

# 4

## *Project Integration Management*

### Objectives

*After reading this chapter, you will be able to:*

- 1. Describe an overall framework for project integration management as it relates to the other project management knowledge areas and the project life cycle*
- 2. Explain the strategic planning process and apply different project selection methods*
- 3. Explain the importance of creating a project charter to formally initiate projects*
- 4. Discuss the process of creating a preliminary project scope statement*
- 5. Describe project management plan development, including content, using guidelines and templates for developing plans, and performing a stakeholder analysis to help manage relationships*
- 6. Explain project execution, its relationship to project planning, the factors related to successful results, and tools and techniques to assist in project execution*
- 7. Describe the process of monitoring and controlling project work*
- 8. Understand the integrated change control process, planning for and managing changes on information technology projects, and developing and using a change control system*
- 9. Explain the importance of developing and following good procedures for closing projects*
- 10. Describe how software can assist in project integration management*

### OPENING CASE

**N**ick Carson recently became the project manager of a critical biotech project for his company in Silicon Valley. This project involved creating the hardware and software for a DNA-sequencing instrument used in assembling and analyzing the human genome.

Each instrument sold for approximately \$200,000, and various clients would purchase several instruments. One hundred instruments running twenty-four hours per day could decipher the entire human genome in less than two years. The biotech project was the company's largest project, and it had tremendous potential for future growth and revenues. Unfortunately, there were problems managing this large project. It had been underway for three years and had already gone through three different project managers. Nick had been the lead software developer on the project before top management made him the project manager. Top management told him to do whatever it took to deliver the first version of the software for the DNA-sequencing instrument in four months and a production version in nine months. Negotiations for a potential corporate buyout with a larger company influenced top management's sense of urgency to complete the project.

Nick was highly energetic and intelligent and had the technical background to make the project a success. He delved into the technical problems and found some critical flaws that were keeping the DNA-sequencing instrument from working. He was having difficulty, however, in his new role as project manager. Although Nick and his team got the product out on time, top management was upset because Nick did not focus on managing all aspects of the project. He never provided top management with accurate schedules or detailed plans of what was happening on the project. Instead of performing the work of project manager, Nick had taken on the role of software integrator and troubleshooter. Nick, however, did not understand top management's problem—he delivered the product, didn't he? Didn't they realize how valuable he was?

## WHAT IS PROJECT INTEGRATION MANAGEMENT?

**Project integration management** involves coordinating all of the other project management knowledge areas throughout a project's life cycle. This integration ensures that all the elements of a project come together at the right

times to complete a project successfully. According to the *PMBOK® Guide 2004*, there are seven main processes involved in project integration management:

1. **Develop the project charter**, which involves working with stakeholders to create the document that formally authorizes a project—the charter.
2. **Develop the preliminary project scope statement**, which involves further work with stakeholders, especially users of the project’s products, services, or results, to develop the high-level scope requirements. The output of this process is the preliminary project scope statement.
3. **Develop the project management plan**, which involves coordinating all planning efforts to create a consistent, coherent document—the project management plan.
4. **Direct and manage project execution**, which involves carrying out the project management plan by performing the activities included in it. The outputs of this process are deliverables, requested changes, work performance information, implemented change requests, corrective actions, preventive actions, and defect repair.
5. **Monitor and control the project work**, which involves overseeing project work to meet the performance objectives of the project. The outputs of this process are recommended corrective and preventive actions, forecasts, recommended defect repair, and requested changes.
6. **Perform integrated change control**, which involves coordinating changes that affect the project’s deliverables and organizational process assets. The outputs of this process include approved and rejected change requests, approved corrective and preventive actions, approved and validated defect repair, deliverables, and updates to the project management plan and project scope statement.
7. **Close the project**, which involves finalizing all project activities to formally close the project. Outputs of this process include final products, services, or results, administrative and contract closure procedures, and updates to organizational process assets.

Many people consider project integration management the key to overall project success. Someone must take responsibility for coordinating all of the people, plans, and work required to complete a project. Someone must focus on the big picture of the project and steer the project team toward successful completion. Someone must make the final decisions when there are conflicts among project goals or people involved. Someone must communicate key project information to top management. This someone is the project manager, and the project manager’s chief means for accomplishing all these tasks is project integration management.

Good project integration management is critical to providing stakeholder satisfaction. Project integration management includes interface management.

**Interface management** involves identifying and managing the points of interaction between various elements of the project. The number of interfaces can increase exponentially as the number of people involved in a project increases. Thus, one of the most important jobs of a project manager is to establish and maintain good communication and relationships across organizational interfaces. The project manager must communicate well with all project stakeholders, including customers, the project team, top management, other project managers, and opponents of the project.

What happens when a project manager does not communicate well with all stakeholders? In the opening case, Nick Carson seemed to ignore a key stakeholder for the DNA-sequencing instrument project—his top management. Nick was comfortable working with other members of the project team, but he was not familiar with his new job as project manager or the needs of the company's top management. Nick continued to do his old job of software developer and took on the added role of software integrator. He mistakenly thought project integration management meant software integration management and focused on the project's technical problems. He totally ignored what project integration management is really about—integrating the work of all of the people involved in the project by focusing on good communication and relationship management. Recall that project management is applying knowledge, skills, tools, and techniques to meet project requirements, while also meeting or exceeding stakeholder needs and expectations. Nick did not take the time to find out what top management expected from him as the project manager; he assumed that completing the project on time and within budget was sufficient to make top management happy.

In addition to not understanding project integration management, Nick did not use holistic or systems thinking (see Chapter 2). He burrowed into the technical details of his particular project. He did not stop to think about what it meant to be the project manager, how this project related to other projects in the organization, or what top management's expectations were of him and his team.

Project integration management must occur within the context of the entire organization, not just within a particular project. The project manager must integrate the work of the project with the ongoing operations of the performing organization. In the opening case, Nick's company was negotiating a potential buyout with a larger company. Consequently, top management needed to know when the DNA-sequencing instrument would be ready, how big the market was for the product, and if they had enough in-house staff to continue to manage projects like this one in the future. They wanted to see a project management plan and a schedule to help them monitor the project's progress and show their potential buyer what was happening. When top managers tried to talk to Nick about these issues, Nick soon returned to discussing

the technical details of the project. Even though Nick was very bright, he had no experience or real interest in many of the business aspects of how the company operated. Project managers must always view their projects in the context of the changing needs of their organizations and respond to requests from top management.

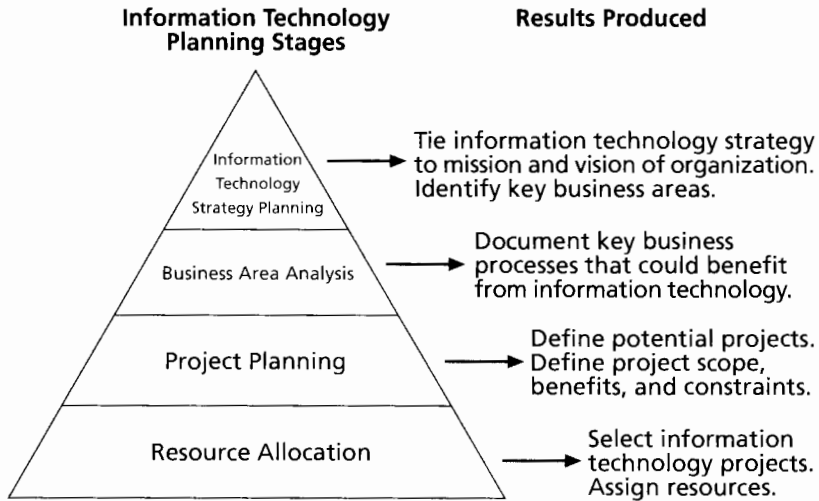
Following a standard process for managing projects can help prevent some of the typical problems new and experienced project managers face, including communicating with managing stakeholders. Before organizations begin projects, however, they should go through a formal process to decide what projects to pursue.

