defined and agreed upon before developing or executing the project plan. At this point, the MOV must be cast in stone. Once agreed upon, the MOV for a project should not change. As you will see, the MOV drives the project planning process and is fundamental for all project-related decisions.

Defining the Project *Infrastructure*—The project charter defines all of the people, resources, technology, methods, project management processes, and knowledge areas that are required to support the project. In short, the project charter will detail everything needed to carry out the project. Moreover, this infrastructure must not only be in place, but must also be taken into account when developing the project plan. For example, knowing who will be on the project team and what resources will be available to them can help the project manager estimate the amount of time a particular task or set of activities will require. It makes sense that a highly skilled and experienced team member with adequate resources should require less time to complete a certain task than an inexperienced person with inadequate resources. Keep in mind, however, that you can introduce risk to your project plan if you develop your estimates based upon the abilities of your best people. If one of these individuals should leave sometime during the project, you may have to replace them with someone less skilled or experienced. As a result, you will either have to revise your estimates or face the possibility of the project exceeding its deadline.

Summarizing the Details *of the* Project Plan—The project charter should summarize the scope, schedule, budget, quality objectives, deliverables, and milestones of the project. It should serve as an important communication tool that provides a consolidated source of information about the project that can be referenced throughout the project life cycle.

Defining Roles and Responsibilities—The project charter should not only identify the project sponsor, project manager, and project team, but also when and how they will be involved throughout the project life cycle. In addition, the project charter should specify the lines of reporting and who will be responsible for specific decisions.

ARE IT PROJECTS DIFFERENT?

Many organizations view project management as an investment to improve the likelihood of success of IT projects. However, Gopal K. Kapur believes that the principles and practices of project management have been developed by the engineering profession. Based upon his experience, first as a civil engineer and then as an IT project manager, Kapur strongly believes that IT projects are more difficult to manage than engineering projects. For IT project management to work, the IT profession must adapt and expand the engineering Project Management Body of Knowledge. Kapur lists seven key differences:

1. The engineer uses artists' renderings, architectural models, and drawings that describe clearly the final product or end state ***before*** construction begins. However, the final product or end state of an IT project is not always clearly defined or known until the later stages of the project.
2. The phases of a construction project are more linear, and the boundaries for each phase are well defined. On the other hand, the phases of an IT project are more complex because they tend to overlap or spiral.
3. The construction process for engineering projects is based on fabricating the end product from pretested and predesigned components, while the code for most IT projects must be developed or written from scratch.
4. The deliverables for most engineering projects are defined precisely in terms of specifications. Deliverables for IT projects, however, are seldom defined as precisely and may be open to interpretation by various stakeholders.
5. Engineering projects often have extensive databases that contain accurate cost information that are available to estimators. IT estimation generally is based on best guess estimates because there are few sources that can provide historical information.
6. In engineering projects, the roles and responsibilities of team members are generally well defined (e.g., carpenters, plumbers, electricians, painters, and so forth), while a single person on an IT project may have to take on several roles or responsibilities.
7. Engineering drawings and specifications make use of standardized symbols, terms, and text. Little confusion arises from blueprints that depict electrical wiring or a map of the landscape. IT vendors, on the other hand, tend to try to create new terms, symbols, or text in order to distinguish themselves from their competition.

SOURCE: Adapted from Gopal K. Kapur, Why IT Project Management is So Hard to Grasp, *Computerworld,* May 3, 1999, http://www.computerworld.com/managementtopics/management/project/story/0,10801,35529,00.html.

- Showing Explicit Commitment to the Project — In addition to defining the roles and responsibilities of the various stakeholders, the project charter should detail the resources to be provided by the project sponsor and specify clearly who will take ownership of the project's product once the project is completed. Approval of the project charter gives the project team the formal authority to begin work on the project.
- Setting Out Project Control Mechanisms — Changes to the project's scope, schedule, and budget will undoubtedly be required over the course of the project. But, the project manager can lose control and the project team can lose its focus if these changes are not managed properly. Therefore, the project charter should outline a process for requesting and responding to proposed changes.

In general, the project charter and project plan should be developed together — the details of the project plan need to be summarized in the project charter, and the infrastructure outlined in the project charter will influence the estimates used in developing the project plan. It is the responsibility of the project manager to ensure that the project charter and plan are developed, agreed upon, and approved. Like the business case, the project charter and plan should be developed with both the project team and the project sponsor to ensure that the project will support the organization and that the goal and objective of the project are realistic and achievable.

What Should Be in a Project Charter?

The framework for a project charter should be based on the nine project management knowledge areas and processes. Although the formality and depth of developing a project charter will most likely depend on the size and complexity of the project, the fundamental project management processes and areas should be addressed and included for all projects. This section presents an overview of the typical areas that may go into a project charter; however, organizations and project managers should adapt the project charter based on best practices, experience, and the project itself.

Project Identification It is common for all projects to have a unique name or a way to identify them. It is especially necessary if an organization has several projects underway at once. Naming a project can also give the project team and stakeholders a sense of identity and ownership. Often organizations will use some type of acronym for the project's name. For example, instead of naming a project something as mundane as the Flight Reservation System in 1965, American Airlines named its system SABRE. Today, SABRE has become a well-recognized product that connects travel agents and online customers with all of the major airlines, car rental companies, hotels, railways, and cmise lines.

Project Stakeholders It is important that the project charter specifically name the project sponsor and the project manager. This reduces the likelihood of confusion when determining who will take ownership of the project's product and who will be the leader of the project. In addition, the project team should be named along with their titles or roles in the project, their phone numbers, and e-mail addresses. This section should describe who will be involved in the project, how they will be involved, and when they will be involved. Formal reporting relationships can be specified and may be useful on larger projects. In addition, including telephone numbers and e-mail addresses can provide a handy directory for getting in touch with the various participants.

Project Description The project charter should be a single source of information. Therefore, it may be useful to include a description of the project to help someone unfamiliar with the project understand not only the details, but the larger picture as well. This may include a brief overview or background of the project as to the problem or opportunity that became a catalyst for the project and the reason or purpose for taking on the project. It may also be useful to include the vision of the organization or project and how it aligns with the organization's goal and strategy. Much of this section could summarize the total benefits expected from the project that were described in the business case. It is important that the project description focus on the business and not the technology.

Measurable Organizational Value (MOV) The MOV should be clear, concise, agreed upon, and made explicit to all of the project stakeholders. Therefore, the project's MOV should be highlighted and easily identifiable in the project charter.

Project Scope The project's scope is the work to be completed. A specific section of the project charter should clarify not only what will be produced or delivered by the project team, but also what will ***not*** be part of the project's scope. This distinction is important for two reasons. First, it provides the foundation for developing the project plan's schedule and cost estimates. Changes to the project's scope will impact the project's schedule and budget—that is, if resources are fixed, expanding the amount work you have to complete will take more time and money. Therefore, the creation of additional work for the project team will extend the project's schedule and invariably increase the cost of the

project. Formal procedures must be in place to control and manage the project's scope. Secondly, it is important for the project manager to manage the expectations of the project sponsor and the project team. By making the project's scope explicit as to what is and what is not to be delivered, the likelihood of confusion and misunderstanding is reduced.

For example, the project team and several users may have several discussions regarding the scope of a project. One user may suggest that the system should allow for the download of reports to a wireless personal digital assistant **(PDA).** After discussing this idea in depth, management may decide that the cost and time to add this wireless PDA capability would not be in the organization's best interest. In this case, it would be a good idea to explicitly state in the project charter that wireless **PDA** capability will not be part of the project's scope. Although *you* may be clear on this issue, others may still have different expectations. The project's scope should, therefore, define key deliverables and/or high-level descriptions of the information system's functionality. The details of the system's features and functionality will, however, be determined later in the systems development life cycle when the project team conducts an information requirements analysis.

Project Schedule Although the details of the project's schedule will be in the project plan, it is important to summarize the detail of the plan with respect to the expected start and completion dates. In addition, expected dates for major deliverables, milestones, and phases should be highlighted and summarized at a very high level.

Project Budget A section of the project charter should highlight the total cost of the project. The total cost of the project should be summarized directly from the project plan.

Quality Issues Although a quality management plan should be in place to support the project, a section that identifies any known or required quality standards should be made explicit in the project charter. For example, an application system's reports may have to meet a government agency's requirements.

Resources Because the project charter acts as an agreement or contract, it may be useful to specify the resources required and who is responsible for providing those resources. Resources may include people, technology, or facilities to support the project team. It would be somewhat awkward for a team of consultants to arrive at the client's organization and find that the only space available for them to work is a corner table in the company cafeteria! Therefore, explicitly outlining the resources needed and who is responsible for what can reduce the likelihood for confusion or misunderstanding.

Assumptions and Risks Any risks or assumptions should be documented in the project charter. Assumptions may include things that must go right, such as a particular team member being available for the project, or specific criteria used in developing the project plan estimates. Risks, on the other hand, may be thought of as anything that can go wrong or things that may impact the success of the project. Although a risk management plan should be in place to support the project team, the project charter should summarize the following potential impacts:

Key situations or events that could significantly impact the project's scope, schedule, or budget. These risks, their likelihood, and the strategy to overcome or minimize their impact should be detailed in the project's risk plan.

Any known constraints that may be imposed by the organization or project environment should be documented. Known constraints may include

such things as imposed deadlines, budgets, or required technology tools or platforms.

Dependencies on other projects internal or external to the organization. In most cases, an IT project is one of several being undertaken by an organization. Subsequently, dependencies between projects may exist, especially if different application systems or technology platforms must be integrated. It may also be important to describe the project's role in relation to other projects.

Impacts on different areas of the organization. As described in Chapter 1, IT projects operate in a broader environment than the project itself. As a result, the development and implementation of an IT solution will have an impact on the organization. It is important to describe how the project will impact the organization in terms of disruption, downtime, or loss of productivity.

- *Any outstanding issues.* It is important to highlight any outstanding issues that need further resolution. These may be issues identified by the project sponsor, the project manager, or the project team that must be addressed and agreed upon at some point during the project. They may include such things as resources to be provided or decisions regarding the features or functionality of the system.

Project Administration Project administration focuses on the controls that will support the project. It may include:

A communications plan that outlines how the project's status or progress will be reported to various stakeholders. This plan also includes a process for reporting and resolving significant issues or problems as they arise.

A *scope managementplan* that describes how changes to the project's scope will be submitted, logged, and reviewed.

A *quality management plan* that details how quality planning, assurance, and control will be supported throughout the project life cycle. In addition, a plan for testing the information system will be included.

A *change management* and *implementation plan* that will specify how the project's product will be integrated into the organizational environment.

A *human resources plan* for staff acquisition and team development.

Acceptance and Approval Since the project charter serves as an agreement or contract between the project sponsor and project team, it may be necessary to have key stakeholders sign off on the project charter. By signing the document, the project stakeholder shows his/her formal acceptance of the project and, therefore, gives the project manager and team the authority to carry out the project plan.

References In developing the project charter and plan, the project manager may use a number of references. It is important to document these references in order to add credibility to the project charter and plan, as well as to provide a basis for supporting certain processes, practices, or estimates.

Terminology Many IT projects use certain terms or acronyms that may be unfamiliar to many people. Therefore, to reduce complexity and confusion, it may be useful to include a glossary giving the meaning of terms and acronyms, allowing all the project's stakeholders to use a common language. Figure **3.4** provides a template for a project charter. Feel free to adapt this template as needed.

PROJECTPLANNING FRAMEWORK

In this section, a project planning framework will be introduced. This framework is part of the IT project methodology and provides the steps and processes necessary to develop the detailed project plan that will support the project's MOV.

A project plan attempts to answer the following questions:

What needs to be done?
Who will do the work?
When will they do the work?
How long will it take?
How *much* will it cost?

The project planning framework illustrated in Figure 3.5 consists of several steps and processes. We will now focus on each of these steps to show how the project's schedule and budget are derived.

Project Name or Identification

Project Stakeholders
- Names
- Titles or roles
- Phone numbers
- E-mail addresses

Project Description
- Background
- Description of the challenge or opportunity
- Overview of the desired impact

Measurable Organizational Value (MOV)
- Statement or table format

Project Bope
- What will be included in the scope of this project
- What will be considered outside the scope of this project

Project Schedule Summary
- Project start date
  Project end date
- Timeline of project phases and milestones
- Project reviews and review dates

Project Budget Summary
- Total project budget
- Budget broken down by phase

Quality Issues
- Specific quality requirements

Resources Required
  People
  Technology
- Facilities
- Other
- Resources to be provided
  Resource
  Name of resource provider
  Date to be provided

Assumptions and Risks
- Assumptions used to develop estimates
- Key risks, probability of occurrence, and impact

Constraints
- Dependencies on other projects or areas within or outside the organization
- Assessment project's impact on the organization
- Outstanding issues

Project Administration
- Communications plan
- Scope management plan
- Quality management plan
- Change management plan
- Human resources plan
- Implementation and project closure plan

Acceptance and Approval
- Names, signatures, and dates for approval

References

Terminology or Glossary

Appendices (as required)

Figure **3.4** Project Charter Template

The MOV

The first step of the project planning framework entails finalizing the definition of and agreement on the project's measurable organizational value or MOV. Although an in-depth discussion of a project's MOV was provided in Chapter **2,** it is important here to focus on a few salient points. First, it is important that the project's MOV he defined and agreed upon before proceeding to the other steps of the project planning framework. The project's MOV provides a direct link to the organization's strategic mission; however, as Figure 3.5 illustrates, a project's MOV links directly to the project plan. Therefore, a project's MOV acts as a bridge between the strategic mission and objectives of the organization and the project plans of individual projects it undertakes. The MOV guides many of the decisions related to scope, schedule, budget, and resources throughout the project's life cycle.

Define the Project's Scope

Once the project's MOV has been defined and agreed upon by the project's stakeholders, the next step of the project planning framework is to define the project's scope.

The Project Management Body of Knowledge defines scope as the product or services to be provided by the project and includes all of the project deliverables. One can think of scope as the work that needs to be completed in order to achieve the project's MOV. Project scope management is one of the nine project management knowledge areas and entails the following processes:

Initiation--Once the project's MOV has been defined and agreed upon, the organization must make a commitment, in terms of time and resources, to define the project's scope in order to create the project plan.

Planning—The project team must develop a written statement that defines the work to be included, as well as the work not to be included in the project plan. The scope statement will be used to guide future project-related decisions and to set stakeholder expectations.

Definition—The project's scope must be organized into smaller and more manageable packages of work. These work packages will require resources and time to complete.

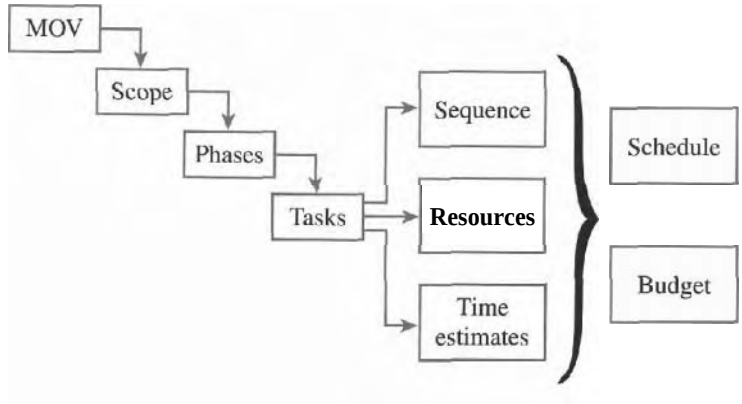

Figure 3.5 The Project Planning Framework—Defining the MOV

Verification—Once the project's scope has been defined, the project team and stakeholders must verify it to ensure that the work completed will in fact support the project in achieving its MOV.

Change *Control*—Controls must be in place to manage proposed changes to the project's scope. Scope changes can either move the project closer to its MOV or result in increased work that drains the project's budget and causes the project to exceed it scheduled deadline. Proper scope control procedures can ensure that the project stays on track.

Subdivide the Project into Phases

Once the project's scope has been defined and verified, the work of the project can be organized into phases in order to deliver the project's product. **Phases** are logical stages. Although the IT project methodology defines five high-level phases, IT projects should be further divided into subphases that follow the phases of the systems development life cycle (SDLC).

Breaking a project down into phases and subphases reduces complexity and risk. In many cases it is easier to focus on the pieces instead of the whole; however, it is important to never lose sight of the big picture. More specifically, each phase should focus on providing at least one specific deliverable—that is, a tangible and verifiable piece of work. In addition, a **milestone** is a significant event or achievement that provides evidence that that deliverable has been completed and that the phase or subphase is complete.

Tasks—Sequence, Resources, and Time Estimates

Once the project is divided into phases, tasks are then identified. A **task** may be thought of as a specific activity or unit of work to be completed. Examples of some tasks in an IT project may be to interview a particular user, write a program, or test links in a Web page. When considering tasks, it is important to consider sequences, resources, and time.

Sequence Some tasks may be linear—i.e., have to be completed in a particular sequence—while others can be completed in parallel—i.e., at the same time. Performing parallel tasks often provides an opportunity to shorten the overall length of the project. For example, assume that a project has two tasks—A and B. Task A will require only one day to complete; task B requires two days. If these tasks are completed one after the other, the project will finish in three days. On the other hand, if these tasks are performed in parallel, the length of the project will be two days. In this case, the length of the project is determined by the time it takes to complete the longest task (i.e., task B). This simple example illustrates two important points: (1) A project is constrained by the longest tasks, and (2) any opportunity to perform tasks in parallel can shorten the project schedule.