## STRATEGIC PLANNING AND PROJECT SELECTION

Successful leaders look at the big picture or strategic plan of the organization to determine what types of projects will provide the most value. Therefore, project initiation starts with identifying potential projects, using realistic methods to select which projects to work on, and then formalizing their initiation by issuing some sort of project charter.

### Identifying Potential Projects

The first step in project management is deciding what projects to do in the first place. Some may argue that project managers should not be involved in strategic planning and project selection, but successful organizations know that current project managers can provide valuable insight into the project selection process. Figure 4-1 shows a four-stage planning process for selecting information technology projects. Note the hierarchical structure of this model and the results produced from each stage. The first step in this process, starting at the top of the hierarchy, is to tie the information technology strategic plan to the organization's overall strategic plan. **Strategic planning** involves determining long-term objectives by analyzing the strengths and weaknesses of an organization, studying opportunities and threats in the business environment, predicting future trends, and projecting the need for new products and services. Many people are familiar with "SWOT" analysis—analyzing **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats—that is used to aid in strategic planning. It is very important to have managers from outside the information technology department assist in the information technology planning process, as they can help information technology personnel understand organizational strategies and identify the business areas that support them.



*Figure 4-1. Planning Process for Selecting Information Technology Projects*

After identifying strategic goals, the next step in the planning process for selecting information technology projects is to perform a business area analysis. This analysis outlines business processes that are central to achieving strategic goals and helps determine which ones could most benefit from information technology. Then, the next step is to start defining potential information technology projects, their scope, benefits, and constraints. The last step in the planning process for selecting information technology projects is choosing which projects to do and assigning resources for working on them.

## Aligning Information Technology with Business Strategy

It is often easier to identify and select appropriate information technology projects when organizations align their information technology departments more closely with the business. Even though many information technology projects do not produce “strategic information systems” or receive great publicity, it is critical that the information technology planning process start by analyzing the overall strategy of the organization. Most organizations face thousands of problems and opportunities for improvement. Therefore, an organization’s strategic plan should guide the information technology project selection process. An organization must develop a strategy for using information technology to define how it will support the organization’s objectives. This information technology strategy must align with the organization’s

strategic plans and strategy. In fact, research shows that supporting explicit business objectives is the number one reason cited for why organizations invest in information technology projects. Other top criteria for investing in information technology projects include supporting implicit business objectives and providing financial incentives, such as a good internal rate of return (IRR) or net present value (NPV).<sup>1</sup> You will learn more about these financial criteria later in this section.

A 2002 study found a direct correlation between closer business and information technology alignment and reporting structure. Hacket Best Practices found that companies in which the chief information officer (CIO) reports directly to the chief executive officer (CEO) lowered their operational support costs per end user by 17 percent. Many CIOs now report to the CEO, increasing from 24 percent in 1999 to 37 percent in 2002. The study also found that companies with centralized or consolidated information technology operations had 24 percent lower operational support costs per end user. The consistent use of information technology standards also lowered companies' application development costs by 41 percent per user.<sup>2</sup>

Information systems can be and often are central to business strategy. Author Michael Porter, who developed the concept of the strategic value of competitive advantage, has written several books and articles on strategic planning and competition. He and many other experts have emphasized the importance of using information technology to support strategic plans and provide a competitive advantage. Many information systems are classified as "strategic" because they directly support key business strategies. For example, information systems can help an organization support a strategy of being a low-cost producer. As one of the largest retailers in the U.S., Wal-Mart's inventory control system is a classic example of such a system. Information systems can support a strategy of providing specialized products or services that set a company apart from others in the industry. Consider the classic example of Federal Express's introduction of online package tracking systems. They were the first company to provide this type of service, which gave them a competitive advantage until others developed similar systems. Information systems can also support a strategy of selling to a particular market or occupying a specific project niche. Owens-Corning developed a strategic information system that boosted the sales of its home-insulation products by providing its customers with a system for evaluating the energy efficiency of building designs.

<sup>1</sup> Bacon, James. "The Use of Decision Criteria in Selecting Information Systems/Technology Investments," *MIS Quarterly*, Vol. 16, No. 3 (September 1992).

<sup>2</sup> Cosgrove Ware, Lorraine. "By the Numbers," *CIO Magazine* ([www.cio.com](http://www.cio.com)) (September 1, 2002).

## Methods for Selecting Projects

Organizations identify many potential projects as part of their strategic planning processes, and often rely on experienced project managers to help them make project selection decisions. However, organizations need to narrow down the list of potential projects to those projects that will be of most benefit. Selecting projects is not an exact science, but it is a critical part of project management. Many methods exist for selecting from among possible projects. Five common techniques are:

1. Focusing on broad organizational needs
2. Categorizing information technology projects
3. Performing net present value or other financial analyses
4. Using a weighted scoring model
5. Implementing a balanced scorecard

In practice, organizations usually use a combination of these approaches to select projects. Each approach has advantages and disadvantages, and it is up to management to decide the best approach for selecting projects based on their particular organization.

### ***Focusing on Broad Organizational Needs***

Top managers must focus on meeting their organization's many needs when deciding what projects to undertake, when to undertake them, and to what level. Projects that address broad organizational needs are much more likely to be successful because they will be important to the organization. For example, a broad organizational need might be to improve safety, increase morale, provide better communications, or improve customer service. However, it is often difficult to provide a strong justification for many information technology projects related to these broad organizational needs. For example, it is often impossible to estimate the financial value of such projects, but everyone agrees that they do have a high value. As the old proverb says, "It is better to measure gold roughly than to count pennies precisely."

One method for selecting projects based on broad organizational needs is to determine whether they first meet three important criteria: need, funding, and will. Do people in the organization agree that the project needs to be done? Does the organization have the will and the capacity to provide adequate funds to perform the project? Is there a strong will to make the project succeed? For example, many visionary CEOs can describe a broad need to improve certain aspects of their organizations, such as communications. Although they cannot specifically describe how to improve communications, they might allocate funds to projects that address this need. As projects progress, the organization must reevaluate the need, funding, and will for each project to determine if the project should be continued, redefined, or terminated.



## *Categorizing Information Technology Projects*

Another method for selecting projects is based on various categorizations. One type of categorization assesses whether projects provide a response to a problem, an opportunity, or a directive.

- **Problems** are undesirable situations that prevent an organization from achieving its goals. These problems can be current or anticipated. For example, users of an information system may be having trouble logging onto the system or getting information in a timely manner because the system has reached its capacity. In response, the company could initiate a project to enhance the current system by adding more access lines or upgrading the hardware with a faster processor, more memory, or more storage space.
- **Opportunities** are chances to improve the organization. For example, the project described in the opening case involves creating a new product that can make or break the entire company.
- **Directives** are new requirements imposed by management, government, or some external influence. For example, many projects involving medical technologies must meet rigorous government requirements.

Organizations select projects for any of these reasons. It is often easier to get approval and funding for projects that address problems or directives because the organization must respond to these categories of projects to avoid hurting their business. Many problems and directives must be resolved quickly, but managers must also apply systems thinking and seek opportunities for improving the organization through information technology projects.

Another categorization for information technology projects is based on the time it will take to complete a project or the date by which it must be done. For example, some potential projects must be finished within a specific time window. If they cannot be finished by this set date, they are no longer valid projects. Some projects can be completed very quickly—within a few weeks, days, or even minutes. Many organizations have an end user support function to handle very small projects that can be completed quickly. Even though many information technology projects can be completed quickly, it is still important to prioritize them.

A third categorization for project selection is the overall priority of the project. Many organizations prioritize information technology projects as being high, medium, or low priority based on the current business environment. For example, if it is crucial to cut operating costs quickly, projects that have the most potential to do so would be given a high priority. The organization should always complete high-priority projects first, even if a low- or medium-priority project could be finished in less time. Usually there are many more potential information technology projects than an organization can undertake at any one time, so it is very important to work on the most important ones first.

## *Performing Net Present Value Analysis, Return on Investment, and Payback Analysis*

Financial considerations are often an important aspect of the project selection process, especially during tough economic times. As authors Dennis Cohen and Robert Graham put it, “Projects are never ends in themselves. Financially they are always a means to an end, cash.”<sup>3</sup> Many organizations require an approved business case before pursuing projects, and financial projections are a critical component of the business case. (See Chapter 3 for a sample business case.) Three primary methods for determining the projected financial value of projects include net present value analysis, return on investment, and payback analysis. Because project managers often deal with business executives, they must understand how to speak their language, which often boils down to these important financial concepts.

### *Net Present Value Analysis*

Everyone knows that a dollar earned today is worth more than a dollar earned five years from now. **Net present value (NPV) analysis** is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time. An organization should consider only projects with a positive NPV if financial value is a key criterion for project selection. This is because a positive NPV means the return from a project exceeds the **cost of capital**—the return available by investing the capital elsewhere. Projects with higher NPVs are preferred to projects with lower NPVs, if all other factors are equal.

Figure 4-2 illustrates this concept for two different projects. Note that this example starts discounting right away in Year 1 and uses a 10 percent discount rate. You can use the NPV function in Microsoft Excel to calculate the NPV quickly. Detailed steps on performing this calculation manually are provided later in this section. Note that Figure 4-2 lists the projected benefits first, followed by the costs, and then the calculated cash flow amount. Note that the sum of the **cash flow**—benefits minus costs or income minus expenses—is the same for both projects at \$5,000. The net present values are different, however, because they account for the time value of money. Project 1 had a negative cash flow of \$5,000 in the first year, while Project 2 had a negative cash flow of only \$1,000 in the first year. Although both projects had the same total cash flows without discounting, these cash flows are not of comparable financial value. Project 2’s NPV of \$3,201 is better than Project 1’s NPV of \$2,316. NPV analysis, therefore, is a method for making equal comparisons between cash flows for multi-year projects.

<sup>3</sup> Cohen, Dennis J. and Robert J. Graham, *The Project Manager’s MBA*, San Francisco, Jossey-Bass (2001) p. 31.

1	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	
1	Discount rate	10%						
2								
3	<b>PROJECT 1</b>	<b>YEAR 1</b>	<b>YEAR 2</b>	<b>YEAR 3</b>	<b>YEAR 4</b>	<b>YEAR 5</b>	<b>TOTAL</b>	
4	Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000	
5	Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000	
6	Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000	
7	NPV →	\$2,316						
8		Formula =npv(b1,b6:f6)						
9								
10	<b>PROJECT 2</b>	<b>YEAR 1</b>	<b>YEAR 2</b>	<b>YEAR 3</b>	<b>YEAR 4</b>	<b>YEAR 5</b>	<b>TOTAL</b>	
11	Benefits	\$1,000	\$2,000	\$4,000	\$4,000	\$4,000	\$15,000	
12	Costs	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000	
13	Cash flow	(\$1,000)	\$0	\$2,000	\$2,000	\$2,000	\$5,000	
14	NPV →	\$3,201						
15		Formula =npv(b1,b13:f13)						
16								
17								

Figure 4-2. Net Present Value Example

There are some items to consider when calculating NPV. Some organizations refer to the investment year(s) for project costs as Year 0 instead of Year 1 and do not discount costs in Year 0. Other organizations start discounting immediately based on their financial procedures; it's simply a matter of preference for the organization. The discount rate can also vary, often based on the prime rate and other economic considerations. You can enter costs as negative numbers instead of positive numbers, and you can list costs first and then benefits. For example, Figure 4-3 shows the financial calculations JWD Consulting provided in the business case for the Project Management Intranet Site Project described in Chapter 3. Note that the discount rate is 8 percent, benefits are listed first, and costs are entered as positive numbers. The NPV and other calculations are still the same; only the format is different. A project manager must be sure to check with his or her organization to find out its guidelines for when discounting starts, what discount rate to use, and what format the organization prefers.

Discount rate		8%				
Assume the project is completed in Year 0						
		Year				
		0	1	2	3	Total
Costs		140,000	40,000	40,000	40,000	
Discount factor		1	0.93	0.86	0.79	
<b>Discounted costs</b>		<b>140,000</b>	<b>37,200</b>	<b>34,400</b>	<b>31,600</b>	<b>243,200</b>
Benefits		0	200,000	200,000	200,000	
Discount factor		1	0.93	0.86	0.79	
<b>Discounted benefits</b>		<b>0</b>	<b>186,000</b>	<b>172,000</b>	<b>158,000</b>	<b>516,000</b>
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	272,800	← NPV
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		

ROI → 112% ↑ Payback In Year 1

Figure 4-3. JWD Consulting Net Present Value Example

To determine NPV, follow these steps:

1. Determine the estimated costs and benefits for the life of the project and the products it produces. For example, JWD Consulting assumed the project would produce a system in about six months that would be used for three years, so costs are included in Year 0, when the system is developed, and ongoing system costs and projected benefits are included for Years 1, 2, and 3.
2. Determine the discount rate. A **discount rate** is the rate used in discounting future cash flow. It is also called the capitalization rate or opportunity cost of capital. In Figure 4-2, the discount rate is 10 percent per year, and in Figure 4-3, the discount rate is 8 percent per year.
3. Calculate the net present value. There are several ways to calculate NPV. Most spreadsheet software has a built-in function to calculate NPV. For example, Figure 4-2 shows the formula that Microsoft Excel uses: =npv(discount rate, range of cash flows), where the discount rate is in cell B1 and the range of cash flows for Project 1 are in cells B6 through F6. (See Chapter 7, Project Cost Management, for more information on cash flow and other cost-related terms.) To use the NPV function, there must be a row in the spreadsheet (or column, depending how it is organized) for the cash flow each year, which is the benefit amount for that year minus the cost amount. The result of the formula yields an NPV of

\$2316 for Project 1 and \$3201 for Project 2. Since both projects have positive NPVs, they are both good candidates for selection. However, since Project 2 has a higher NPV than Project 1 (38 percent higher), it would be the better choice between the two. If the two numbers are close, then other methods should be used to help decide which project to select.