Resources Resources on an IT project may include such things as technology, facilities (e.g., meeting rooms), and people. Tasks require resources, and there is a cost associated with using a resource. The use of a resource may be accounted for by using a per-use charge or on a prorated basis—that is, a charge for the time you use that resource. For example, a developer earns $50,000 a year and is assigned to work on a task that takes one day to complete. The cost of completing that particular task would be prorated as $191 (assuming an eight-hour, five-day work week).

Time It will take a resource a specific amount of time to complete a task. The longer it takes a resource to complete a specific task, however, the longer the project will take to finish and the more it will cost. For example, if we plan on assigning our developer who earns $50,000 a year to a task that takes two days, then we would estimate the cost of completing that task to be approximately $400. If the developer completes the task in one half the time, then the cost of doing that task will be about $200. Moreover, if the developer were then free to start the next task, our schedule would then be ahead by one day. Unfortunately, the reverse is true. If we thought the task would take two days to complete (at a cost of $400) and it took the developer three days to complete, the project would be one day behind schedule and $200 over budget. However, if two tasks could be performed in parallel, with our developer working on Task A (one day) and another $50,000/year-developer working on Task B (two days), then even if Task A takes two days, our project schedule would not be impacted—as long as the developer working on Task B completes the task within the estimated two days. While this parallel work may save our schedule, our budget will still be $200 over budget because task A took twice as long to complete. Understanding this relationship among tasks, resources, and time will be important when developing the project plan and even more important later if it is necessary to adjust the project plan in order to meet schedule or budget constraints.

Schedule and Budget—The Baseline Plan

The detailed project plan is an output of the project planning framework. Once the tasks are identified and their sequence, resources required, and time-to-complete estimated, it is a relatively simple step to determine the project's schedule and budget. All of this information can be entered into a project management software package that can determine the start and end dates for the project, as well as the final cost.

Once the project plan is complete, it should be reviewed by the project manager, the project sponsor, and the project team to make sure it is complete, accurate, and, most importantly, able to achieve the project's MOV. Generally, the project plan will go through several iterations as new information becomes known or if there are compromises with respect to scope, schedule, and budget. In addition, many of the details of the project plan are summarized in the project charter in order to provide a clearer picture as to how the plan will be carried out. Once the project plan is approved, it becomes the baseline plan that will serve as a benchmark to measure and gauge the project's progress. The project manager will use this baseline plan to compare the actual schedule to the estimated schedule and the actual costs to budgeted costs.

THE KICK-OFF MEETING

Once the project charter and project plan are approved, many organizations have a **kick-off meeting** to officially start work on the project. The kick-off meeting is useful for several reasons. First, it brings closure to the planning phase of the project and signals the initiation of the next phase of the IT project methodology. Second, it is a way of communicating to everyone what the project is all about. Many kick-off meetings take on a festive atmosphere in order to energize the stakeholders and get them enthusiastic about working on the project. It is important that everyone starts working on the project with a positive attitude. How the project is managed from here on will determine largely whether that positive attitude carries through.

CHAPTER SUMMARY

Processes are important to project management because they support all of the activities needed to develop and manage the development of an IT solution. Product-oriented processes focus on the development of the application system itself and require specific domain knowledge, tools, and techniques. On the other hand, project management processes are needed to manage and coordinate all of the activities of the project. A balance of both product-oriented processes and project management processes is needed otherwise, the result may be a solution that is a technical success but an organizational failure. In addition, five project management process groups were introduced that support both the project and each phase of the project. These include: (1) initiating, (2) planning, **(3)** executing, (4) controlling, and (5) closing.

Project integration management is one of the most important Project Management Body of Knowledge areas. It coordinates and integrates the other knowledge areas and all of the project processes. Project integration management is concerned with three areas: (1) project plan development so that a useable, flexible, and consistent project plan is developed, (2) project plan execution so that the project plan is carried out in order achieve the project's MOV, and **(3)** overall change control to help manage change so that change does not disrupt the focus of the project team.

The project charter serves as an agreement and as a communication tool for all of the project stakeholders. The project charter documents the project's MOV and describes the infrastructure needed to support the project. In addition, the project charter summarizes many of the details found in the project plan. A well-written project charter should provide a consolidated source of information about the project and reduce the likelihood of confusion and misunderstanding. In general, the project charter and project plan should be developed together—the details of the project plan need to be summarized in the project charter, and the infrastructure outlined in the project charter will influence the estimates used to develop the project plan.

The project plan provides the details of the tactical plan that answers these questions: What needs to be done? Who will do the work? When will they do the work? How long will it take? How much will it cost?

A project planning framework was introduced and recommended a series of steps to follow in order to develop a detailed project plan. The details with respect to carrying out these steps will be the focus of subsequent chapters. Once the project charter and plan are approved, the project plan serves as a baseline plan that will allow the project manager to track and access the project's actual progress to the original plan. A kick-off meeting usually brings closure to the second phase of the IT project methodology and allows the project team to begin the work defined in the plan.

REVIEW QUESTIONS

1. What are project management processes? Give one example.
2. What are product-oriented processes? Give one example.
3. Why must a balance exist between project management processes and product-oriented processes?
4. Describe the initiating processes. Give one example of an initiating process to support a particular phase of the IT project methodology.
5. Describe the planning process. Give one example of a planning process to support a particular phase of the IT project methodology.
6. Describe the executing process. Give one example of an executing process to support a particular phase of the IT project methodology.
7. Describe the controlling process. Give one example of a controlling process to support a particular phase of the IT project methodology.
8. Describe the closing process. Give one example of a closing process to support a particular phase of the IT project methodology.
9. Describe how the output of project management process groups in one phase becomes the input or catalyst for the process group in the next phase. Provide an example.
10. What is the difference between contract closure and administrative closure?
11. Describe project integration management and its relationship to the other eight Project Management Body of Knowledge areas.
12. Describe project plan development and its importance to the second phase of the IT project methodology.
13. Describe project plan execution and its importance to project plan development.

14. Describe overall change control and its importance to the project team.
15. What is the purpose of a project charter?
16. Why can a project charter serve as an agreement or a contract?
17. Why is a project charter a useful communication tool?
18. Why should the project charter and project plan be developed together?
19. How does the project charter support the project plan?
20. How does the project plan support the project charter?
21. Describe the project planning framework.
22. Why is it important that the project's MOV be cast in stone.
23. Describe how the project's MOV supports the development of the project's scope, schedule, and budget.
24. What is a project's scope?
25. Why should a project he divided into phases?
26. What is a deliverable? What is the relationship between phases and deliverables?
27. What is a milestone? Why are milestones useful?
28. What is a task? Provide three examples of some typical tasks in an IT project.
29. What impact can the sequence of tasks have on a project's schedule?
30. How can resources impact the schedule of aproject?
31. What is a baseline plan? What purpose does it serve once the project team begins to execute the project plan?
32. What is a kick-off meeting? What purpose does it serve?

EXTEND YOUR KNOWLEDGE

1. You have just been hired by a local swim team to develop a Web site. This Web site will be used to provide information to boys and girls between the ages of six and eighteen who are interested in joining the team. In addition, the Web site will provide information about practices and the swim meet schedule for the season. The team would also like to be able to post the meet results. The head coach of the swim team is the project sponsor. He would also like the Web site to include pictures of the three assistant coaches and of the different swimmers at swim meets and practice. The swim team is supported largely by an association of parents who help run the swim meets and work the concession stand. Several of the parents have asked that a volunteer schedule be part of the Web site so that the parent volunteers can see when they are scheduled to work at a particular meet. The head coach, however, has told you that he believes this project can wait and should not be part of the Web site now. Two people will be helping you on the project. One is a graphic artist; the other is person who is very familiar with HTML, Java, Active Server Pages (ASP), and several Web development tools. Based upon the information provided, develop the basics of a project charter. Although you will not be able to develop a complete project charter at this point, you can get started on the following:
   a. Come up with a name for the project.
   b. Identify the project stakeholders, their roles, and their titles.
   c. Provide a brief description of the project.
   d. Develop a MOV for this project.
   e. Specify the project's scope in terms of the high-level features or functionality that should be included in the Web site.
   f. Specify what should not be included in the project's scope.
   g. Specify the resources that will be required and provide an estimated cost for each resource. (Be sure to include a reference or sound basis to justify the cost for each resource).
   h. Identify some of the risks associated with this project.
   i. You are free to make assumptions as needed, but be sure to document them!
2. Suppose a company is interested in purchasing a call center software package to improve its customer service. Describe the project management processes that would be needed to support the first two phases of the IT project methodology.
3. Plan a kick-off meeting for a project team.

CHAPTER

4

The Human Side of Project Management

CHAPTER OVERVIEW

Chapter 4 focuses on the human side of project management. After studying this chapter, you should understand and be able to:

- Describe the three major types of formal organizational structures: functional, pure project, and matrix.
- Discuss the advantages and disadvantages of the functional, pure project, and matrix organizational structures.
- Describe the informal organization.
- Develop a stakeholder analysis.
- Describe the difference between a work group and a team.
- Describe and apply the concept of learning cycles and lessons learned as a basis for knowledge management.

GLOBAL TECHNOLOGY SOLUTIONS

Tim Williams thought he was going to be the first one to arrive at the office, but as he turned into the parking lot, he could see Kellie Matthews' car in its usual spot. Tim parked his car next to Kellie's and strode into the GTS office. This was going to be an exciting and busy day because several new employees were going to report for their first day of work at GTS. He wanted to get to the office early so he could greet them and prepare for their day of orientation.

As Tim walked through the office door, he made a beeline for the small kitchen area where a fresh pot of coffee was waiting. The smell brought a smile to his face as he poured the dark liquid into his favorite coffee mug. Tim turned around as Kellie entered the kitchen area. "Good morning!" Kellie exclaimed. Tim never had been a morning person, and he wondered to himself how anyone could be so cheerful this early. He tried to

be as cheerful as possible given that he hadn't had his first cup of coffee. "Good morning to you, too." Tim could see that Kellie was at least one cup of coffee ahead of him, which gave him some consolation. "Care for another cup?" Tim asked as he offered to pour a cup for Kellie. "Sure, thanks," said Kellie as she held the cup out.

As Tim poured the coffee for Kellie, she smiled and said, "After you left yesterday, I received a phone call from Sitaramin. He said that he would accept our offer and join us at GTS next week." That news seemed to wake Tim up. "That's great!" Tim exclaimed.

Both Tim and Kellie have been busy during the last two weeks interviewing and negotiating with a number of candidates to join GTS. With the addition of Sitaramin, the team for the Husky Air project would be complete.

Kellie sipped her coffee and said, "Well, our budget for salaries is going to be slightly higher than we had planned, but I guess that can be expected given the job market for information systems professionals and the fact that we had to pay a premium because we're a start-up company. But if all goes well, I'm pretty sure that the Husky Air project will still be profitable for us. We can develop a detailed project plan and use the latest software metrics for planning the project schedule and budget, but the succcss of this project rests largely on how well this team performs."

Tim agreed, looked at his watch and said, "We have about an hour before our new employees arrive. I suggest we go over the details of the day's agenda one more time." Tim refilled his coffee mug and Kellie's before they made their way to the conference room where the orientation would be held. As they walked down the hall, Tim thought about what Kellie had said. He knew that it was going to be a challenge to form a cohesive and high-performance team from people who would meet for the first time in less than an hour.

Things to Think About

1. What feelings might a new employee have when starting a new job?
2. What could GTS do to help new employees transition successfully to their new jobs?
3. Why does the succcss of a project rest largely on the performance of the team?
4. How can a group of individuals become a cohesive and high-performing team?

INTRODUCTION

The key ingredients to IT Project management are people, processes, and technology. Technology is a tool, while processes provide a structure and path for managing and carrying out the project. The success of a project, however, is often determined by the various project stakeholders, as well as who is (or who is not) on the project team.

In this chapter, we will discuss the human side of project management. According to the Project Management Body of Knowledge, the area of project human resource management entails: (1) organizational planning, (2) staff acquisition, and **(3)** team development.

Organizational planning focuses on the roles, responsibilities, and relationships among the project stakeholders. These individuals or groups can be internal or external to the project. Moreover, organizational planning involves creating a project structure that will support the project processes and stakeholders so that the project is carried out efficiently and effectively.

Staff acquisition includes staffing the project with the best available human resources. Effective staffing involves having policies, procedures, and practices to guide the recruitment of appropriately skilled and experienced staff. Moreover, it may include negotiating for staff from other functional areas within the organization. Team development involves creating an environment to develop and support the individual team members and the team itself.

This chapter will expand upon these three PMBOK concepts and integrate several relatively recent concepts for understanding the human side of IT project management. In the next section, we will focus on project and organizational planning. Three primary organizational structures—the functional, project, and **matrix**—will be described. In addition, the various opportunities and challenges for projects conducted under each structure will be discussed. As a project manager or project team member, it is important to understand an organization's structure since this will determine authorities, roles, responsibilities, communication channels, and availability of resources.

While the formal organizational structure defines official roles, responsibilities, and reporting relationships, informal relationships will exist as well. It is important to understand why these informal structures and relationships exist and how they can influence the relationships among the different project stakeholders. In addition, understanding both the formal and informal organizations will help you to understand not only who makes certain decisions, but also why certain decisions are made.

We will also focus on the various roles of the project manager. In general, one of the greatest responsibilities of the project manager is the selection and recruitment of the project team. Once the project team is in place, the project manager must also ensure that the project team members work together to achieve the project's MOV. Therefore, the language and discipline of ***real teams*** versus ***workgroups*** will be introduce'd. These concepts will provide the basis for understanding the dynamics of the project team.

Once the project team is in place, it is important that the project team learn from each other and from past project experiences. Thus, the idea of learning cycles will be introduced as a tool for team learning and for capturing lessons learned that can be documented, stored, and retrieved using a knowledge management system.

In the last section of this chapter, we will focus on the project environment. In addition to staffing the project, the project manager must create an environment to support the project tcam. If necessary, this includes appropriating a suitable place for the team to work and ensuring that the team has the proper tools and supplies needed to accomplish their work.

ORGANIZATION AND PROJECT PLANNING

The performance of an organization or a project is influenced largely by how well its resources arc organized. In general. structures are created within an organization to manage the input, processing, and output of resources. For example, departments or areas based on the svecialized skills needed to manage a particular resource are created—i.e., accounting and finance manages the money resources, personnel manages the human resources, and information systems manages the information resource. As a result, many organizations adopt a structure based upon function. Other organizations may adopt a structure based on the products it sells or its customers. These structures may use brand management or geographical divisions.

However, the structure of an organization must fit its strategy, and since organizations may follow different strategies, it makes sense that no single structure can work well for every organization. Therefore, there are different organizational structures and ways to efficiently and effectively manage not only the organizational resources but also the work and processes involved. As long as the firm performs well, a particular structure and strategy will exist. On the other hand, when a firm performs poorly, a change in structure and/or strategy may be required.

Projects are part of an organization and can be thought of as micro organizations that require resources, processes, and structure. Moreover, these resources, processes, and structures are determined largely by the organizational structure of the supporting or parent organization, which may determine or influence the availability of resources, reporting relationships, and project roles and responsibilities. Therefore, it is important to understand how the project interfaces with the host or parent organization and how the project itself will be organized. In this section, we will focus on three formal structures that tie projects explicitly to the organization. Each structure provides distinct opportunities and challenges, and choosing and implementing the correct structure can have a major impact on both the project and the organization.

The Formal Organization

An organization's structure reveals the fonnal groupings and specializations ofactivities. Generally, these groupings and activities are documented in an organizational chart to clarify and portray the lines of authority, communication, reporling relationships; and responsibilities of individuals and groups within the organization. Although an organization's formal structure does not tell us anything about the informal lines of communication among its subunits, it does provide us with an indication of how a project will interface with the parent or supporting organization. In other words, the formal organizational structure will determine how resources are allocated, who has authority over those resources, and who is really in charge of the project.

Figure 4.1 illustrates the three most common structures—the functional, matrix, and project-based organization. Keep in mind that these organizations are not exhaustive—they represent a continuum of approaches that may evolve over time or as the result of a unique situation. An organization may choose to combine these forms any number of ways to create a hybrid organization such as a **functional matrix** or **project matrix.**

The Functional Organization The functional organizational structure may be thought of as the more traditional organizational form. This particular structure is based upon organizing resources to perform specialized tasks or activities in order to attain the goals of the organization. As Figure 4.2 illustrates, individuals and subunits (i.e., groups of individuals) perform similar functions and have similar areas of expertise. Subsequently, projects are managed within the existing functional hierarchy.

Projects in a functional organization are typically coordinated through customary channels and housed within a particular function. For example, a project to install a new machine would be a self-contained project within the manufacturing function because the expertise required for the project would reside within the manufacturing subunit. The project manager would most likely be a senior manufacturing manager, and the project team would he made up of individuals from the engineering and production areas. As a result, the manufacturing subunit would be responsible for managing the project and for supplying and coordinating all of the resources dedicated to the project.