The mathematical formula for calculating NPV is:

$$\text{NPV} = \sum_{t=1..n} A/(1+r)^t$$

where  $t$  equals the year of the cash flow,  $n$  is the last year of the cash flow,  $A$  is the amount of cash flow each year, and  $r$  is the discount rate. If you cannot enter the data into spreadsheet software, you can perform the calculations by hand or with a simple calculator. First, determine the annual **discount factor**—a multiplier for each year based on the discount rate and year—and then apply it to the costs and benefits for each year. The formula for the discount factor is  $1/(1+r)^t$  where  $r$  is the discount rate, such as 8 percent, and  $t$  is the year. For example, the discount factors used in Figure 4-3 are calculated as follows:

$$\text{Year 0: discount factor} = 1/(1+0.08)^0 = 1$$

$$\text{Year 1: discount factor} = 1/(1+0.08)^1 = .93$$

$$\text{Year 2: discount factor} = 1/(1+0.08)^2 = .86$$

$$\text{Year 3: discount factor} = 1/(1+0.08)^3 = .79$$

After determining the discount factor each year, multiply the costs and benefits each year by the appropriate discount factor. For example, in Figure 4-3, the discounted cost for Year 1 is  $\$40,000 * .93 = \$37,200$ . Next, sum all of the discounted costs and benefits each year to get a total. For example, the total discounted costs in Figure 4-3 are  $\$243,200$ . To calculate the NPV, take the total discounted benefits and subtract the total discounted costs. In this example, the NPV is  $\$516,000 - \$243,200 = \$272,800$ .

### *Return on Investment*

Another important financial consideration is return on investment. **Return on investment (ROI)** is the result of subtracting the project costs from the benefits and then dividing by the costs. For example, if you invest \$100 today and next year it is worth \$110, your ROI is  $(\$110 - 100)/100$  or 0.10 (10 percent). Note that the ROI is always a percentage. It can be positive or negative. It is best to consider discounted costs and benefits for multi-year projects when calculating ROI. Figure 4-3 shows an ROI of 112 percent. You calculate this number as follows:

$$\text{ROI} = (\text{total discounted benefits} - \text{total discounted costs})/\text{discounted costs}$$

$$\text{ROI} = (516,000 - 243,200) / 243,200 = 112\%$$

The higher the ROI, the better. An ROI of 112 percent is outstanding. Many organizations have a required rate of return for projects. The **required rate of return** is the minimum acceptable rate of return on an investment. For example, an organization might have a required rate of return of at least 10 percent for projects. The organization bases the required rate of return on what it could expect to receive elsewhere for an investment of comparable risk. You can also determine a project's **internal rate of return (IRR)** by finding what discount rate results in an NPV of zero for the project. You can use the Goal Seek function in Excel (use Excel's Help function for more information on Goal Seek) to determine the IRR quickly. Simply set the cell containing the NPV calculation to zero while changing the cell containing the discount rate. For example, in Figure 4-2, you could set cell B7 to zero while changing cell B1 to find that the IRR for Project 1 is 27 percent.

Many organizations use ROI in the project selection process. The magazine *Information Week* asked 200 information technology and business professionals how often they measure formal ROI for information technology investments. The poll found that 41 percent of organizations required ROI calculations for all information technology investments, and 59 percent required it for specific initiatives.<sup>4</sup>

### *Payback Analysis*

Payback analysis is another important financial tool to use when selecting projects. **Payback period** is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project. In other words, payback analysis determines how much time will lapse before accrued benefits overtake accrued and continuing costs. Payback occurs when the net discounted cumulative benefits and costs reach zero. Figure 4-3 shows how to find the payback period. The cumulative benefits minus costs for Year 0 are (\$140,000). Adding that number to the discounted benefits minus costs for Year 1 results in \$8,800. Since that number is positive, the payback occurs in Year 1.

Creating a chart helps illustrate more precisely when the payback period occurs. Figure 4-4 charts the cumulative discounted costs and cumulative discounted benefits each year using the numbers from Figure 4-3. Note that the lines cross a little after Year 1 starts. The cumulative discounted benefits and costs are greater than zero where the lines cross. A payback early in Year 1 is normally considered very good.

<sup>4</sup> Klein, Paula, "Fickle Yet Focused," *Information Week* (August 3, 2001).

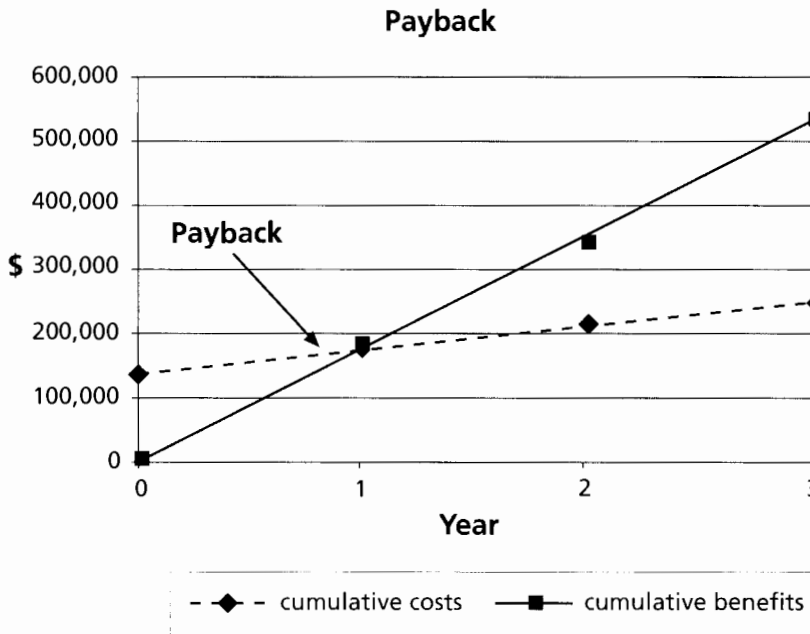


Figure 4-4. Charting the Payback Period

Many organizations have certain recommendations for the length of the payback period of an investment. They might require all information technology projects to have a payback period of less than two years or even one year, regardless of the estimated NPV or ROI. Rhonda Hocker, CIO at San Jose-based BEA Systems Inc., said the middleware vendor has a general rule that its information technology projects should have a payback period of less than one year. The company also tries to limit project teams to no more than twelve people doing a job within four months. Given the economic climate and rapid pace of change in businesses and technology, the company has to focus on delivering positive financial results quickly.<sup>5</sup> However, organizations must also consider long-range goals when making technology investments. Many crucial projects cannot achieve a payback so quickly or be completed in such a short time period.

To aid in project selection, it is important for project managers to understand the organization's financial expectations for projects. It is also important for top

<sup>5</sup> Songini, Marc L. "Tight Budgets Put More Pressure on IT." *Computer World* (December 2, 2002).

management to understand the limitations of financial estimates, particularly for information technology projects. For example, it is very difficult to develop good estimates of projected costs and benefits for information technology projects. You will learn more about estimating costs and benefits in Chapter 7, Project Cost Management.

### *Using a Weighted Scoring Model*

A **weighted scoring model** is a tool that provides a systematic process for selecting projects based on many criteria. These criteria can include factors such as meeting broad organizational needs; addressing problems, opportunities, or directives; the amount of time it will take to complete the project; the overall priority of the project; and projected financial performance of the project.