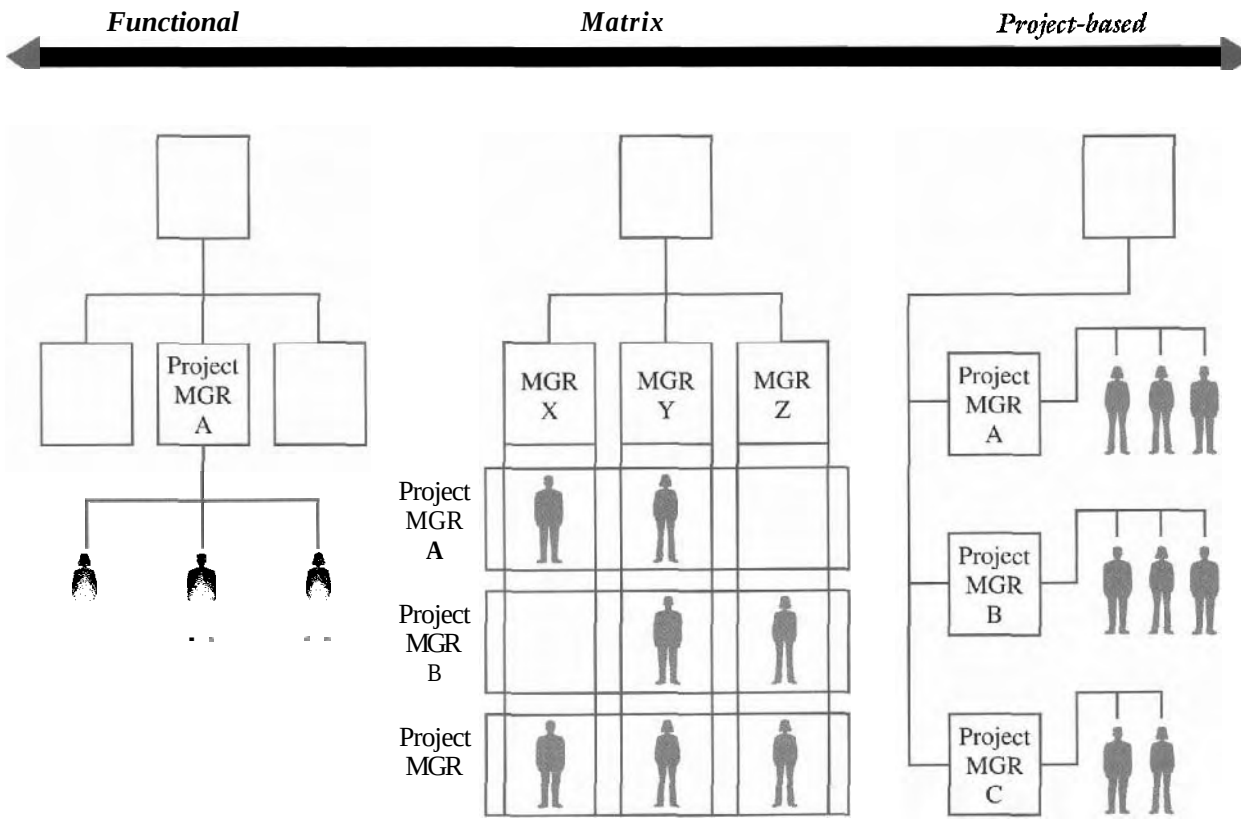

Figure 4.1 Organizational Structures

However, a project may cross functional boundaries. In the case of an information technology project, the knowledge and expertise to design and develop an application may reside in the information systems subunit, while the domain or functional knowledge resides in one of the functional subunits. As a result, the project team may consist of individuals from two or more functional areas. There are two main issues that must be resolved at the outset of a project: Who will be responsible for the project? What resources will each subunit provide?

There are a number of advantages for projects sponsored by organizations with functional structures. These include:

Increased flexibility—Subject matter experts and other resources can be assigned to the project as needed. In addition, an individual can be part of the project team on a full-time or part-time basis. Once the project is completed, the project team members can return to their respective functional units.

Breadth and ***depth of*** knowledge and experience—Individuals from a particular subunit can bring a wealth of knowledge, expertise, and experience to the project. This knowledge can be expanded even further as a result of their experiences with the project. As a result, the project experience may lead to greater opportunities for career advancement within the subunit. If the project crosses functional areas, an opportunity exists for these individuals to learn from each so that a less parochial solution can be developed.

Less *duplication*—Coordination of resources and activities can lead to less duplication of resources across projects since specialization of skills and

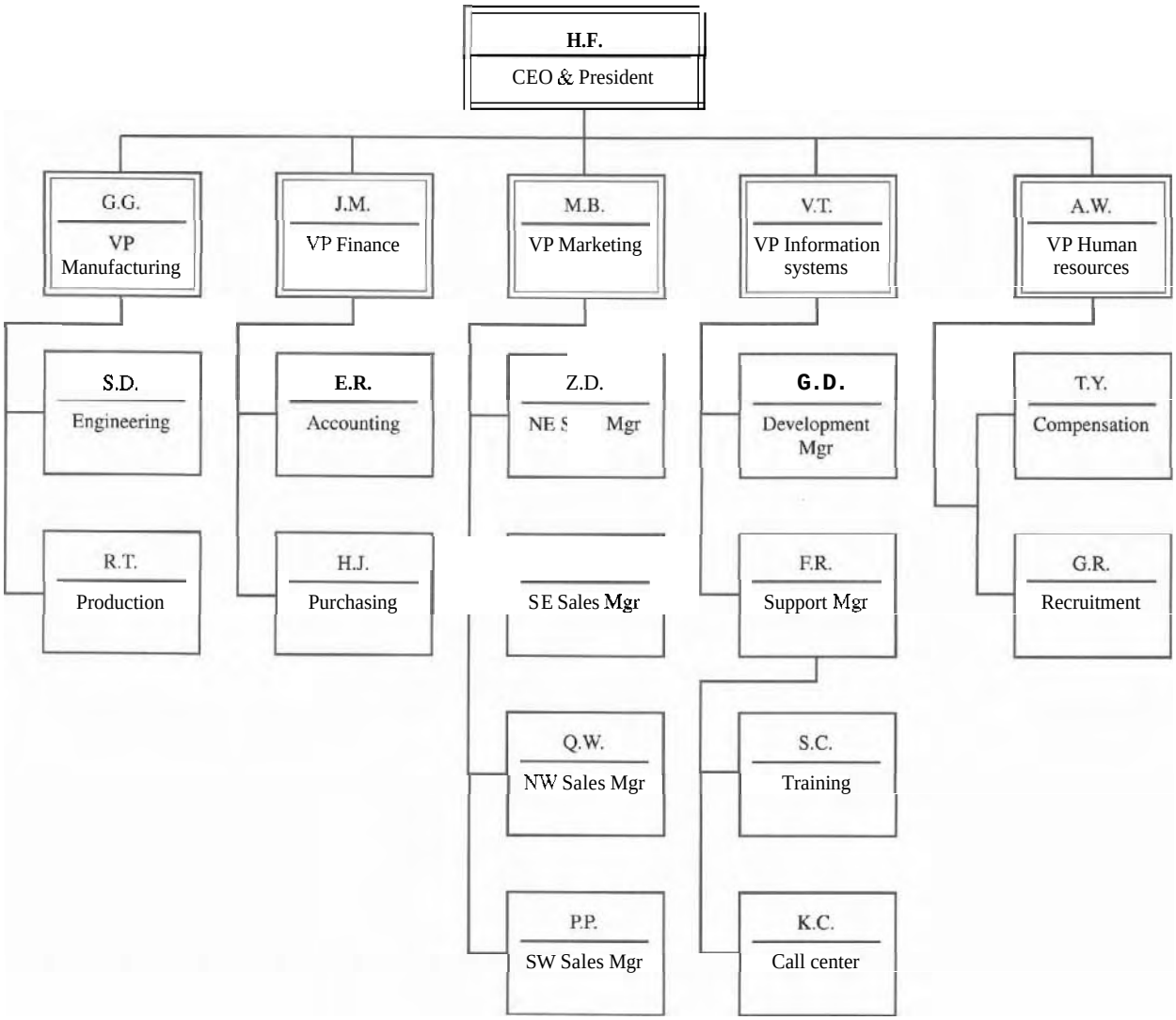

Figure *4.2* Functional Organizational Structure

resources are housed within a functional area. The project also tends to be more focused because a primary functional area is responsible for and ultimately takes ownership of the project.

There are, however, several disadvantages associated with projects sponsored by organizations with functional structures. These include:

Determining *authority and* responsibility—As was mentioned previously, determining who has authority and responsibility for a project must be resolved at the outset, especially when the project involves more than one functional area. For example, in an IT project, will the project manager be from the IS department or from the functional area? A project manager from the IS area may have knowledge and expertise with respect to the technology, but lack critical knowledge about the business. On the other hand, a project manager from the functional area may understand the business, but lack an understanding of the technology. Furthermore, there is a

WARRING TRIBES

According to Allen Alter, the reason the IS function sometimes has a poor reputation in an organization may be due to strong in-group loyalty he calls tribalism. Alter contends that the typical IS department, made up of support centers, data centers, programmers, and network administration, is really several clans that tend to stick together with others of "similar backgrounds or status." As a result, some tribes "regularly knock heads" because of conflicting interests or because they do not communicate well with each other. Often when a project is in trouble, one tribe will not go out of its way to help another. Then, the business suffers because this indifference results in delays and wasted time. Ideas and suggestions for IT initiatives are also held back or fail globally because no one is able to see and understand the big picture. Alter suggests that tribes should not be abolished because highly skilled and specialized individuals are comfortable working this way. It is, however, important that communication form a bridge between groups. Communication can be helped by bringing the whole function together in meetings and social events. But, it is imperative to pick a manager who can encourage people from different groups to communicate. Alter also suggests that unless IS tribes communicate effectively with each other, they will have even more difficulty working with another important tribe—the users.

SOURCE: Adapted from Allen E. Alter, Think Tribally, Fail Globally, *Computerworld,* November 17, 1997, http://ww.computenvorld.com/news/1997/story/0,11280,11174,00.html.

chance that the project manager will have an insular view of the project—that is, the project manager's allegiance and loyalty to a particular functional area may lead her or him to focus primarily on the interests of that area. The likelihood of this happening increases when the project expands across several functional boundaries. Other functional areas may begin to ask if there is anything in it for them and withhold resources unless their needs and expectations are met. The project manager may not have the authority for acquiring and providing the resources, but she or he will certainly be accountable for the failure of the project.

Poor response time—The normal lines of authority and communication delineated by the functional structure determine who makes specific decisions. Projects may take longer if important decisions have to pass through several layers of management and across several functional areas. Unfortunately, what's important to you may not be important to me if a particular functional unit has a dominant role or interest in a project. Due to the potential for parochial interests, problem resolution may break down because of finger pointing, trying to place blame for the problem rather than focusing on problem resolution.

Poor integration—The culture of the organization may encourage functional areas to insulate themselves from the rest of the organization as a way to avoid many of these parochial issues. However, this can result in two problems: First, the individuals in a functional area may act in their own best interests instead of taking a holistic or organizational view of the project. Second, the functional area may attempt to become self-sufficient by acquiring knowledge, expertise, and technology outside of its normal area of specialization. While specialization of skills and resources can *reduce* duplication of activities and resources, the functional structure can also increase this duplication. It may lead to an organization of warring tribes as functional areas compete for resources and blur lines of responsibility.

The Project Organization At the other end of the spectrum from the functional organization is the project organization (see Figure 4.3). Sometimes referred to as the pure project organizution, this organizational structure supports projects as the dominant form of business. Typically, a project organization will support multiple projects at one time and integrate project management tools and techniques throughout the organization. Each project is treated as a separate and relatively independent unit within the organization. The project manager has sole authority over and responsibility for the project and its resources, while the parent or supporting organization provides financial and administrative controls. Both the project manager and the project team are typically assigned to a particular project on a full-time basis.

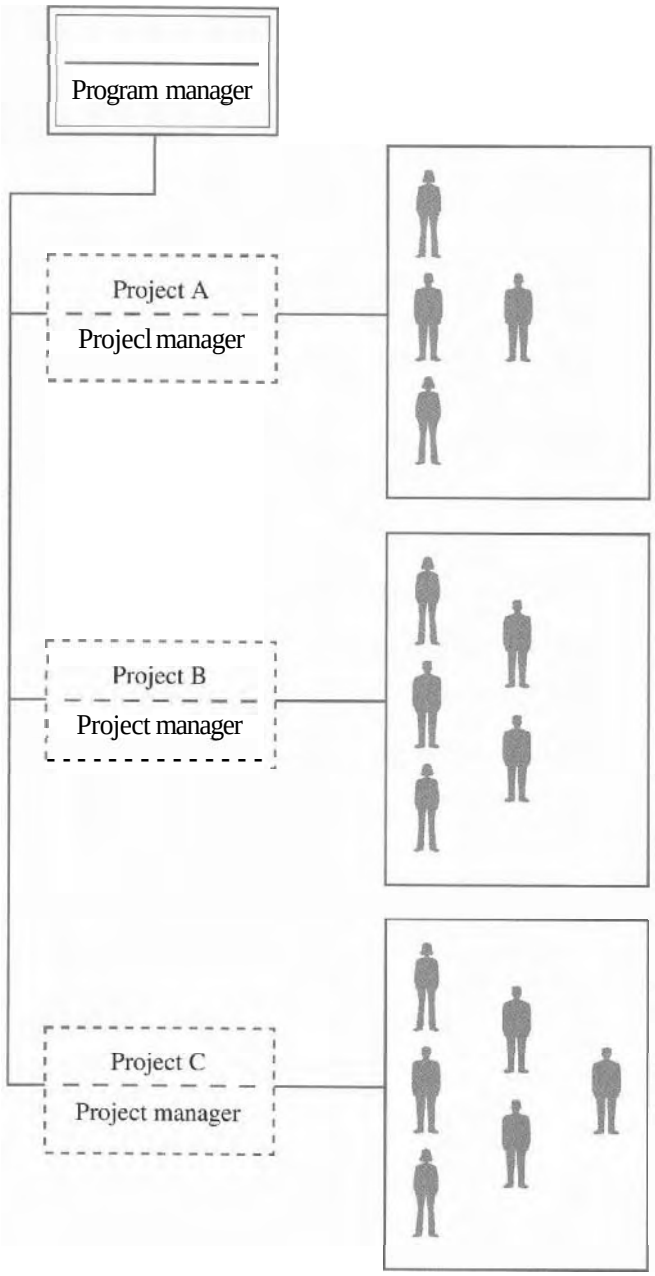

Figure **4.3** The Project Organization

There are advantages and disadvantages associated with projects supported by the project organization. Advantages include:

Clear *authority* and *responsibility*— Unlike the projects in a functional organization, the project manager here is fully in charge. Although he or she must provide progress reports and is ultimately responsible to someone who has authority over all the projects (e.g., a program manager), the project manager has full authority over and responsibility for the assigned project. Moreover, the project team reports directly to the project manager, thus providing clear unity of command. This structure may allow the project team to better concentrate on the project.

Improved communication—A clear line of authority results in more effective and efficient communication. In addition, lines of communication are shortened because the project manager is able to bypass the normal channels of distribution associated with the functional organizational structure. This structure thus results in more efficient communication and fewer communication problems.

High level of integration—Since communication across the organization is increased, the potential for a higher level of cross integration across the organization exists. For example, the project team may include experts with technical skills or knowledge of the business. Fewer conflicts over resources arise since each project has resources dedicated solely to it.

Projects supported by project organization structures face several disadvantages. These disadvantages include:

Project isolation—Since each project may be thought of as a self-contained unit, there is the potential for each project to become isolated from other projects in the organization. Unless a project management office or program manager oversees each project, inconsistencies in policies and project management approaches may occur across projects. In addition, project managers and project teams may have little opportunity to share ideas and experiences with other project managers and project teams, thus hindering learning throughout the organization.

- Duplication *of effort*—While the potential for conflicts over resources is reduced, various projects may require resources that are duplicated on other projects. Project managers may try to stockpile the best people and other resources that could be shared with other projects. Each project must then support the salaries of people who are part of the dedicated project team but whose services are not needed at all times. There is then the problem of what to do with these people when the project is completed and they have not been assigned to another project. Many consulting firms, for example, refer to people who are between projects as being on the beach or on the bench. While awaiting the next assignment, consultants are often sent to training in order to make the most of their idle time.

Projectitis—Projectitis sometimes occurs when the project manager and project team develop a strong attachment to the project and to each other. As a result, these individuals may have a difficult time letting go, and the project begins to take on a life of its own with no real end in sight (Meredith and Mantel 2000). The program manager or project office must ensure that proper controls are in place to reduce the likelihood of this happening.

The Matrix Organization The third type of organizational form is the matrix structure. The matrix organization is a combination of the vertical functional structure and the horizontal project structure (see Figure 4.4). As a result, the matrix organization provides many of the opportunities and challenges associated with the functional and project organizations.

The main feature of the matrix organization is the ability to integrate areas and resources throughout an organization. Moreover, people with specialized skills can be assigned to the project either on a part-time or on a more permanent basis. Unfortunately, **unity of command** is violated since each project team member will have more than one boss, leading to the possibility of confusion, frustration, conflict, and mixed loyalties. The functional manager will be responsible for providing many of the people and other resources to the project, while the project manager is responsible for coordinating these resources. In short, the project manager coordinates all the project activities for the functional areas, while the functional areas provide the wherewithal to carry out those activities.

The matrix organization can take on various forms that can create **hybrid organizations.** The most common forms include:

Balanced matrix--In the balanced matrix form, the project manager focuses on defining all of the activities of the project, while the functional managers determine how those activities will be carried out.

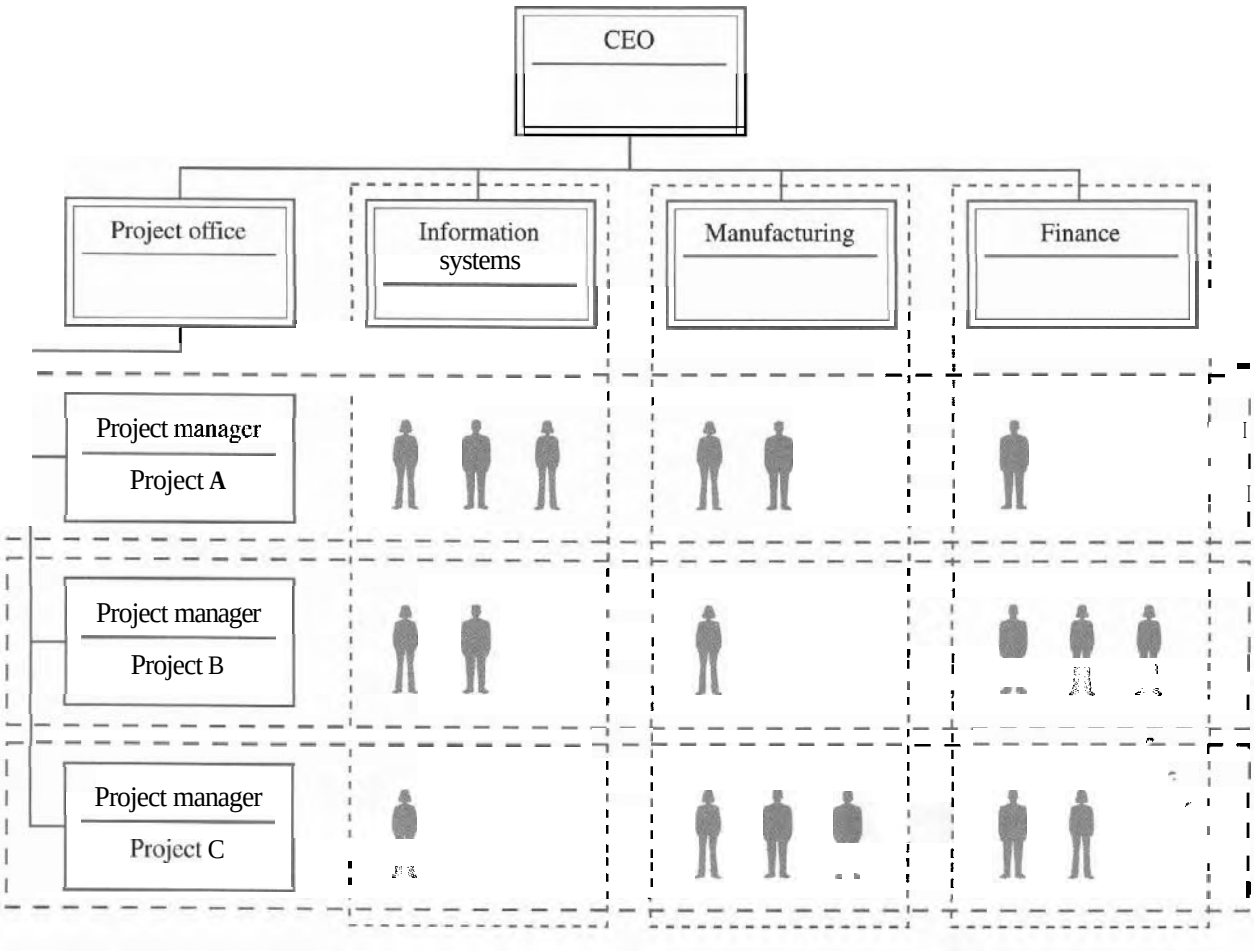

Figure 4.4 Matrix Organization

Functional matrix—The functional matrix organization tends to take on more of the qualities of a functional organization. Here the project manager focuses on coordinating the project activities, while the functional managers are responsible for completing those activities that are related to their particular area.

Project *matrix*—It follows, then, that a project matrix structure would take on more of the qualities of a project organization. In this case, the project manager has most of the authority and responsibility for defining and completing the project activities, while the functional managers provide guidance and resources, as needed.

There are several advantages and disadvantages for projects supported by a matrix organization. The advantages include:

High level of integration—The cross-functional nature of the matrix structure allows for the access and sharing of skilled people and resources from across the organization, and people within the organization can be assigned to more than one project. This ability to share can result in less duplication of resources and activities.

Improved communication—Due to the high level of integration, communication channels are more efficient and effective. As a result, problems and issues can be addressed by the project manager and functional managers, and decisions can be made more quickly than in a functional organization.

Increased project focus–Because a project under the matrix organization has improved communication channels and access to a repository of resources and skilled expertise, the project team can focus on the activities of the project. This ability to focus should increase the likelihood of projects being completed on time and meeting the needs of the organization better.

On the other hand, there are several disadvantages for projects supported by the matrix organization. These include:

Higher potential for conflict—Since power is distributed, project team members may wonder who really is their boss. They may receive conflicting orders, especially if the project and functional area managers have different goals or are fighting over scarce resources. In general, power may depend on which manager has the fewest direct reports to the chief executivc office. The project manager may be required to be a skillful mediator and negotiator in order to keep the project on track.

Poorer response time—Because the concept of unity of command is violated in a matrix structure, there can be confusion, mixed loyalties, and various distributions of power. Communication can become bogged down, and decisions may require agreement from individuals who are in conflict with each other. As a result, the project may stall and the project team may begin to experience low moral, little motivation, and the pressure to pick sides.

Which Organizational Structure Is Best? Unfortunately, there are no simple answers. It really depends on factors such as the nature of the organization's products and services it provides, the business environment, and its culture—that is, the personality of the organization. Projects supported under a functional organizational structure may work best when the organization focuses on a few internal projects. On the other hand, a project organizational structure may work better if an organization takes on a large number of external projects. Subsequently, most consulting firms follow the project organization structure. On thc other hand, the matrix organizational structure may work best when an organization takes on projects that require a cross-functional approach.

There has been some research in this area. For example, Larson and Cobeli (1988) surveyed more than 1,600 project management professionals. The results of their study suggest that both project and functional managers have a strong preference for the project or project matrix organization. The functional and functional matrix organizational structures were viewed as the least effective, and the balanced matrix structure was seen as only marginally effective. Larson and Gobeli suggest that the success of a project is linked directly to the project manager's degree of autonomy and authority.

The success of large, complex projects may require a concentrated project focus that can be best supported by the project or project-matrix organization. On the other hand, the matrix organizational structure may work well when an organization cannot dedicate scarce staff and resources to a project or when a cross-functional focus is needed. If a project is undertaken within one specific area of the organization, then a functional-matrix structure would be effective. Although there is little evidence to

support the effectiveness of projects supported under a functional organization, it would make sense that the best organizational structure would balance the needs of the project with those of the organization (Gray and Larson 2000).

The Informal Organization

The formal organization is the published structure that defines the official lines of authority, responsibilities, and reporting relationships. While the formal structure tells us how individuals or groups within an organization ***should*** relate to one another, it does not tell us how they ***actually*** relate (Nicholas ***1990).*** In many cases the informal organization bypasses the formal lines of communication and authority because of the inevitable positive and negative relationships that occur over time in any organization. While communication in the formal organization is supposed to flow through published channels, it can flow in any direction and at a much faster pace through the network of informal relationships—the famous grapevine. Power in an organization, therefore, is not only determined by one's place in the hierarchy, but also how well one is connected in the informal network. A person's degree of connectedness in the informal organization largely determines what information is received or not received.

Stakeholders Stakeholders are individuals, groups, or even organizations that have a stake, or claim, in the project's outcome. Often we think of stakeholders as only those individuals or groups having an interest in the successful outcome of a project, but the sad truth is that there are many who can gain from a project's failure. While the formal organization tells us a little about the stakeholders and what their interests may be, the informal organization paints a much more interesting picture.

Stakeholder Analysis A published organizational chart is usually fairly easy to acquire or create. The informal organization may be more difficult to understand or explain, even for those well-connected individuals. To help the project manager and project team understand the informal organization better, one can develop a stakeholder analysis as a means of determining who should be involved with the project and understanding the role that they must play. To develop a stakeholder analysis, one may start with the published organizational chart and then add to it as the complexities of the informal organization become known. Since the purpose of the stakeholder analysis is to understand the informal organization, it may be best to view this as an exercise rather than a formal document to be made public. The following steps provide a guide for developing a stakeholder analysis:

1. Develop a list of stakeholders. Include individuals, groups, and organizations that must provide resources to the project or who have an interest in the successful or unsuccessful outcome of the project.
2. Next to each stakeholder, identify the stakeholder's interest in the project by giving the stakeholder a "1" if they have an positive interest in the project's outcome or a "–1" if they have a negative interest. Neutral individuals or groups can be given a "0". If you are not sure, then give a stakeholder a "?".
3. Next, it may be useful to gauge the amount of influence each stakeholder has over the project. One can use a scale from 0 to 5, with zero meaning no influence and five meaning extremely high influence—that is, this person or group could terminate the project.

4. The fourth step involves defining a role for each of the stakeholders. For example, every project should have a champion or someone prominent within the organization who will be a public supporter of the project. In addition, it is important to identify the owner of the project. This list may include an individual, group, or organization that will accept the transfer of the project's product. Other roles may include consultant, decision maker, advocate, ally, rival, foe, and so forth. Use adjectives or metaphors that provide a clear meaning and picture of the stakeholder.
5. Once you determine who has an interest in the project, what that interest is, and what influence they may have, it may be useful to identify an objective for each stakeholder. This may include such things as providing specific resources, expertise, or guidance navigating through the political waters of the organization. In the case of potential adversarial stakeholders, this may require getting their acceptance or approval concerning certain aspects of the project.
6. Lastly, it is important to identify various strategies for each stakeholder. These strategies may require building, maintaining, improving, or re-establishing relationships. In short, this list should include a short description of how the objective could be attained.

The exercise for developing a stakeholder analysis can be conducted and summarized in a table such as the template illustrated in Figure 4.5.

THE PROJECT TEAM

The word ***team*** has different meanings for each of us. As a result of past experiences with teams, those meanings probably have both positive and negative connotations. lnformation technology projects require various resources; but people are the most valuable resource and have the greatest influence on the project's outcome. Indeed, the human resource of a systems development project will consume up to 80 percent of its budget (McLeod and Smith 1996). It is important, then, that the project manager and project team members be chosen wisely. In addition, people must be sure to support the project team so that project success is not a random event.

The Roles of the Project Manager

One of the most critical decisions in project management is selecting a project manager or team leader. The project manager is usually assigned to the project at the earliest stages of the project life cycle, but a new one may be brought in as replacement in the later stages of a project.

Stakeholder	*Interest*	*Influence*	*Role*	*Objective*	*Strategy*

Figure 4.5 Stakeholder **Analysis** Chart

The project manager must play many roles. First, the project manager must play a managerial role that focuses on planning, organizing, and controlling. The project manager, for example, is responsible for developing the project plan, organizing the project resources, and then overseeing execution of the plan. The project manager must also perform many administrative functions, including performance reviews, project tracking and reporting, and other general day-to-day responsibilities.

Although this work sounds fairly simple and straightforward, even the best thought-out plans do not always go the way we expect. Thus, the project manager must know when to stay the course and when to adapt or change the project plan by expediting certain activities or acting as a problem solver.

The success of the project, of course, depends not only on the project team, but also on the contributions and support of all project stakeholders as well. Therefore, the project manager must build and nurture the relationships among the various stakeholders. To do this effectively, the project manager must play a strong leadership role. While the managerial role focuses on planning, organizing, and controlling, leadership centers on getting people motivated and then headed down the right path towards a common goal.

Choosing a project manager for a project is analogous to hiring an employee. It is important to look at his or her background, knowledge, skill sets, and overall strengths and weaknesses. Some attributes of a successful project manager include:

- *The ability to communicate with people*—A project manager must have strong communication skills. A project manager need not to be a great motivational speaker, but should have the ability to connect with people, share a common vision, and get everyone to respond or head in the right direction.
- *The ability to deal with* people—Aside from being a good communicator, a project manager must have the soft skills for dealing with people, their egos, and their agendas. The project manager must be a good listener, hearing what people say and understanding what they mean. This skill allows the project manager to get below the surface of issues when people are not being completely honest or open without being annoying or alienating them. A project manager must also have a sense of humor. Often, project managers and project teams are expected to perform during stressful situations, and a sense of humor can make these situations more manageable. Although a project manager does not have to be everyone's best friend, people should feel that they are at least approachable and should be comfortable talking with him or her. In addition, the project manager must also be willing to share knowledge and skills with others and be willing to help each individual develop to her or his fullest potential.
- *The ability to create and sustain relationships*—A good project manager must be able to build bridges instead of walls. Acting as a peacemaker or negotiator among the project client or sponsor, top management, the project team, customers, suppliers, vendors, subcontractors, and so forth may be necessary. In addition, the project manager should be a good salesperson. An effective project manager must continually sell the value of the project to all of the stakeholders and influence others over whom he or she has no direct authority.
- *The ability to organize*—A project manager must be good at organizing—developing the project plan, acquiring resources, and creating an effective project environment. The project manager must also know and understand both the details and the big picture, which requires a familiarity with the

details of the project plan and also an understanding of how contingencies may impact the plan.

Team Selection and Acquisition

Another critical task of a project manager is selecting and staffing the project. Staffing involves recruiting and assigning people to the project team. Selecting the right mix of people, with both technical and non-technical skills, is a decision that can influence the outcome of the project. Although a project manager should strive to acquire the brightest and the best, project team members should be chosen based on the following skills:

Technology skills—Depending upon the nature of the project, members with specific technology skill sets— programmers, systems analysts, network specialist, and so forth—will be required.

Business/organization skills—Although technology skills are important in IT projects, it is also important to have people or access to people with domain knowledge. These skills include knowledge or expertise within a specific domain (e.g., compensation planning) as well as knowledge of a particular organization or industry (e.g., healthcare) to augment the technical skill requirements.

Interpersonal skills—The ability to communicate with other team members and other stakeholders is an important skill for team members. It is important not only for the team members to understand one another, but also for the project team to understand the project sponsor's needs. Due to the nature of many projects, other desirable characteristics should include creativity, a tolerance for ambiguity, acceptance of diversity, flexibility in adapting to different roles, and the capacity to take calculated risks.

The size or scope of the project will determine the size of the project team. Although smaller teams have the potential to work faster and develop a product in a shorter time, larger teams can provide a larger knowledge base and different perspectives. Unfortunately, there is also a tendency for larger teams to function more slowly. One solution to this latter problem may be creating subgroups to make the project more manageable and to facilitate communication and action.

The project manager may recruit project team members internally or externally. For example. in the functional or matrix organization, people may be acquired from the functional areas. In a project organization, a project manager may recruit people who are currently in-between projects or who will be soon rolling *off* an existing project. The project manager may have to negotiate with other managers for specific individuals with specific skills or areas of expertise. On the other hand, a project manager may have to hire individuals from outside the organization. In either case, for a particular project, training may be required. Therefore, the timing of when a particular individual can begin work on the project is a significant factor that can impact the project's schedule.

Team Performance

The project team has a direct influence on the outcome of the project. Therefore, it is important the team's performance be of the utmost concern to the project manager. In The Wisdom *of Teams,* Jon R. Katzenbach and Douglas K. Smith (1999) provide an insightful and highly usable approach for understanding the language and discipline

IS SWAT TEAMS

SWAT (Special Weapons And Tactics) teams are law enforcement teams that are highly trained to respond to special situations. The term *SWAT* has also been applied to expert teams in the IS world. Drawing upon the analogy of police SWAT teams, these IS teams came about to respond effectively to client/server projects; but this same idea could be applied to many other types of projects. The basic idea of an IS SWAT team is to assemble a small team of highly skilled developers who are experts in the latest technology. By pooling the knowledge, expertise, and talents of a select few individuals, the team can harness the creative power of the group and develop a solution that is much more effective than an individual could. Because everyone is a highly skilled technologist, IS SWAT teams give individual team members the opportunity to learn more from each other than they would on their own. In addition, working in groups allows the team members to hone their people skills because working in a group requires greater communication and the art of compromise. On the downside, people working on IS SWAT teams must be comfortable working in a very unstructured environment. Often, the beginning of the project is chaotic and the teams reflect the individual personalities of the individuals involved. In addition, IS SWAT teams involve high profile projects. While success can lead to career advancement for the team members, project failure can reflect badly on them.

SOURCE: Adapted from Linda Wilson, SWAT Teams, *Computerworld,* October 23, 1995, http://www.computerworld.com/news/1995/story/0,11280,1946,00.html.

of teams. In refining the language of teams, they provide a distinction between work groups and several types of teams.

Work Groups The work group is based on the traditional approach where a single leader is in control, makes most of the decisions, delegates to subordinates, and monitors the progress of the assigned tasks. Therefore, the performance of a work group depends greatly on the leader.

A work group can also include members who interact to share information, best practices, or ideas. Although the members may be interested in each other's success, work groups do not necessarily share the same performance goals, do not necessarily provide joint work-products, and are not necessarily held mutually accountable. A study group is an example of a work group. You and several members of a class may find it mutually beneficial to study together for an exam, but each of you (hopefully!) will work on the exam individually. The grade you receive on the exam is not a direct result of the work produced by the study group, but rather of your individual performance on the exam. In an organizational context, managers may form work groups to share information and help decide direction or policy, but performance will ultimately be a reflection of each manager and not the group. Work groups or single leader groups are viable and useful in many situations.

Real Teams In cases where several individuals must produce a joint work product, teams are a better idea. More specifically, Katzenbach and Smith (1999) define a team as:

> a small number of people with complimentary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable. (45)

Moreover, calling a group of people a team does not make it one nor does working together make a group a team. Teamwork focuses on performance, not on becoming a team. Subsequently, there are several team basics that define a real team:

> A small number ofpeople--Ideally, a project team must be between two and twelve people. Although a large number of people can become a team,

a large team can become a problem in terms of logistics and communication. As a result, a large team should break into subteams rather than try to function as one large unit.