The first step in creating a weighted scoring model is to identify criteria important to the project selection process. It often takes time to develop and reach agreement on these criteria. Holding facilitated brainstorming sessions or using groupware to exchange ideas can aid in developing these criteria. Some possible criteria for information technology projects include:

- Supports key business objectives
- Has strong internal sponsor
- Has strong customer support
- Uses realistic level of technology
- Can be implemented in one year or less
- Provides positive NPV
- Has low risk in meeting scope, time, and cost goals

Next, you assign a weight to each criterion. Once again, determining weights requires consultation and final agreement. These weights indicate how much you value each criterion or how important each criterion is. You can assign weights based on percentages, and the sum of all of the criteria's weights must total 100 percent. You then assign numerical scores to each criterion (for example, 0 to 100) for each project. The scores indicate how much each project meets each criterion. At this point, you can use a spreadsheet application to create a matrix of projects, criteria, weights, and scores. Figure 4-5 provides an example of a weighted scoring model to evaluate four different projects. After assigning weights for the criteria and scores for each project, you calculate a weighted score for each project by multiplying the weight for each criterion by its score and adding the resulting values.

For example, you calculate the weighted score for Project I in Figure 4-5 as:

$$25\%*90 + 15\%*70 + 15\%*50 + 10\%*25 + 5\%*20 + 20\%*50 + 10\%*20 = 56$$



	A	B	C	D	E	F										
1	<b>Criteria</b>	<b>Weight</b>	<b>Project 1</b>	<b>Project 2</b>	<b>Project 3</b>	<b>Project 4</b>										
2	Supports key business objectives	25%	90	90	50	20										
3	Has strong internal sponsor	15%	70	90	50	20										
4	Has strong customer support	15%	50	90	50	20										
5	Uses realistic level of technology	10%	25	90	50	70										
6	Can be implemented in one year or less	5%	20	20	50	90										
7	Provides positive NPV	20%	50	70	50	50										
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90										
9	<b>Weighted Project Scores</b>	<b>100%</b>	<b>56</b>	<b>78.5</b>	<b>50</b>	<b>41.5</b>										
10	<p style="text-align: center;"><b>Weighted Score by Project</b></p> <table border="1"> <thead> <tr> <th>Project</th> <th>Weighted Score</th> </tr> </thead> <tbody> <tr> <td>Project 1</td> <td>56</td> </tr> <tr> <td>Project 2</td> <td>78.5</td> </tr> <tr> <td>Project 3</td> <td>50</td> </tr> <tr> <td>Project 4</td> <td>41.5</td> </tr> </tbody> </table>						Project	Weighted Score	Project 1	56	Project 2	78.5	Project 3	50	Project 4	41.5
Project							Weighted Score									
Project 1							56									
Project 2							78.5									
Project 3							50									
Project 4							41.5									
11																
12																
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Figure 4-5. Sample Weighted Scoring Model for Project Selection

Note that in this example, Project 2 would be the obvious choice for selection because it has the highest weighted score. Creating a bar chart to graph the weighted scores for each project allows you to see the results at a glance. If you create the weighted scoring model in a spreadsheet, you can enter the data, create and copy formulas, and perform a “what-if” analysis. For example, suppose you change the weights for the criteria. By having the weighted scoring model in a spreadsheet, you can easily change the weights to update the weighted scores and charts automatically. This capability allows you to investigate various options for different stakeholders quickly. Ideally, the result should be reflective of the group’s consensus, and any major disagreements should be documented.

Many teachers use a weighted scoring model to determine grades. Suppose grades for a class are based on two homework assignments and two exams. To calculate final grades, the teacher would assign a weight to each of these items. Suppose Homework One is worth 10 percent of the grade, Homework Two is worth 20 percent of the grade, Test One is worth 20 percent of the grade, and Test Two is worth 50 percent of the grade. Students would want to do well on each of these items, but they should focus on performing well on Test Two since it is 50 percent of the grade.

You can also establish weights by assigning points. For example, a project might receive 10 points if it definitely supports key business objectives, 5 points if it somewhat supports them, and 0 points if it is totally unrelated to key business objectives. With a point model, you can simply add all the points to determine the best projects for selection, without having to multiply weights and scores and sum the results.

You can also determine minimum scores or thresholds for specific criteria in a weighted scoring model. For example, suppose an organization really should not consider a project if it does not score at least 50 out of 100 on every criterion. You can build this type of threshold into the weighted scoring model to reject projects that do not meet these minimum standards. As you can see, weighted scoring models can aid in project selection decisions.

### *Implementing a Balanced Scorecard*

Drs. Robert Kaplan and David Norton developed another approach to help select and manage projects that align with business strategy. A **balanced scorecard** is a methodology that converts an organization's value drivers, such as customer service, innovation, operational efficiency, and financial performance, to a series of defined metrics. Organizations record and analyze these metrics to determine how well projects help them achieve strategic goals. Using a balanced scorecard involves several detailed steps. You can learn more about how balanced scorecards work from the Balanced Scorecard Institute ([www.balancedscorecard.org](http://www.balancedscorecard.org)) or other sources. Although this concept can work within an information technology department specifically, it is best to implement a balanced scorecard throughout an organization because it helps foster alignment between business and information technology.<sup>6</sup> The Balanced Scorecard Institute, which provides training and guidance to organizations using this methodology, quotes Kaplan and Norton's description of the balanced scorecard as follows:

"The balanced scorecard retains traditional financial measures. But financial measures tell the story of past events, an adequate story for industrial age companies

<sup>6</sup> Berkman, Eric, "How to Use the Balanced Scorecard," *CIO Magazine* (May 15, 2002).

for which investments in long-term capabilities and customer relationships were not critical for success. These financial measures are inadequate, however, for guiding and evaluating the journey that information age companies must make to create future value through investment in customers, suppliers, employees, processes, technology, and innovation.”<sup>7</sup>

As you can see, organizations can use many approaches to select projects. Many project managers have some say in which projects their organization selects for implementation. Even if they do not, they need to understand the motive and overall business strategy for the projects they are managing. Project managers and team members are often asked to justify their projects, and understanding many of these project selection methods can help them to do so.

## Project Charters

After top management decides on which projects to pursue, it is important to let the rest of the organization know about these projects. Management needs to create and distribute documentation to authorize project initiation. This documentation can take many different forms, but one common form is a project charter. A **project charter** is a document that formally recognizes the existence of a project and provides direction on the project’s objectives and management. It authorizes the project manager to use organizational resources to complete the project. Ideally, the project manager will provide a major role in developing the project charter. Instead of project charters, some organizations initiate projects using a simple letter of agreement, while others use much longer documents or formal contracts. Key project stakeholders should sign a project charter to acknowledge agreement on the need for and intent of the project. A project charter is a key output of the initiation process, as described in Chapter 3.

The *PMBOK® Guide 2004* lists inputs, tools and techniques, and outputs of the seven project integration management processes, as shown in Figure 4-6. For example, inputs that are helpful in developing a project charter include the following:

- A contract: If you are working on a project under contract, the contract should include much of the information needed for creating a good project charter. Some people might use a contract in place of a charter; however, many contracts are difficult to read and can often change, so it is still a good idea to create a project charter.

<sup>7</sup> The Balanced Scorecard Institute. “What Is a Balanced Scorecard.” ([www.balancedscorecard.org](http://www.balancedscorecard.org)) (February 2003).

- **A statement of work:** A statement of work is a document that describes the products or services to be created by the project team. It usually includes a description of the business need for the project, a summary of the requirements and characteristics of the products or services, and organizational information, such as appropriate parts of the strategic plan, showing the alignment of the project with strategic goals.
- **Enterprise environmental factors:** These factors include the organization's structure, culture, infrastructure, human resources, personnel policies, marketplace conditions, stakeholder risk tolerances, industry risk information, and project management information systems.
- **Organizational process assets information:** **Organizational process assets** include formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information that help people understand, follow, and improve business processes in a specific organization. How an organization manages its business processes, promotes learning, and shares knowledge can also provide important information when creating a project charter. Managers should review formal and informal enterprise plans, policies, procedures, guidelines, and management systems when developing a project charter.