Complementary skills—For achieving the team's goal, a team must have or develop the right mix of skills that are complementary. These skills include:

Technical or functional expertise

Problem-solving or decision-making skills

Interpersonal skills—that is, people skills

Commitment to a common purpose andperformance goals—Katzenbach and Smith distinguish between activity goals (e.g., install a local area network) and performance goals (e.g., ship all orders within twenty-four hours of when they are received). The concept of a performance goal is similar to the concept of the MOV and sets the tone and aspirations of the team while providing a foundation for creating a common team purpose. As a result, the team develops direction, momentum, and commitment to its work. Moreover, a common performance goal and purpose inspires pride because people understand how their joint work product will impact the organization. A common goal also gives the team an identity that goes beyond the individuals involved.

- Commitment to a common approach—Although teams must have a common purpose and goal, they must also develop a common approach to how they will work together. Teams should spend as much time developing their approach as they do defining their goal and purpose. A common work approach should focus not only on economic and administrative issues and challenges, but also on the social issues and challenges that will shape how the team works together.

Mutual *accountability*—A group can never become a team unless members hold themselves mutually accountable. The notion that "we hold ourselves accountable" is much more powerful than "the boss holds me accountable." Subsequently, no team can exist if everyone focuses on his or her individual accountability. Mutual accountability requires a sincere promise that each team member makes to herself or himself and to the other members of the team. This accountability requires both commitment and trust because it counters many cultures' emphasis on individualism. In short, it can be difficult for many people to put their careers and reputations in the hands of others. Unless a common approach and purpose has been forged as a team, individuals may have a difficult time holding themselves accountable as a team.

Based upon their in-depth study of several teams, Katzenbach and Smith provide several common sense findings:

Teams tend toflourish on a demandingperformance challenge. A clear performance goal is more important to team success than team-building exercises, special initiatives, or seeking team members with ideal profiles.

The team basics are *often* overlooked. The weakest of all groups is the pseudo team, which is not focused on a common performance goal. If a team cannot shape a common purpose, it is doomed to achieving mediocre results. We cannot just tell a group of individuals to be a team.

Most organizations prefer individual accountability to team accountability. Most job descriptions, compensation plans, and career paths emphasize

individual accomplishments and, therefore, tend to make people uncomfortable trusting their careers to outcomes dependent on the performance of others.

Katzenbach and Smith provide some *uncommon sense* findings as well:

Strong performance goals tend to spawn more real teams. A project team cannot become a real team just because we call them a team or require them to participate in team-building activities or exercises. However, their findings suggest that real teams tend to thrive as a result of clearly defined performance-based goals.

High performance teams are rare. In their study of teams, Katzenbach and Smith identified high performance teams. These are real teams that outperform all other teams and even the expectations given. This special type of team requires an extremely high level of commitment to other team members and cannot be managed.

Real teams provide the basis ofperformance. Real teams combine the skills, experiences, and judgments of the team members to create a synergy that cannot be achieved through the summation of individual performance. Teams are also the best way to create a shared vision and sense of direction throughout the organization.

Teams naturally integrate performance and learning. Performance goals and common purposes translate into team members developing the skills needed to achieve those goals. As a result of open communication and trust, the members of a team are more apt to share their ideas and skills so that they may learn from one another. Moreover, successful teams have more fun, and their experiences are more memorable for both what the team accomplished and in terms of what each member learned as a result of the team process.

Project Teams and Knowledge Management

The primary challenge of real teams is to develop shared performance goals and a common purpose. For project teams following the IT project methodology, this challenge requires defining and getting agreement on the project's MOV. It also requires that the team members leam from each other and from other project teams' experiences.

In *The Radical Team Handbook,* John Redding *(2000)* describes a fundamentally new and different form of teamwork based on learning. Based on a study of twenty teams, Redding suggests that traditional teams tend to:

Accept background information at jace value. In short, most teams accept the project challenge as it is first defined and do not challenge preconceived notions about the problem or opportunity and what they must do.

Approach projects in a linear fashion. Projects have a beginning and end, and the project plan outlines all of the steps needed to complete the project on time and within budget. Traditional teams tend to focus on the project's schedule and, therefore, base project success on completing the project on time and within budget.

Provide run-of-the-mill solutions. Since the team focuses on the challenge as it was handed to them (i.e., the way the challenge was originally framed), they never really understand the challenge and subsequently provide a solution that

has minimal impact on the organization. In other words, the team may focus on a symptom and, therefore, never focus on the real problem or opportunity since the solutions remain within the original *frame* or how the challenge was originally presented to them.

In contrast, Redding describes a radical team as a team that is able to get to the root or fundamental issue or challenge. In general, radical teams do not accept the original performance challenge at its face value. The core objective of a radical team is to question and challenge the original framing of the problem or challenge at hand.

The way the problem or challenge is defined may very well be the problem. Too often a team is handed a performance challenge that is framed by a senior manager. For example, the team may be told by a senior manager that the company is losing money and, therefore, the team should focus on cutting costs. If the team accepts this framing of the challenge, they will develop a solution aimed at saving money. If, however, a team challenges this original frame, they may find out that the real reason why the organization is losing money is because customers are leaving due to poor service. Unless the project team understands the real problem in this case, its solution to cut costs will have little impact on the organization and the organization will continue to lose money.

Learning Cycles and Lessons Learned

Learning cycle theory was originally proposed by John Dewey in 1938 and used to describe how people learn (Kolb 1984). More recently, the concept of learning cycles has been applied to project teams and knowledge management. More specifically, learning cycles provide a way to resolve ambiguous situations through the repeated pattern of thinking through a problem (Dewey 1938). Figure 4.6 illustrates a team learning cycle.

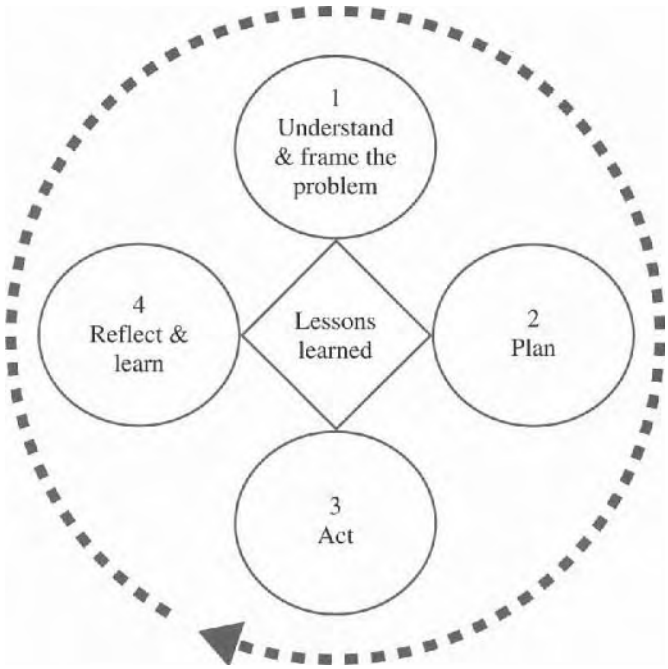

Figure 4.6 A Learning Cycle

Source: *The Radical Team Handbook, John* Redding, Jossey-Bass 2000. ***Reprinted by*** permission of John **Wilcy &** Sons, Inc.

Redding (2000) suggests that a team learning cycle has four phases:

1. Understand *and frame* the problem — It is important that a project team not accept the issues and challenges presented to them at face value. Assumptions must be surfaced and tested because the problem or issue as it is originally framed may not be the real problem after all. Thus, the project team must get to the root of the problem. At the beginning of a project, the team member's understanding may be quite general, or they may feel that they really do not understand the challenge assigned to them. Unfortunately, few people are willing to admit that they do not have all the answers or that their understanding of the team's challenge is

limited. On the other hand, other members of the team may approach the project with a high degree of certainty—that is, they may act as though they know what the solution is and, therefore, the team just needs to work out the details of how to go about implementing the solution. Opinions are often accepted without question and can result in erroneous assumptions that lead the project team in the wrong direction or keep the team from getting at the real problem. Moreover, there is often pressure for the team to take immediate action so that the project can be completed on time and within budget. In either case, the team runs the risk of not getting to the root of the problem and may propose solutions that have minimal impact on the organization.

Therefore, the project team must come to understand two things: Preconceived solutions are likely to produce run-of-the-mill results, and teams should encourage open humility. In other words, it is all right for team members to recognize and admit that they do not have all the answers, especially at the beginning of a project. As a result, team members may feel more comfortable admitting they have more questions than answers and the potential for preconceived ideas leading to mediocre solutions is reduced.

2. Plan—To help teams understand and reframe the problem, teams should create a shared understanding of the problem or opportunity. This understanding includes defining what the team is trying to accomplish and how they are going to go about it. Figure 4.7 provides a template to guide a team through the exercise of separating facts from assumptions.

   Using the team learning record as shown in Figure 4.7, the team can brainstorm "what they know" (the facts), "what they think they know" (assumptions), and "what they don't know" (questions to be answered). Early in the project, a team may have more questions and assumptions than facts. That is to be expected because the team may not understand the problem or challenge fully. Assumptions are ideas, issues, or concepts that must bc tested (e.g., "the users will never agree to this" or "senior management will never spend the money"). Often, a person can make an assumption sound like a fact, especially if she or he says it with enough authority. Therefore, it is every team member's job to separate the facts (proof, evidence, or reality) from assumptions (theories, opinions, or guesses). On the other hand, if the team identifies things it does not know, these can be classified as questions to be answered. Once the project team identifies what it knows, what it thinks it knows, and what it doesn't know, it can create a plan of action. Each team member can volunteer or be assigned to specific tasks that require him or her to test assumptions or to learn answers to questions that were identified in the team learning record (Figure 4.7). As a

What We Know (Facts)	***What We Think We Know (Assumptions)***	***What We Don't Know (Questions to be Answered)***

Figure 4.7 Team Learning Record

SOURCE: *The Radical Team Handbook,* John Redding, Jossey-Bass 2000. Reprinted by permission of John Wiley & Sons. Inc.

result, the team creates a plan of action and can document the actions to be learned in a format similar to Figure 4.8

3. Act—The key to team learning is carrying out the actions defined in the team's action plan. Team members can work on their own or together to test out assumptions, try out hunches, experiment, or gather and analyze data. The purpose of these actions should be to generate knowledge and test assumptions, not to complete a series of tasks like a to-do list. Thus, the purpose of these actions is to confirm or disconfirm assumptions and learn answers to questions the team does not know. Redding suggests that what teams do outside of meetings is just as important as the meeting itself because only by acting do teams have the opportunity to learn.
4. Reflect and learn—After the team has had a chance to carry out the action items in the action-learning plan, the team should meet to share its findings and reflect upon what everyone has learned. To be effective, this reflection must take place in an environment of openness, honesty, and trust. Once the team has a chance to meet and reflect on the information it has acquired, the team can document what it has learned. One format Redding suggests is for the team to answer the following questions:
   - What do we know now that we didn't know before?
   - Have we encountered any surprises? Have we gained any new insights? If so, what were they?
   - What previous assumptions have been supported or refuted by what we have learned so far?
   - How does the team feel the project is progressing at this point in time?
   - How effective has the team been so far?

   Another approach for documenting **lessons learned** is the United States Army's After Action Review (AAR). The format for an AAR is:
   - What *was* the intent? Begin by going back and defining the original purpose and goal of the action.
   - What happened? Describe as specifically and objectively as possible what actually occurred.
   - What have we learned? Identify key information, knowledge, and insights that were gained as a result.
   - What do we do now? Determine what will be done as a result of what has been learned, dividing actions into three categories: Short-term, mid-term, and long-term.
   - Take action.
   - Tell someone else. Share what has been learned with anyone in the organization who might benefit.

What Needs To Be Done?	*By Whom?*	*By When?*

Figure 4.8 Action Plan for Team Learning

The team learning cycles and lessons learned can be documented and shared with other project teams. However, the completion of a team's lessons learned marks the ending of one learning cycle and the beginning of another. Based on the learning that has transpired, the team can focus once again on understanding and reframing the problem and then repeat the plan, act, reflect and learn phases again. Figure 4.9 illustrates this concept.

As illustrated in Figure 4.9, an entire project can be viewed as a series of learning cycles. An initial team meeting can examine the initial problem or challenge assigned to the team. During that meeting, the team can develop an initial action plan. Between meetings, the members of the team can then carry out their assigned tasks for testing assumptions or gathering information. At the next meeting, the team can reflect on what it has learned, document the lessons learned, and then start the beginning of a new cycle. Each cycle should be used to challenge the framing of the problem and create new opportunities for learning.

Teams do not always begin and end learning cycles at each meeting. Some learning cycles may take longer, and some can be accomplished in a shorter time if face-to-face meetings are not needed. Redding suggests, however, that three dimensions can be used to assess team learning: speed, depth, and breadth.

> Speed—First, a team should follow a learning cycle approach rather than a traditional, linear approach. Second, speed refers to the number of leaming cycles completed. Therefore, the opportunity to learn can be increased if a team can complete more cycles in a given amount of time.
>
> Depth—Just increasing the number of learning cycles does not guarantee that teams will increase their learning. Subsequently, depth of learning refers to the degree to which a team can deepen its understanding of the project from cycle to cycle. This learning includes challenging the framing of the problem and various assumptions. In short, depth focuses on bow well the team is able to dig below the surface in order to get to the root of the problem. Redding suggests that a team can measure depth by asking the following question: Was the team's conception of the project at the end any different from what it was in the beginning? (47)

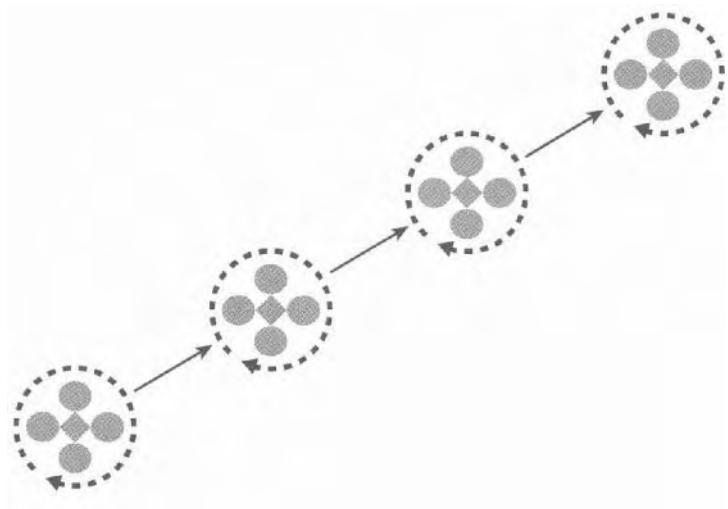

Figure 4.9 Team Learning **Cycles Over the Project Life Cycle**

SOURCE: *The Radical* **Team Handbook, John** Redding, **Jossey-Bass 2000.** Reprinted by **permission of** John Wiley & **Sons,** Inc.

Breadth—The breadth of learning refers to the impact the project has on the organization. It also focuses on whether the learning that has taken place within the team stays within the team or is shared and used throughout the organization. If a team can uncover complex relationships, it can develop a solution that impacts the whole organization. For example, what originally was thought to be a marketing problem could very well cross several functional or departmental boundaries.

THE PROJECT ENVIRONMENT

The project manager is responsible for many things. In addition to acquiring human resources, the project manager must also focus on the project environment. The project environment includes not only the physical space where the team will work, but also the project culture as well. More specifically, the project environment includes:

A place to call home—It may seem obvious, but a project team must have adequate space to work and meet. If the project team is internal to the organization, a work area may already be available to the team. However, consultants often are found camped out in a conference room or even the organization's cafeteria because no other space in the organization is available. Therefore, the project manager should make sure that the team has a place to call home and a place to meet as a team for the duration of the project.

Technology--In addition to having an adequate work area, the team will also need adequate technology support. Support may include a personal computer and appropriate software, Internet access, electronic mail, and a telephone. In addition, many teams today are geographically dispersed. Technology provides a means for teams to collaborate when they cannot meet at the same time in the same place. Collaboration tools not only can improve communication, but also can increase the speed of the team's learning cycles by allowing the team to store and share minutes of team meetings, action plans, and lessons learned.

Office supplies—Aside from technology resources, the team will need various office supplies, such as paper, pens, pencils, staplers, and so forth.

COLLABORATION AND CULTURE

Groupware can be an important business tool that allows people to work together without the limitation of having to meet at the same time or in the same place. However, implementing groupware technology and expecting people from different cultures to embrace it can lead to many problems. For example, a U.S. manager may expect workers in different departments and locations to use a groupware system to electronically kick around ideas informally. Unfortunately, that may violate cultural protocols in countries that adhere to a more hierarchical business structure. To talk to another co-worker, an individual may have to first let her or his manager know, who, in turn, would have to check with the co-worker's manager. Moreover, some cultures encourage people to be selective about what client data they make available to others. For example, Margaret Matthews, a knowledge director at Andersen Consulting (now Accenture), found that the company's Japanese users were more likely to call a client "a worldwide electronics distributor" than to name the company, because of a strong bias toward protecting client confidentiality.

SOURCE: Adapted from Rebecca Sykes, Collaboration Kinks, *Computerworld*, December 8, 1997, http://www.computerworld.com/news/1997/story/0,11280,14715,00.html.

Culture — Each organization has its own culture, but a project team should have its own culture as well. Culture reflects the values and norms of the team. One way of establishing a culture for the project team is to have the project team develop a team charter early on in the project. The team charter allows the team to agree on a set of values and expectations that will help define the project team culture. This charter includes:

What is expected from each member?

What role will each team member play?

How will conflicts be resolved?

Figure 4.10 provides an example of an actual team charter. Because many organizations operate globally today, many projects teams are made up of people from different backgrounds and cultures. The project manager and the project team members must be sensitive to these cultural differences.

CHAPTER SUMMARY

Organizations create a specific structure to support a particular strategy. If the organization performs poorly, then the firm will often develop a new strategy and/or formal organizational structure. Three different formal organizational structures were discussed in this chapter: the functional organization, the project organization, and the matrix organization. These organizational structures represent a continuum of possible structures, and an organization can create structures that are between functional and matrix organizations or matrix and project organizations.

Each organizational structure presents opportunities and challenges for projects in terms of flexibility, knowledge and expertise available, and authority and responsibilities. While the formal organization, in terms of an organizational or hierarchical chart, defines the official line of authority and communication, the informal organization includes the informal relationships and internetworking of people within the organization that develops over time. Understanding the formal and informal sides of an organization is important because it will help the project manager and project team better understand the politics and culture of the organization and provide greater insight into the decision-making process.

The project manager is a key position that should be filled at the earliest stages of the project. The project manager plays many important roles that include not only the traditional roles of a manager, but also roles specific to the nature of projects. Therefore, the project manager must be a skillful communicator, negotiator, organizer,

Expectations and Team Values

Everybody's ideas and opinions count

Everyone must learn something new technically and with the business

Work hard, but have fun

Produce necessary, quality periodic deliverables throughout the course of the product

Add values to clients' organization

Heavy team commitment

Show up for team meetings

Team coordination

Accountability

Assistance

Communication with clients and team

No such thing as a stupid question

RESPECT *for everyone*

Research: expanding knowledge base as well as comfort zone

Extend ourselves (Leave our comfort zones)

Punctuality and group attendance

Equal contributions from members

Be prepared for meetings: check e-mail and team web site before every meeting

Trust one another

Grievance Resolution

Try to resolve issue with each team member first

Figure 4.10 Project Team Charter

and relationship builder. In addition, the project manager must perform several critical tasks, including selecting and acquiring members of the project team and creating the project environment.

Two relatively new approaches to managing project teams were introduced in this chapter. First, *The Wisdom of Teams* by Jon *R.* Katzenbach and Douglas K. Smith (1999) provides a new language and discipline for project teams. For example, a work group can follow a traditional approach where a single leader or boss is in control, makes most of the decisions, and delegates to subordinates who work independently from each other. Or a work group can include several individuals who come together to share information or set policy, but work independently from one another and do not necessarily share the same performance goals or work products. On the other hand, real teams are a special type of team, with a few individuals with complimentary skills who focus on a performance-based goal and share a common purpose and approach. Based on their study of teams, Katzenbach and Smith found that real teams consistently outperform work groups.

Project team members must learn from each other and from other project team experiences if they are to provide a solution that gets to the root of the problem and not just a symptom. Learning cycle theory has been around since 1938, but has recently been applied to team learning and knowledge management. In *The Radical Team Handbook,* John Redding (2000) provides an interesting approach for teams based on learning cycles. Here, it is important that a team not accept the problem or challenge as it is originally presented to them. Following a learning cycle, the team follows four phases: (1) understand and frame the problem, (2) plan, **(3)** act, and (4) reflect and learn. The conclusion of a learning cycle and the beginning of the next is marked by the documentation of lessons learned.

Instead of developing a solution prematurely, the project team is to encourage open humility by acknowledging that it does not have all the answers, especially at the beginning of a project. Therefore, the project team is encouraged to discuss and separate facts from assumptions or opinions. The team then creates an action plan to research questions and test assumptions. When the team meets, the members reflect on and learn from the information collected. Surprises, insights, and confirmed (or disconfirmed) assumptions are then documented as lessons learned. A team's learning can be assessed using three dimensions: (1) speed or the number of learning cycles, (2) depth or the degree to which the team deepened its understanding of the project, and **(3)** breadth or the impact of the team's proposed solution on the organization.

Although the project manager is responsible for overseeing many project activities, it is his or her responsibility to ensure that the project team has an adequate work environment. A suitable workspace and the technology to support the team are necessary. In addition, each project should define its own culture. It is helpful to have the team develop a team charter that outlines the roles, values, expectations, and methods for resolving conflict in order to set proper expectations.

REVIEW QUESTIONS

1. What is the relationship between an organization's strategy and organizational structure?
2. What is meant by the formal organization?
3. Why is it important for a project manager to understand the formal organization?
4. Describe the functional organizational structure.
5. What are some challenges for IT projects under the functional organizational structure?
6. What are some opportunities for IT projects under the functional organizational structure?
7. Describe the project organizational structure.
8. What are some challenges for IT projects under the project organizational structure?
9. What are some opportunities for IT projects under the project organizational structure?
10. Describe the matrix organizational structure.
11. What are some challenges for IT projects under the matrix organization structure?
12. What are some opportunities for IT projects under the matrix organizational structure?
13. What is projectitis? When might you expect to encounter projectititis? How could an organization minimize the likelihood of projectititis?
14. Describe the balanced matrix, functional matrix, and project matrix organizational structures.
15. Describe what is meant by the informal organization. Why should the project manager or project team be concerned with understanding the informal organization?
16. What is a stakeholder?

17. How does conducting a stakeholder analysis help the project manager and project team understand the informal organization?
18. Why would the project manager and project team not want to make a stakeholder analysis public to the entire organization?
19. In conducting a stakeholder analysis, why is it important not only to identify those who will gain from the project's success, but also those who may gain from its failure?
20. What is the purpose of defining a role and objective for each stakeholder identified in the stakeholder analysis?
21. Describe the roles of a project manager.
22. What qualities are required for a good project manager? Can you come up with any on your own?
23. What skills or qualities are important in selecting a project team?
24. What is the difference between a work group and a real team?
25. What is the difference between a performance-based goal and an activity-based goal? Give an example of each.
26. Why is focusing on a performance-based goal, such as a project's MOV, more important than having the team go through a series of team-building exercises?
27. Why do you think many teams accept the project opportunity at face value and never question the way the project was originally framed?
28. Describe the concept of a learning cycle?
29. What purpose does creating a lesson learned at the end of a learning cycle provide?
30. What advantage does a team have when it encourages open humility instead of trying to solve the problem or provide a solution as soon as possible?
31. What is meant by the speed of learning cycles? How is speed associated with team learning?
32. What is meant by depth of learning cycles? How is depth associated with team learning?
33. What is meant by breadth of learning cycles? How is breadth associated with team learning?
34. What is the project environment? Why must a project manager ensure that a proper project environment is in place?

EXTEND YOUR KNOWLEDGE

1. Develop and write a job description for hiring a project manager to manage an Enterprise Resource Planning (ERP) project. Once the job description is complete, describe how you might go about finding this person externally. What sources would you use?
2. If you are working on a semester assignment with other individuals in your class, complete a stakeholder analysis using the Stakeholder Analysis Chart in Figure **4.5.**
3. What kind of projects are you best suited for? Using the World Wide Web, point your browser to the following Web sites and take an online assessment.
   - Quiz 1: http:/lwww.project-manager.com/pmpage19.html
   - Quiz 2: http://www.project-manager.com/pmpage20.html
4. If you are working with other students on a semester project assignment, do you consider yourselves more of a work group or a team? Why? How effectively has this worked for you? What would you like to change? What would you like to leave the same?
5. If you are working with a team on a class project, go through a learning cycle as a team.

   Write down the problem or challenge assigned to your team as you originally understood it. What is MOV (i.e., performance-based goal) that your team is trying to achieve?

   Using the following table as a guide, write down what you know (facts), what you think you know (assumptions), and what you don't know (questions to be answered). Be sure to challenge any opinions or assumptions before concluding they are facts.

What We Know (Facts)	*What We Think We Know (Assumptions)*	*What We Don't Know (Questions to be Answered)*

   Once you and your team members finish brainstorming facts, assumptions, and questions, develop an action plan and assign responsibilities for each member of the team using the following table as a guide. Agree on a meeting day and time so that each member has a chance to complete his or her assignment and so that the team can meet to discuss these findings.

Actions to Learn	*Who's Responsible*

After everyone has had a chance to complete his or her action-learning assignments, the team should meet to share this information. Each member should take a turn presenting what he or she found. While a team member is presenting what they found, the other members must listen carefully and not challenge any of the information presented. Clarification questions are fine. After each member has had a chance to present her or his findings, the team should focus on the following questions:

a. Is there anything we know now that we didn't know before?
b. Were there any surprises? Have we gained any new insights? If so, what are they?
c. What assumptions have been supported and not supported?
d. How well is the team progressing?
e. The answers to these questions should be documented. Once documented, the team has completed one full learning cycle. The next step is to start over and reframe the project challenge as you did in Part a.

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CHAPTER 5

Defining and Managing Project Scope

CHAPTER OVERVIEW

Chapter 5 focuses on developing a scope management plan to define and manage the project and product deliverables of the project. After studying this chapter, you should understand and be able to:

- Identify the five processes that support project scope management. These processes, defined by the Project Management Body of Knowledge (PMBOK), include initiation, planning, scope definition, scope verification, and scope change control.
- Describe the difference between product scope (i.e., the features and functions that must support the IT solution) and project scope (i.e., the deliverables and activities that support IT project methodology).
- Apply several tools and techniques for defining and managing the project's scope.

GLOBAL TECHNOLOGY SOLUTIONS

On Friday evening Matt and Kellie were still at the GTS office, working on the project charter and project plan for Husky Air. Rubbing her eyes, Kellie asked, "I know we defined the goal of the project by developing the MOV, but what about the work that has to be done to get us there?"

"Clad you asked," Matt said as he put down his personal digital assistant on the desk in front of him. "I think we're ready to start defining the scope of the project, which will help us define all of the deliverables and activities that support the MOV."

"I remember working on a project that never seemed to end," she replied. "The users always wanted to add more bells and whistles to the system, and the project ended up missing its deadline and costing a lot more than we had planned."

Matt thought for a moment, then asked. "So, what can we learn from that experience?"

Kellie smiled. "First of all," she said. "I think we need to have a plan in place to make sure that the scope of the project is well-defined. I think part of our problem was that we never really got a clear idea of the project's goal; so we never defined the scope of the project properly. And secondly, we should've had some kind of process in place to control scope changes once we started the project."

Matt agreed. "That sounds like an excellent idea. But why not just say no to any scope change requests?"

Kellie sat back in her chair. "The way I see it, if we say yes to each and every scope change request, we run the risk of escalating the project's schedule and, in turn, the project's budget. On the other hand, if we say no to all scope change requests, we run the risk of missing some opportunities or appearing non-responsive to our client's needs."

"Good point, but how do you know when to say yes to a scope change and when to say no?" asked Matt.

"I guess we could let the project's MOV be our guide," she answered. "If a scope change supports the MOV, then it's worth doing. Otherwise, if it doesn't support the MOV, then the scope change isn't worth the time or money. Besides, the client has to make the decision whether the change in scope is worth the increase in schedule and cost. All we can do is keep the schedule and budget under control and then point out to them how any requested scope change will impact the project."

Matt stood up, saying "I think what we need is a scope management plan that can be part of the project charter. It's also important that we let everyone involved with the project know about it. Let's call it a day and get started on it first thing Monday morning."

Kellie agreed. "That's the best idea I've heard all day. Why don't you go ahead? I'll lock up after I make a few phone calls."

Things to Think About

1. What is the importance of ensuring that the scope of a project has been defined completely and accurately?
2. What is the relationship between the project's MOV and its scope?
3. What is the importance of having scope control procedures in place?
4. Why should a scope control process be communicated to all of the stakeholders of a project?

INTRODUCTION

This chapter focuses on defining and managing the work that must be accomplished by the project team over the course of the project. The term **scope** is used to define the work boundaries and deliverables of the project so what needs to get done, gets done—and only what needs to get done, gets done. Therefore, it is important to define not only what is part of the project work, but also what is not part of the project work. Any work not part of the project is considered to be outside of the project's scope.

Project Scope **Management** Processes

The Project Management Body of Knowledge (PMBOK) defines five processes to support the knowledge area of project scope management, as shown in Table 5.1. This process group begins with a **scope initiation** process whereby the project sponsor gives

Table 5.1 Scope Management Processes

Scope Management Process	*Description*
Project scope initiation	Ensuring that authority and resources are committed to developing a scope management plan.
Scope planning	Setting the scope boundary to determine what is and what is not included in the project work.
Scope definition	Identifying the product and project deliverables that support the project's MOV.
Scope verification	Confirming that the project's scope is accurate, complete, and supports the project's MOV.
Scope change control	Ensuring that controls are in place to manage scope changes once the project's scope is set. These procedures must be communicated to all project stakeholders.

the project manager the authority and resources to define the scope of the project. In the context of the IT project methodology, the authority to commit time and resources to define the project's scope is included in the second phase when the project charter and project plan are developed.

Once the commitment and resources to develop the project charter and plan are in place, the next process focuses on scope planning. This planning process entails setting the boundary of the project in order to determine what is and what is not to be included in the project work.

The third process centers on scope definition. While scope planning defines the project boundary, scope definition identifies the project deliverables (as identified in the IT project methodology) and the product deliverables (the high-level functionality or features of the IT product to be delivered by the project team). As a result, the boundary and deliverables defined by the scope planning and definition processes provide a key component for developing the project charter and plan. Moreover, the boundary and deliverables become critical inputs for estimating the project's schedule and budget.

Once the scope is defined, the process of scope verification confirms that the scope is complete and accurate. The project team and sponsor must agree to all of the project deliverables. This not only sets expectations, but also focuses the project team on what needs to get done and what is outside the scope of the project.

Time and resources will be wasted needlessly if the scope of the project is never defined accurately or agreed upon. However, changes to the scope may be inevitable as new information becomes available or if the needs of the organization change. Therefore, a process called scope change control is needed to handle these changes so that if a scope change is appropriate, the change can be approved in order to amend the project's schedule and budget accordingly. In addition, scope change control procedures also protect the scope boundary from expanding as a result of ***increasing*** *featurism,* requests by project stakeholders to keep adding additional features and functions (i.e., bells and whistles) to the project once the scope has been set. Remember that the scope, schedule, and budget relationships suggest that increasing the project's scope (i.e., expanding the scope boundary) will generally require an increase in schedule and budget. Therefore, adding additional work to the project's scope will ultimately lead to a project that misses its deadline and costs more than originally estimated. Subsequently, once the project's

scope has been set, approved changes to the project's scope must be reflected in the project's baseline plan.

Together, the processes and techniques for defining and managing scope make up the **scope management plan.** Depending on the size and nature of the project, this plan can be separate and/or summarized in the project charter. Regardless, the procedures for defining and managing the scope of a project must be communicated and understood by all of the project's stakeholders to minimize the likelihood of misunderstandings. Moreover, the project's scope must align and support the project's MOV. Why spend time and resources to perform work that will not add any value to the organization or help the project achieve its MOV? Again, work that does not add value consumes valuable time and resources needlessly. Figure 5.1 summarizes the components and processes of a scope management plan.

PROJECT SCOPE INITIATION

Scope initiation provides a beginning process that formally authorizes the project manager and team to develop the scope management plan. In terms of the IT project methodology, this authorization is given after the project is formally accepted and funds are committed to developing the project charter and plan by the project sponsor or client. The business case provides important information about the project's description, MOV, risks, assumptions, and feasibility. In addition, the business case provides information about the background of the project in terms of why it was proposed and how it aligns with the organization's overall strategic plan.

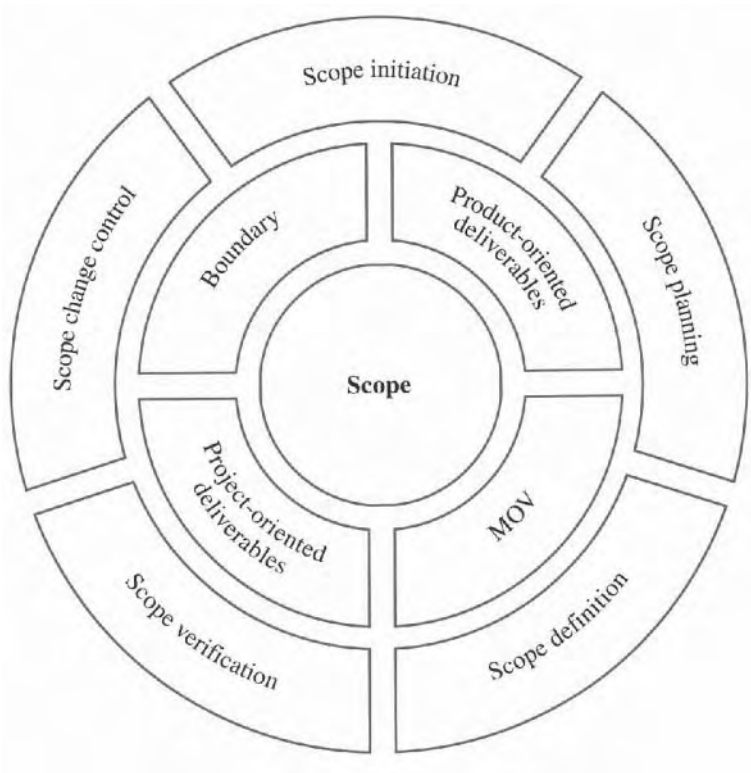

Figure 5.1 Scope Management Plan

Project Scope Planning

> Failure to define what is part of the project, as well as what is not, may result in work being performed that was unnecessary to create the product of the project and thus lead to both schedule and budget overruns.
>
> Olde Curmudgeon, *PM Network Magazine,* 1994.