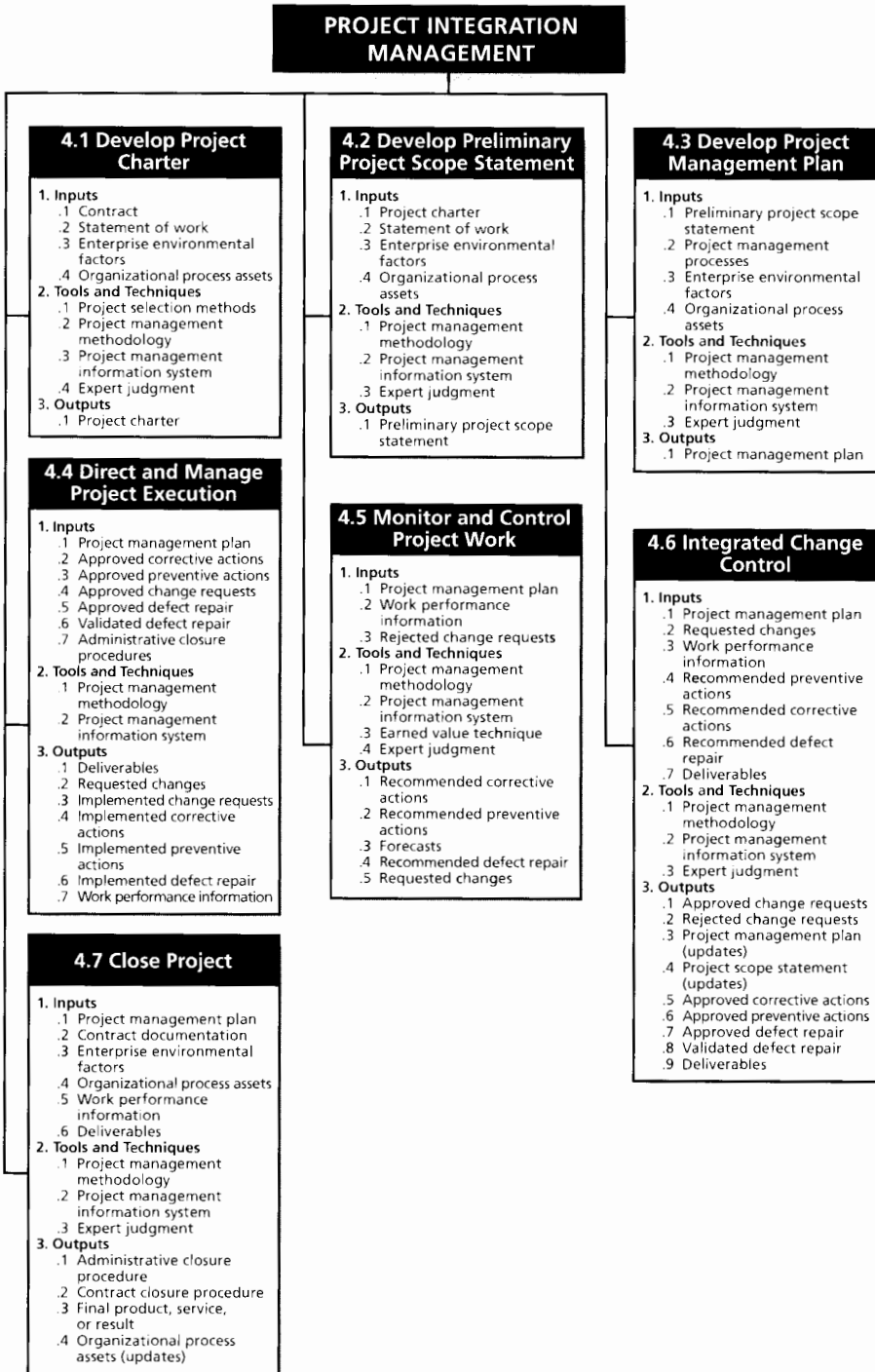


Figure 4-6. Project Integration Management Overview

Tools and techniques for developing a project charter listed in the *PMBOK® Guide 2004* include project selection methods, a project management methodology, a project management information system, and expert judgment. The previous section described several project selection methods, and Chapter 3 discussed using a project management methodology. A project management information system is a set of automated tools that help to organize and integrate project management information throughout an organization. In addition to project management software, such as Project 2003 or similar software, a project management information system can include additional software that helps people in an organization create, modify, track, and communicate project information. See the sections in Chapters 4–12 about using software to assist in each knowledge area. Expert judgment is also an important technique for creating a project charter as well as for performing many other project management processes.

The only output of the process to develop a project charter is a project charter. Although the format of project charters can vary tremendously, they should include the following basic information:

- The project's title and date of authorization
- The project manager's name and contact information
- A summary schedule, including the planned start and finish dates; if a summary milestone schedule is available, it should also be included or referenced
- A summary of the project's budget or reference to budgetary documents
- A brief description of the project objectives, including the business need or other justification for authorizing the project
- A summary of the planned approach for managing the project, which should describe stakeholder needs and expectations, important assumptions, and constraints, and refer to related documents, such as a communications management plan, as available
- A roles and responsibilities matrix
- A sign-off section for signatures of key project stakeholders
- A comments section in which stakeholders can provide important comments related to the project

Chapters 3 and 5 include samples of project charters. Unfortunately, many internal projects, like the one in the opening case of this chapter, do not have project charters. They often have a budget and general guidelines, but no formal, signed documentation. If Nick had a project charter to refer to—especially if it included information on the approach for managing the project—his job would have been easier. Project charters are usually not difficult to write. What is difficult is getting people with the proper knowledge and authority to write and sign the project charters. Top management should have reviewed the charter with Nick, since he was the project manager. In their initial meeting, they should have

discussed roles and responsibilities, as well as their expectations of how Nick should work with them. If there is no project charter, the project manager should work with key stakeholders, including top management, to create one.

Since many projects fail because of unclear requirements and expectations, starting with a project charter makes a lot of sense. If project managers are having difficulty obtaining support from project stakeholders, for example, they can refer to what everyone agreed to in the project charter. After formally recognizing the existence of a project, the next step in project integration management is preparing a preliminary scope statement.

## PRELIMINARY SCOPE STATEMENTS

A **scope statement** is a document used to develop and confirm a common understanding of the project scope. It describes in detail the work to accomplish on the project and is an important tool for preventing **scope creep**—the tendency for project scope to keep getting bigger, as described in more detail in Chapter 5. It is helpful to create a *preliminary* or initial scope statement during project initiation so that the entire project team can start important discussions and work related to the project scope. A more detailed scope statement is prepared as part of project scope management. There are usually several versions of the scope statement, and each one becomes more detailed as the project progresses and more information becomes available.

Scope statements, like project charters, also vary by type of project. Complex projects have very long scope statements, whereas smaller projects have shorter scope statements. See Chapter 3 for a sample scope statement for JWD Consulting's Project Management Intranet Site Project. Items often described in a preliminary scope statement include the project objectives, product or service requirements and characteristics, project boundaries, deliverables, product acceptance criteria, project assumptions and constraints, the organizational structure for the project, an initial list of defined risks, a summary of schedule milestones, a rough order of magnitude cost estimate, configuration management requirements, and a description of approval requirements.