Scope planning is a process for defining and documenting the project work. More specifically, a project's scope defines all the work, activities, and deliverables that the project team must provide in order for the project to achieve its MOV. It is an important step in developing the project plan since one must know what work must be done before an estimate can be made on how long it will take and how much it will cost.

Scope Boundary

Defining the scope boundary is the first step to establishing what is, and what is not, part of the project work to be completed by the project team. Think of the scope boundary as a fence designed to keep certain things in and other things out. As Figure *5.2* illustrates, any work within the scope boundary should include only the work or activities that support the project's MOV. This work is what we want to capture and keep within our fence. On the other hand, a project team can spend a great deal of time doing work and activities that will not help the project achieve its MOV. As a result, the project will consume time and resources with very little return. Therefore, the scove boundary must orotect the scove from these activities once it is set and agreed upon by the project stakeholders. Having a clear and agreed upon definition of the project MOV is critical for defining and managing the scope boundary.

The Scope Statement

One way to define the scope boundary is to create a **scope statement** that documents the project sponsor's needs and expectations. For example, let's say we are outside consultants hired to develop an electronic commerce application for a bank. After developing and presenting a business case to our client, we have been given the authority to develop the project charter and plan. Although the business case provides a great deal of relevant information, we will still set up several meetings and interviews with key stakeholders in the bank. Based upon these meetings and interviews, we create a scope statement.

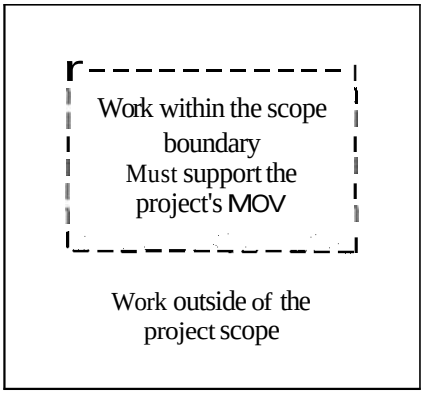

Figure *5.2* Scope Boundary

Scope Statement

1. Develop a proactive electronic commerce strategy that identifies the processes, products, and services to be delivered through the World Wide Web.
2. Develop an application system that supports all of the processes, products, and services identified in the electronic commerce strategy.
3. Integrate the application system with the bank's existing enterprise resource planning system.

It is just as important to clarify what work is not to be included, that is, what work is outside the scope of the project. Often the

scope of a project is defined through interviews, meetings, or brainstorming sessions. Stakeholders often suggest ideas that are interesting, but not feasible or appropriate for the current project.

Let's say that in our example a certain bank vice president pushed for a customer relationship management (CRM) and a data mining component to be included in the application system. The bank's president, however, has decided that the time and effort to add these components cannot be justified because launching the Web site in eight months is vital to bank's competitive strategy. Let's also assume that conducting technology and organizational assessments of our client's current environment is an important piece of our project methodology. But because the bank would like to control some of the costs of this project, we agree that its IT department will conduct that study. The results of this study will then be documented and provided to us.

In this case, it is critical that we define explicitly both what is and what is not part of the project scope. Individuals from both organizations may believe that specific project work (i.e., the assessment study), system features, or functionality (i.e., CRM and data mining) will be part of this project. These beliefs may result in misunderstandings that lead to false expectations or needless work. To manage these expectations, it is useful to list explicitly what is *not* part of the project's scope.

Out of Scope for this Project

1. Technology and organizational assessment of the current environment
2. Customer resource management and data mining components

Setting the scope boundary for the project not only sets expectations, but also can define the constraints of the project and how the product of the organization fits within the organization, that is, the system must integrate with the organization's existing systems.

The scope statement provides a very general and high-level view of the project work and provides only a starting point for defining the scope of our project. At the beginning of a project understanding of the project's scope may be limited. However, as we work more closely with our client more information is uncovered and our understanding of the project increases. Subsequently, the project scope will evolve from being very general and high level to more detailed and defined.

THE OREGON DEPARTMENT OF MOTOR VEHICLES

In 1993, the Oregon Department of Motor Vehicles (DMV) began a project to automate its manual system. The project was originally scheduled to be completed in five years and cost $50 million; but state officials envisioned saving $7.5 million a year by reducing its DMV staff by 20 percent. By 1995, the project's deadline had been extended to 2001 with expected costs escalating to $123 million. A prototype was implemented in a test office in 1996, but soon lines of people backed up around the block. The system was considered a total failure, and the project was cancelled. The project failed because the project team did not accurately define the project's scope. The state's procurement and development rules were followed, and the project's vendor delivered everything promised on time But no one thought to have the vendor integrate the new system. Subsequently, there was a strict process, but no tangible result from the project.

SOURCE: Adapted from When Bad Things Happen to Good Projects, CIO, October 15, 1997, **http:llww.cio.comlarchive/l01597/bad.html.**

PROJECT SCOPE DEFINITION

Developing a scope statement is a useful first step for defining the scope of the project and setting a boundary. A project's scope, however, should also be defined in terms of the deliverables that the team must provide. These deliverables can be divided into project-oriented deliverables and product-oriented deliverables. This separation gives the team a clearer definition of the work to be accomplished and improves the likelihood of accurately assigning resources and estimating the time and cost of completing the work. Moreover, a clear definition of the project's deliverables sets unambiguous expectations and agreement among all of the project stakeholders.

Project-Oriented Scope

Project-oriented deliverables, or scope, support the project management and IT development processes that are defined in the information technology project methodology (ITPM). Project scope includes such things as the business case, project charter, and project plan and defines the work products of the various ITPM phases. Project-oriented deliverables also include specific deliverables such as a current systems study, requirements definition, and the documented design of the information system. These are deliverables supported by the systems development life cycle (SDLC) component of the overall ITPM.

Project-oriented deliverables require time and resources and, therefore, must be part of the overall project schedule and budget. Their role is to ensure that the project processes are being competed so that the project's product (i.e., the information system) achieves the project's MOV and objectives. Project-oriented deliverables also provide tangible evidence of the project's progress (or lack of progress). Finally, they allow the project manager to set a baseline for performance and quality control because they usually require some form of approval before work on the next project phase or deliverable begins.

Project-Oriented Scope Definition Tools All of the project deliverables must have a clear and concise definition. One way to communicate the project's deliverables is to create a deliverable **definition** table (DDT). An example of a DDT for our bank's electronic commerce system is illustrated in Table 5.2.

The purpose of the DDT is to define all of the project-oriented deliverables to be provided by the project team. Each deliverable should have a clear purpose. In addition, it is important to define the structure of the deliverable. For example, a deliverable could be a document (paper or electronic), prototype, presentation, or the application system itself. This sets the expectation of what will be *delivered* by the project team. Moreover, the standards provide a means to verify whether the deliverable was produced correctly. These standards could be defined within the IT Project methodology, controlling agency (e.g., International Organization for Standardization), or through various quality standards established by the organization. Each deliverable must be verified and approved generally by the project sponsor and/or the project manager. It is important that the responsibility for approving a deliverable be clearly defined as well. Once a deliverable is approved, the project team is authorized to begin work on the next deliverable. This provides authorization control as well as a basis for logically sequencing the work. Finally, it is important that the resources required to complete the deliverable be defined. This will provide the foundation for determining not only what resources will be needed for the project, but also for estimating the time and cost in completing each deliverable.

Tahle 5.2 Deliverable Definition Table

Deliverable	*Structure*	*Standards*	*Approval Needed By*	*Resources Required*
Business case	Document	As defined in the project methodology	Project sponsor	Business case team & office automation (OA) tools
Project charter & project plan	Document	As defined in the project methodology	Project sponsor	Project manager, project sponsor. & OA tools
Technology & organizational assessment	Document	As defined in the project methodology	Project manager & project sponsor	Bank's systems analysts users, case tool, and OA tools
Requirements definition	Document	As defined in the project methodology	Project manager	System analyst, users, case tool, & OA tools
User interface	Prototype	As defined in the user interface guidelines	Project sponsor	System analyst, programmer, users, & integrated development environment (IDE)
Physical & technical design	Document	As defined in the project methodology	Project manager & project sponsor	System analyst, programmer, & case tool
Application system	Files & database	As defined in the project methodology	Project sponsor	Programmers, system analysts, network specialists, program development tools, and relational database management system
Testing plan	Document	As defined in the project methodology	Project manager	System analysts & OA tools
Testing results	Document	As defined in the test plan	Project manager	Programmers, system analysts, & OA tools
Change management and implementation plan	Document	As defined in the project methodology	Project manager	Systems analysts & OA tools
Training program	User documentation &training class	As defined in the implementation plan	Project manager & project sponsor	Trainers, documentation writers, & OA tools
Final report & presentation	Document	As defined in the project methodology	Project sponsor	Project Sponsor, project manager, & OA tools
Project evaluations & lessons learned	Document	As defined in the project methodology	Project manager & senior	Project team, knowledge management system

SOURCE: Inspired by Graham McLeod and Derek Smith, ***Managing Information Technology Projects*** (San Francisco: Boyd & Fraser, 1996), **51–52.**

Once the deliverables have been defined in the DDT, a **deliverable structure chart (DSC)** can be developed as an interim step to define detailed work packages that will be used to estimate the project schedule and budget. Later on, these work packages will be used to create a **work breakdown structure (WBS)**—a tool used to help create the project plan. For example, Figure 5.3 provides an example of a

PROJECT SCOPE: KEEP IT SIMPLE

Since 1994, the Standish Group has studied over twenty-three thousand projects. It found that the number of IT projects delivered on time and within budget for ***Fortune*** 500 companies increased from 9 percent in 1994 to 24 percent by 1998. The average cost of IT projects has decreased from $2.3 million to $1.2 million as a result of a reduction in project scope. It appears that the likelihood of a project being developed on time and within budget is negatively correlated with project size. In other words, projects that take less than six months, have fewer than six people, and cost less than $750,000 have the highest probability of meeting the schedule and budget objectives. According to Jim Johnson, president of Standish Group Intcmational, the best way to design and manage projects is to follow an iterativc process that Cocuses on the most key features. Although more features can he added later on, they will probably be deemed unnecessary. The study also found that user involvement, executive support, experienced project management, clear business objectives, and good communication were important to project success.

SOURCE: Adapted from Kathleen Melpmuka, With IT Projects, Small is Beautiful, ***Computenvorld,*** June 18, 1998. http://www.computerworld.com/news/1998/story/0,11280,25731,00.html

Deliverable Structure Chart that maps the project life cycle and systems development life cycle phases to the deliverables defined in the DDT.

Product-Oriented Scope

Although the electronic commerce application system is listed as a project-oriented deliverable, we really do not have any idea what exactly will be delivered to the client. In general, the application system will be the largest project deliverable and will, therefore, require the most time and resources to complete. Identifying the features and functionality of thc application system (and their complexity) will be pivotal for estimating the time and cost of producing this deliverable.

Product-Oriented Scope Definition Tools Product scope therefore focuses on identifying the features and functionality of the information system to be implemented.

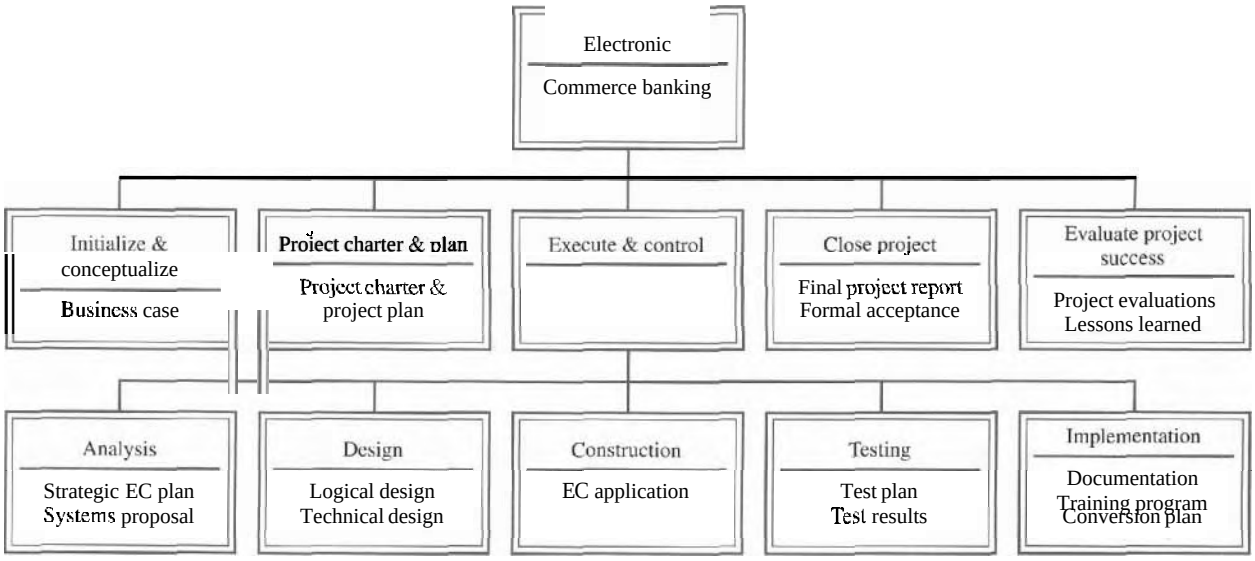

Figure 5.3 Deliverable Structure Chart (DSC)

A useful tool for refining the scope boundary and defining what the system must do is a modeling tool called a context level **data flow diagram (DFD).** A **DFD** is a process model that has been available for quite some time and is often taught in systems analysis and design courses. A context level DFD, however, presents a high-level representation of the system that has one process (i.e., a circle or rounded rectangle that represents the system as a whole) and depicts all the inflows and outflows of data and information between the system and its external entities. The external entities are usually represented by a square and can be people, departments, or other systems that provide or receive flows of data. Arrows represent the directional flow of data between external entities and the system. Each arrow and entity should be labeled appropriately. Lower level DFDs can be developed later to model the processes and flows of data in greater detail. An example of a context level DFD for our banking electronic commerce system is provided in Figure 5.4. As you can see, the high level features and functionality of the system focus on what the system must do.

Another useful tool for defining the product scope is the **use case diagram,** which has been used in the object-oriented world as part of the Unified Modeling Language (UML). While Jacobson (Jacobson, Cristerson et al. 1992) introduced the use case as a tool for software development, a use case diagram can provide a high level model for defining, verifying, and reaching agreement upon the product scope.

The use case diagram is a relatively simple diagram in terms of symbols and syntax, but it is a powerful tool for identifying the main functions or features of the system and the different users or external systems that interact with the system. At this early stage of the project, the use case can provide a high level diagram that can be further refined and detailed during requirements analysis later in the project.

Actors are people (i.e., users, customers, managers, etc.) or external systems (i.e., the bank's ERP system) that interact, or use, the system. Think of actors in terms of roles (e.g., customer) instead of as specific individuals (e.g., Tom Smith). **A use case,**

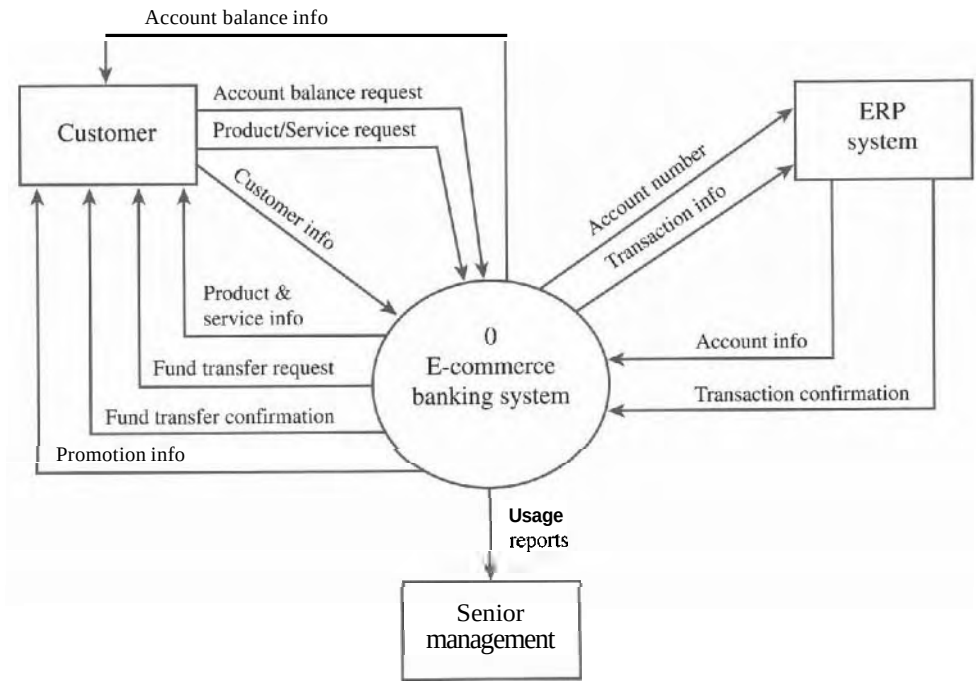

Figure 5.4 Context Level Data Flow Diagram (DFD)

on the other hand, depicts the major functions the system must perform for an actor or actors. When developing a use case diagram, actors are identified using stick figures, while use cases are defined and represented using ovals. Figure 5.5 provides an example of a use case diagram for the bank example.