Referring again to the opening case, we can assume that Nick and his project team had a good handle on the project scope since they did produce the desired product and results. Most of the team members had been working on the project for a long time, and they were experts in various aspects of biotechnology. However, Nick and senior management should have discussed and agreed on what information they needed to review, such as schedule milestones and product acceptance criteria, since those items had the most effect on the corporate buyout. A preliminary and more detailed scope statement, updated as the project progressed, would have been another tool for improving communications between Nick and senior management.

## PROJECT MANAGEMENT PLANS

To coordinate and integrate information across project management knowledge areas and across the organization, there must be a good project management plan. A **project management plan** is a document used to coordinate all project planning documents and help guide a project's execution and control. Plans created in the other knowledge areas are considered subsidiary parts of the overall project management plan. Project management plans also document project planning assumptions and decisions regarding choices, facilitate communication among stakeholders, define the content, extent, and timing of key management reviews, and provide a baseline for progress measurement and project control. Project management plans should be dynamic, flexible, and subject to change when the environment or project changes. These plans should greatly assist the project manager in leading the project team and assessing project status.

To create and assemble a good project management plan, the project manager must practice the art of project integration management, since information is required from all of the project management knowledge areas. Working with the project team and other stakeholders to create a project management plan will help the project manager guide the project's execution and understand the overall project.

### Project Management Plan Contents

Just as projects are unique, so are project management plans. A small project involving a few people over a couple of months might have a project management plan consisting of only a project charter, scope statement, and Gantt chart. A large project involving a hundred people over three years would have a much more detailed project management plan. It is important to tailor project management plans to fit the needs of specific projects. The project management plans should guide the work, so they should be only as detailed as needed for each project. (See the first Suggested Reading for information on accessing a real example of a complete project management plan.)

There are, however, common elements to most project management plans. Parts of a project management plan include an introduction or overview of the project, a description of how the project is organized, the management and technical processes used on the project, and sections describing the work to be performed, the schedule, and the budget.

The introduction or overview of the project should include, as a minimum, the following information:

- The project name: Every project should have a unique name. Unique names help distinguish each project and avoid confusion among related projects.



- A brief description of the project and the need it addresses: This description should clearly outline the goals of the project and reason for the project. It should be written in layperson's terms, avoid technical jargon, and include a rough time and cost estimate.
- The sponsor's name: Every project needs a sponsor. Include the name, title, and contact information of the sponsor in the introduction.
- The names of the project manager and key team members: The project manager should always be the contact for project information. Depending on the size and nature of the project, names of key team members may also be included.
- Deliverables of the project: This section should briefly list and describe the products that will be produced as part of the project. Software packages, pieces of hardware, technical reports, and training materials are examples of deliverables.
- A list of important reference materials: Many projects have a history preceding them. Listing important documents or meetings related to a project helps project stakeholders understand that history. This section should reference the plans produced for other knowledge areas. (Recall from Chapter 3 that every single knowledge area includes some planning processes.) Therefore, the project management plan should reference and summarize important parts of the scope management, schedule management, cost management, quality management, human resource management, communications management, risk management, and procurement management plans.
- A list of definitions and acronyms, if appropriate: Many projects, especially information technology projects, involve terminology unique to a particular industry or technology. Providing a list of definitions and acronyms will help avoid confusion.

The description of how the project is organized should include the following information:

- Organizational charts: In addition to an organizational chart for the company sponsoring the project and for the customer's company (if it is an external customer), there should be a project organizational chart to show the lines of authority, responsibilities, and communication for the project. For example, the Manhattan Project introduced in Chapter 1 had a very detailed organizational chart to show all the people working on the project.
- Project responsibilities: This section of the project plan should describe the major project functions and activities and identify those individuals who are responsible for them. A responsibility assignment matrix (described in Chapter 9) is a tool often used for displaying this information.
- Other organizational or process-related information: Depending on the nature of the project, there may be a need to document major processes

followed on the project. For example, if the project involves releasing a major software upgrade, it might help everyone involved in the project to see a diagram or timeline of the major steps involved in this process.

The section of the project management plan describing management and technical approaches should include the following information:

- **Management objectives:** It is important to understand top management's view of the project, what the priorities are for the project, and any major assumptions or constraints.
- **Project controls:** This section describes how to monitor project progress and handle changes. Will there be monthly status reviews and quarterly progress reviews? Will there be specific forms or charts to monitor progress? Will the project use earned value management (described in Chapter 7) to assess and track performance? What is the process for change control? What level of management is required to approve different types of changes? (You will learn more about change control later in this chapter.)
- **Risk management:** This section briefly addresses how the project team will identify, manage, and control risks. It should refer to the risk management plan, if one is required for the project.
- **Project staffing:** This section describes the number and types of people required for the project. It should refer to the staffing management plan, if one is required for the project.
- **Technical processes:** This section describes specific methodologies a project might use and explains how to document information. For example, many information technology projects follow specific software development methodologies or use particular Computer Aided Software Engineering (CASE) tools. Many companies or customers also have specific formats for technical documentation. It is important to clarify these technical processes in the project management plan.

The next section of the project management plan should describe the work to perform and reference the scope management plan. It should summarize the following:

- **Major work packages:** A project manager usually organizes the project work into several work packages using a work breakdown structure (WBS), and produces a scope statement to describe the work in more detail. This section should briefly summarize the main work packages for the project and refer to appropriate sections of the scope management plan.
- **Key deliverables:** This section lists and describes the key products produced as part of the project. It should also describe the quality expectations for the product deliverables.

- **Other work-related information:** This section highlights key information related to the work performed on the project. For example, it might list specific hardware or software to use on the project or certain specifications to follow. It should document major assumptions made in defining the project work.

The project schedule information section should include the following:

- **Summary schedule:** It is helpful to see a one-page summary of the overall project schedule. Depending on the size and complexity of the project, the summary schedule might list only key deliverables and their planned completion dates. For smaller projects, it might include all of the work and associated dates for the entire project in a Gantt chart. For example, the Gantt chart and milestone schedule provided in Chapter 3 for JWD Consulting were fairly short and simple.
- **Detailed schedule:** This section provides information on the project schedule that is more detailed. It should reference the schedule management plan and discuss dependencies among project activities that could affect the project schedule. For example, it might explain that a major part of the work cannot start until an external agency provides funding. A network diagram can show these dependencies (see Chapter 6, Project Time Management).
- **Other schedule-related information:** Many assumptions are often made in preparing project schedules. This section should document major assumptions and highlight other important information related to the project schedule.

The budget section of the project management plan should include the following:

- **Summary budget:** The summary budget includes the total estimate of the overall project's budget. It could also include the budget estimate for each month or year by certain budget categories. It is important to provide some explanation of what these numbers mean. For example, is the total budget estimate a firm number that cannot change, or is it a rough estimate based on projected costs over the next three years?
- **Detailed budget:** This section summarizes what is in the cost management plan and includes more detailed budget information. For example, what are the fixed and recurring cost estimates for the project each year? What are the projected financial benefits of the project? What types of people are needed to do the work, and how are the labor costs calculated? See Chapter 7, Project Cost Management, for more information on creating cost estimates and budgets.

- Other budget-related information: This section documents major assumptions and highlights other important information related to financial aspects of the project.

## Using Guidelines to Create Project Management Plans

Many organizations use guidelines to create project management plans. Project 2003 and other project management software packages come with several template files to use as guidelines. However, do not confuse a project management plan with a Gantt chart. The project management plan includes all project-planning documents. Plans created in the other knowledge areas can be considered subsidiary parts of the overall project management plan.