As you can see in Figure 5.5, the use case diagram provides a simple yet effective overview of the functions and interactions between the use cases and the actors. The box separating the use cases from the actors also provides a system boundary that defines the scope boundary. Use cases inside the boundary are considered within the scope of the project, while anything outside of the boundary is considered outside the scope of the project. Listing the actors provides an opportunity to identify various stakeholders and can be useful for understanding the needs of the organization as a whole. It can be useful not only for addressing competing needs among various stakeholders, but also for identifying security issues as well (Fowler and Scott 1997). The development of a use case diagram is an iterative process that can be developed during a joint application development (JAD) session. JAD is a group-based method where the users and systems analysts jointly define the system requirements or design the system (Turban, Rainer and Potter 2001).

The use case diagram used to define the product scope can be used to refine the level of detail and functionality later on in our project. Following our example, the use case diagram in Figure 5.5 identifies the customer actor as using the system to transfer payments. However, a scenario or set of scenarios could be developed during the analysis and design phases of our project to determine how a customer would transfer funds successfully, while another scenario might focus on what happens when a customer has insufficient funds in their account. This level of detail is more suited to the requirements definition rather than the scope definition. At this point, it is more important to identify that the system must allow a customer to transfer funds than to identify how the funds may be transferred. Later on, the product scope can be compared or measured against the detailed requirements. These detailed requirements will be defined during the SDLC component of the ITPM.

But what is the appropriate level of detail for defining the product scope? Knowing the right level of detail is more an art than a science. The right level allows the project manager to estimate the time it will take to produce the application system accurately. As the next chapter shows, estimating the time and effort to produce the application system deliverable depends on the size of the application, the number of features incorporated, and their level of complexity. Therefore, the quality of the estimates will be greatly influenced by our understanding of the information system to be delivered.

The time and resources committed to developing the project charter and plan may limit the amount of time and energy we can devote to defining the details of the information system. Thus, the objective during this planning stage of the project should be to secure enough detail about the information system to allow us to estimate the time and effort needed to produce this deliverable. During the analysis and design phases, we can commit more time and resources to increasing our understanding and to documenting the level of detail needed to built and deliver the system.

PROJECT SCOPE VERIFICATION

Once the project's scope has been defined, it must be verified. Project scope verification is the scope management process that provides a mechanism for ensuring that the project deliverables are completed according to the standards described in the

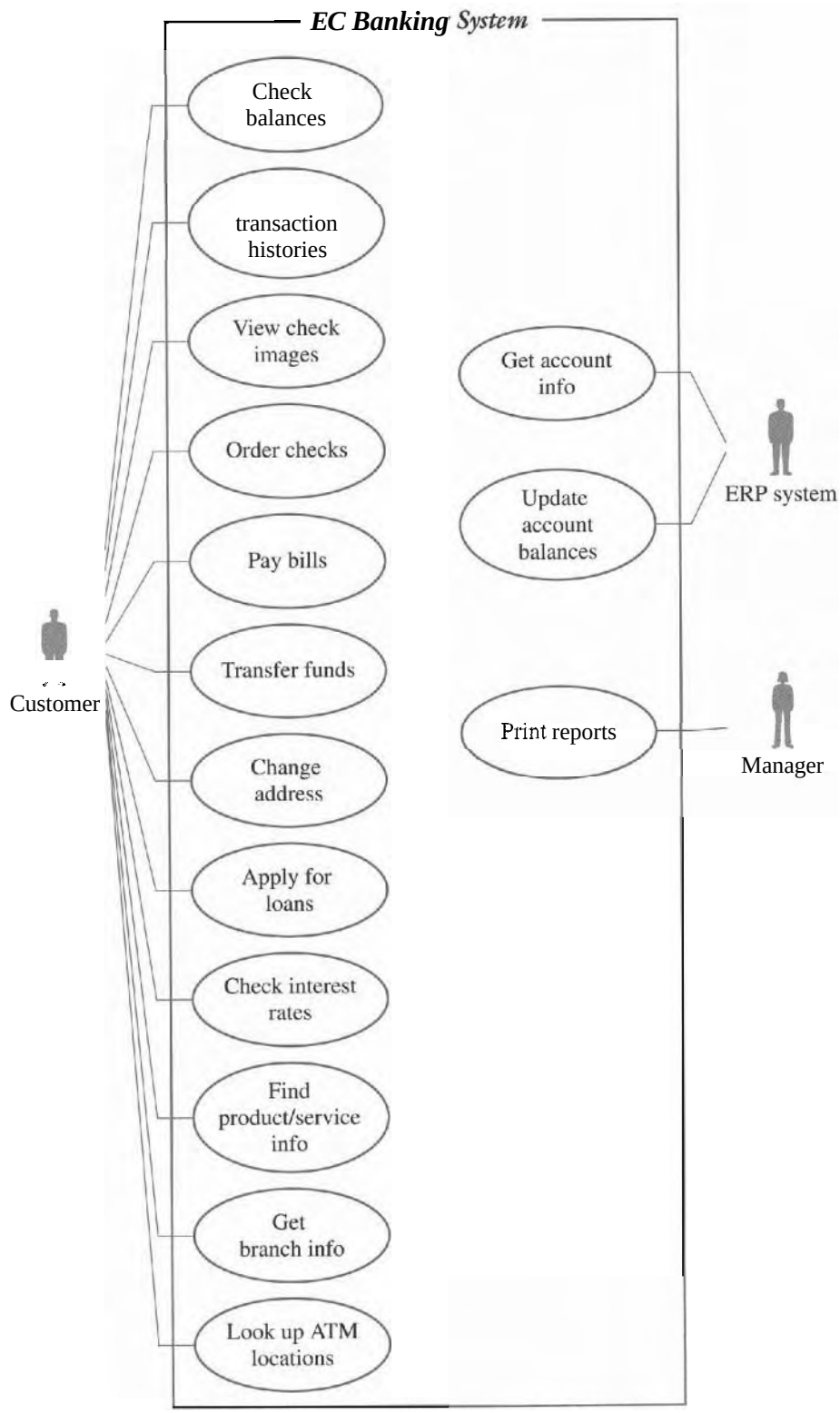

Figure 5.5 Use Case Diagram

DDT. Gray and Larson (2000) provide a project scope checklist for ensuring that the deliverables are completed—and completed correctly. This checklist has been adapted to include the MOV concept.

MOV—Are the project's MOV clearly defined and agreed upon? Failure to define and agree upon the MOV could result in scope changes later in the project, which can lead to added work impacting the project's schedule and budget.

Deliverables—Are the deliverables tangible and verifiable? Do they support the project's MOV?

Quality standards—Are controls in place to ensure that the work was not only completed, but also completed to meet specific standards?

Milestones—Are milestones defined for each deliverable? Milestones are significant events that mark the acceptance of a deliverable and give the project manager and team the approval to begin working on the next deliverable. In short, milestones tell us that a deliverable was not only completed, but also reviewed and accepted.

Review *and* acceptance—Are both sides clear in their expectations? The project's scope must be reviewed and accepted by the project stakeholders. The project sponsor must formally accept the boundary, product to be produced, and the project-related deliverables. The project team must be clear on what it must deliver. In both cases, expectations must be realistic and agreed upon.

SCOPE CHANGE CONTROL

According to the PMBOK, scope **change control** is concerned with ensuring that any changes to the project scope will be beneficial, with determining that an actual scope change has occurred, and with managing the actual changes when and as they occur. Scope control is also concerned with:

Scope grope—Scope grope is a metaphor that describes a project team's inability to define the project's scope. This situation is common early in a project when the project team and sponsor have trouble understanding what the project is supposed to accomplish. Scope grope can be minimized by having a clearly defined MOV and by following or applying the processes, concepts, and tools described in this chapter.

Scope creep—Scope creep refers to increasing featurism, adding small yet time- and resource-consuming features to the system once the scope of the project has been approved. For example, a project sponsor may try to add various bells and whistles to the project scope. Yet, scope creep does not always come from the project sponsor side. The project team itself may come across interesting or novel ideas as the project work progresses. Its enthusiasm for adding these ideas can divert its attention or add features and functions to the system that the project sponsor did not ask for and does not need. Scope creep must be identified and controlled throughout the project because it will lengthen the project schedule and, in turn, lead to cost overruns.

Scope *leap*—If scope creep is caused by increasing featurism, scope leap suggests a fundamental and significant change in the project scope. For example, the original scope for the bank's electronic commerce project was

SIX MYTHS OF SCOPE MANAGEMENT

Myth **1:** User involvement will result in an IS project grounded in the realities of business needs.

Reality: Often user involvement is really a vaguely stated idea from senior management handed off to someone in the user community. Involvement by proxy can create problems if the original ***concept person*** is too busy or unavailable to discuss the details.

Myth **2: A** scope statement will clearly define what a project will do.

Reality: A good scope statement will also make it clear as to what the project will not attempt to do, which is especially important when specifying roles and responsibilities. Setting scope is much like putting a fence around the project. It not only keeps things **in,** it also keeps things out.

Myth **3:** Once the scope of the project is defined, hold **firm** because any deviation from the original plan is a sign that the project is out of control.

Reality: Scope change is inevitable. Often schedules and budgets are set before enough details of the project are known. Early estimates should be revised as new information is acquired. Good scope management, however, involves a change management committee of senior management who review proposed changes and decide whether an additional feature or requirement should be added to the project's scope.

Myth 4: A function of a scope change committee is to arbitrate user requests for additional features or functionality beyond the original project charter.

Reality: Scope problems go beyond additional user demands. Scope changes will affect schedule, budget, or both. Slippage of the schedule will require additional resources or reduced functionality. It is also important that the project not get off track while the scope change committee reviews a particular change.

Myth 5: Regular and frequent meetings with senior management will ensure they are kept up to date and will result in goodwill and support.

Reality: They may not be listening. It is important to keep their attention and involvement by focusing on the benefits of the system.

Myth 6: You can always make up schedules and budgets later on if they slip a little bit.

Reality: Catching up is a rare occurrence. Projects rarely fail overnight, and project managers must be vigilant for early warning signs. If there are minor setbacks, it is important that the project manager be candid with senior management.

SOURCE: Adapted from Alice LaPlante, Scope Grope, *Computerworld,* March 20, *1995,* http://www.computerworld.com/news/1995/story/0,11280,1340,00.html.

to provide new products and services to its customers. Scope creep may be adding a new feature, such as a new product or service, not originally defined in the project's scope. Scope leap, on the other hand, is an impetus to change the project so that the electronic commerce system would allow the bank to obtain additional funding in the open market. Adding this activity would dramatically change the entire scope and focus of the project. Scope leap can occur as a result of changes in the environment, the business, and the competitive makeup of the industry. Scope leap entails changing the MOV and, therefore, requires that the organization rethink the value of the current project. If this change is critical, the organization may be better off pulling the plug on the current project and starting over by conceptualizing and initiating a new project.

Scope Change Control Procedures

A scope change procedure should be in place before the actual work on the project commences. It can be part of, or at least referenced in, the project charter so that it is communicated to all project stakeholders. This procedure should allow for the identification and handling of all requested changes to the project's scope. Scope change requests can be made, and each request's impact on the project can be assessed. Then, a decision whether to accept or reject the scope change can be made.

JUST ONE MORE BELL—ONE MORE WHISTLE

Scope creep is a widespread problem. A *Computerworld* survey of 160 IS professionals revealed that 80 percent of the respondents said scope creep "always" or "frequently" occurs. Moreover, 44 percent responded that "poor initial requirements definition" was the leading cause for scope creep. In addition, only 16 percent of the respondents said "no" when users demanded significant changes once the project was well under way. To reduce scope creep, 63 percent of the respondents use JAD and 25 percent use prototyping. A classic case of scope creep is provided in a research study by Mark Keil of Georgia State University, which focused on an artificial intelligence application designed to help sales people of a large computer vendor configure computer systems. Although scope creep may arise as a result of not getting the scope of a project defined properly, Keil found that sales staff did not care for the system because they, the system's would-be users, were rewarded on sales volume and not the accuracy or completeness of the order. Thus, they began to make excuses for not using the system. These excuses became scope changes, and the project began to take on a life of its own that led to project escalation. The company eventually canceled the project after the company spent tens of millions of dollars over eleven years.

SOURCE: Adapted from Mark Keil, Pulling the Plug: Software Project Management and the Problem of Project Escalation, MIS ***Quarterly.*** December 1995, 421–447; and Gary H. Anthes, No More Creeps: Are You a Victim of Creeping User Requirements? *Computerworld,* May 2, 1994, http://www.computerworld.com/news/1994/story/0,11280,15919,00.html.

A scope change procedure may include a scope change request form. An example of a scope change request form is illustrated in Figure 5.6. The individual or group making the scope change request should complete the form.

Regardless of the format for a scope change request form, it should contain some basic information. First, the description of the change request should be clearly defined so that the project manager and project team understand fully the nature and reason for the scope change. Second, the scope change should be justified, which separates the ***would likes*** from the *must* haves. In addition, several alternatives may be listed in order to assess the impact on scope, schedule, resources, and cost. Often a trade-off or compromise will be suitable if the impact of the scope change is too great. The project sponsor must understand and approve these impacts because the baseline project plan will have to be adjusted accordingly. Alternatives may include reducing functionality in other areas of the project, extending the project deadline, or adding more resources in terms of staff, overtime, or technology. Finally, all scope changes must be approved so that additional resources can be committed to the project.

However, nothing can be more frustrating than making a request and then not hearing anything. Too often requests fall through the cracks, leading to credibility concerns and accusations that the project manager or project team is not being responsive to the client's needs. Therefore, a scope change control procedure should be logged with the intention that each request will be reviewed and acted upon. As seen in Figure 5.7, an example of a Change Request Log includes information as to who has the authority to make the scope change decision and when a response can be expected.

Although this may seem like the beginning of a bureaucracy, it is really designed to protect all project stakeholders. Too often the project manager and project team feel the pressure to say yes to each and every scope change request because their refusal may be interpreted as being uncooperative. Unfortunately, introducing scope creep will impact the schedule and budget. As the deadline passes or as costs begin to overrun the budget, the project manager and team then may come under fire for not controlling the project objectives.

Scope change request form

Requestor name: _____ Request date: _____

Request title: _____ Request number: _____

Request description:

Justification:

Possible alternatives:

Impacts	*Alternative 1*	*Alternative 2*	*Alternative 3*
Scope			
Schedule			
Resources required			
Cost			

Recommendation:

Authorized by ***Date***

Figure 5.6 Scope Change Request Form

Request Number	*Request Title*	*Date of Request*	*Requested By*	*Priority (L, M, H)*	*Authority to Approve Request*	*Expected Response Date*	*Scope Change Approved? (Y/N)*

Figure 5.7 Scope Change Request Log

Still, a project manager and team should not say no to every scope change request. Some changes will be beneficial and warranted as the project proceeds. The question then becomes, What should he the basis for making a scope change decision?

As you have seen, the project's MOV guides the project planning process. Similarly, the project's MOV can also guide scope change decisions. A scope change request should be approved if—and only if—the scope change can bring the project closer to achieving its MOV; otherwise, why bother adding additional work, resources, time, and money to activities that will not bring any value to the organization?

Benefits of Scope Control

The most important benefit of scope change control procedures is that they keep the project manager in control of the project. More specifically, they allow the project manager to manage and control the project's schedule and budget. Scope control procedures also allow the project team to stay focused and on track in terms of meeting its milestones because it does not have to perform unnecessary work.

CHAPTER SUMMARY

Although scope is the work to be performed on the project, a project's scope can be defined as the boundary and deliverables that the project team will provide to the project sponsor. A scope boundary acts as a fence to ensure that what needs to get done, gets done—and only what needs to get done, gets done. Performing work that does not help the project achieve its MOV needlessly consumes valuable time and resources. Therefore, the project's boundary helps the project team define the limits of the project and how it will interact with its environment. In addition, deliverables are tangible units of work that ensure that the project is on track. Deliverables may be product-oriented or project-oriented. Product-oriented deliverables focus on the high level features and functionality of the application system—the project's product. On the other hand, project-oriented deliverables focus on the project's processes as defined in the IT project methodology.

The Project Management Body of Knowledge identifies five processes that make up the scope management process group. These processes include: (1) Scope Initiation, (2) Scope Planning, (3) Scope Definition, (4) Scope Verification, and (5) Scope Change Control. Figure 5.8 summarizes these processes and the tools used to support them.

Scope grope is a common occurrence in the early stages of the project. Often the project team struggles to define what the project is all about and what work must be done. By applying the concept of an MOV and the tools introduced in this chapter, the time a project team spends searching for these answers should be reduced. Scope creep, on the other hand, is a common occurrence in many projects. It entails adding additional features or functions to the scope once the scope has been set and approved. This phenomenon can increase the schedule and budget, causing the project to miss its deadline and budget targets. Scope creep can be managed by (1) verifying that the scope is accurate and complete by using a scope verification checklist, and (2) ensuring that appropriate scope changes are approved and reflected in the baseline plan by having scope change procedures. The MOV concept can guide this decision process. For example, scope changes that move the project closer to achieving its MOV should be approved, while those that do not merely waste time and resources. Lastly, scope leap entails a major and fundamental change to the project scope. It may be the result of a changing business environment or the competitive makeup of the industry. Such a radical departure from the original business case may require the project stakeholders to rethink the viability of the current project.

REVIEW QUESTIONS

1. What is meant by project scope?
2. Briefly describe the five scope management processes.
3. What is the project's scope initiation process? When docs it occur? Why is it important?
4. How is a project's scope initiation process supported by the IT project methodology?
5. Briefly describe the scope planning process.
6. Briefly describe the scope definition process.
7. Briefly describe the scope verification process.