Many government agencies also provide guidelines for creating project management plans. For example, the U.S. Department of Defense (DOD) Standard 2167, Software Development Plan, describes the format for contractors to use in creating a plan for software development for DOD projects. The Institute of Electrical and Electronics Engineers (IEEE) Standard 1058-1998 describes the contents of a Software Project Management Plan (SPMP). Table 4-1 provides some of the categories for the IEEE SPMP. Companies working on software development projects for the Department of Defense must follow this or a similar standard.

**Table 4-1: Sample Contents for a Software Project Management Plan (SPMP)**

MAJOR PROJECT MANAGEMENT PLAN SECTIONS					
	OVERVIEW	PROJECT ORGANIZATION	MANAGERIAL PROCESS PLANS	TECHNICAL PROCESS PLANS	SUPPORTING PROCESS PLANS
Section Topics	Purpose, scope, and objectives; assumptions and constraints; project deliverables; schedule and budget summary; evolution of the plan	External interfaces; internal structure; roles and responsibilities	Start-up plans (estimation, staffing, resource acquisition, and project staff training plans); work plan (work activities, schedule, resource, and budget allocation); control plan; risk management plan; closeout plan	Process model; methods, tools, and techniques; infrastructure plan; product acceptance plan	Configuration management plan; verification and validation plan; documentation plan; quality assurance plan; reviews and audits; problem resolution plan; subcontractor management plan; process improvement plan

IEEE Standard 1058-1998.

In many private organizations, specific documentation standards are not as rigorous; however, there are usually guidelines for developing project management plans. It is good practice to follow standards or guidelines for developing project management plans in an organization to facilitate the development and execution of those plans. The organization can work more efficiently if all project management plans follow a similar format. Recall from Chapter 1 that companies that excel in project management develop and deploy standardized project delivery systems.

The winners clearly spell out what needs to be done in a project, by whom, when, and how. For this they use an integrated toolbox, including PM tools, methods, and techniques...If a scheduling template is developed and used over and over, it becomes a repeatable action that leads to higher productivity and lower uncertainty. Sure, using scheduling templates is neither a breakthrough nor a feat. But laggards exhibited almost no use of the templates. Rather, in constructing schedules their project managers started with a clean sheet, a clear waste of time.<sup>8</sup>

For example, in the opening case, Nick Carson's top managers were disappointed because he did not provide them with the project planning information they needed to make important business decisions. They wanted to see detailed project management plans, including schedules and a means for tracking progress. Nick had never created a project management plan or a status report before, and the organization did not provide templates or examples to follow. If it had, Nick might have been able to deliver the information top management was expecting. See the companion Web site for templates and samples or real project documents. The first Suggested Reading includes an entire project management plan, which is available on the author's Web site.

## Stakeholder Analysis and Top Management Support

Because the ultimate goal of project management is to meet or exceed stakeholder needs and expectations from a project, it is important to include a stakeholder analysis as part of project planning. A **stakeholder analysis** documents information such as key stakeholders' names and organizations, their roles on the project, unique facts about each stakeholder, their level of interest in the project, their influence on the project, and suggestions for managing relationships with each stakeholder. Since a stakeholder analysis often includes sensitive information, it should not be part of the overall project plan, which would be available for all stakeholders to review. In many cases, only project managers and other key project team members should see the stakeholder analysis. Table 4-2 provides an example of a stakeholder analysis that

<sup>8</sup> Milosevic, Fragan and And Ozbay. "Delivering Projects: What the Winners Do." Proceedings of the Project Management Institute Annual Seminars & Symposium (November 2001).

Nick Carson could have used to help him manage the DNA-sequencing instrument project described in the opening case. It is important for project managers to take the time to perform a stakeholder analysis of some sort to help understand and meet stakeholder needs and expectations.

**Table 4-2: Sample Stakeholder Analysis**

	KEY STAKEHOLDERS				
	AHMED	SUSAN	ERIK	MARK	DAVID
<i>Organization</i>	Internal senior management	Project team	Project team	Hardware vendor	Project manager for other internal projects
<i>Role on project</i>	Project sponsor and one of the company's founders	DNA sequencing expert	Lead programmer	Supplier of some instrument hardware	Competitor for company resources
<i>Unique facts</i>	Quiet, demanding, likes details, business-focused, Stanford MBA	Ph.D. in biology, easy to work with, has toddler	Very smart, best programmer I know, weird sense of humor	Head of a start-up company, he knows we can make him rich if this works	Nice guy, one of the oldest people at company, has three kids in college
<i>Level of interest</i>	Very high	Very high	High	Very high	Low to medium
<i>Level of influence</i>	Very high; can call the shots	Subject matter expert; critical to success	High; hard to replace	Low; other vendors available	Low to medium
<i>Suggestions on managing relationship</i>	Keep informed, let him lead conversations, do as he says and quickly	Make sure she reviews specifications and leads testing; can do some work from home	Keep him happy so he stays; emphasize stock options; likes Mexican food	Give him enough lead time to deliver hardware	He knows his project takes a back seat to this one, but I can learn from him

A stakeholder analysis will also help the project manager lead the execution of the project plan. For example, Nick Carson should have taken the time to get to know key stakeholders, especially the project sponsor, so he could understand the project sponsor's expectations and working style. Because Nick had a tendency to talk at great lengths about technical details and Ahmed, the project sponsor, was very quiet by nature, Nick should have let him lead conversations about the project to determine his concerns and interests. Once Ahmed told Nick what to do, Nick should have focused on

meeting his sponsor's expectations. If Nick did not know how to perform certain project management functions, he should have asked for help. Nick should have realized his own limitations and perhaps hired an assistant with a project management background.

Likewise, Ahmed and other top managers at the company should have taken the time to understand Nick's needs and provided him with more support. Nick heard, "Do whatever it takes to get the job done," so he delved into what he loved to do: technical problem solving. Ahmed did not hire someone to fill Nick's previous technical position, so how could he expect Nick to do both the management work and technical work required for the project? He should have seen that Nick needed help and worked with him to plan the best course of action. Recall from Chapter 2 that executive support contributed the most to successful information technology projects. Top management must work with project managers to help them plan and execute projects successfully. Since Nick was the fourth project manager on this project, top management at his company obviously had some problems choosing and working with project managers in general.

## PROJECT EXECUTION

Directing and managing project execution involves managing and performing the work described in the project management plan. The majority of time on a project is usually spent on execution, as is most of the project's budget. The application area of the project directly affects project execution because the products of the project are produced during project execution. For example, the DNA-sequencing instrument project from the opening case and all associated software and documentation would be produced during project execution. The project team would need to use their expertise in biology, hardware and software development, and testing to produce the product successfully.

The project manager would also need to focus on leading the project team and managing stakeholder relationships to execute the project management plan successfully. Project human resource management and project communications management are crucial to a project's success. See Chapters 9 and 10 respectively for more information on those knowledge areas. If the project involves a significant amount of risk or outside resources, the project manager also needs to be well versed in project risk management and project procurement management. See Chapters 11 and 12 for details on those knowledge areas. Many unique situations occur during project execution, so project managers must be flexible and creative in dealing with them. Review the situation Erica Bell faced during project execution in Chapter 3. Also review the ResNet case study (available on the companion Web site for this text) to understand the execution challenges project manager Pector Kivestu and his project team faced.

## Coordinating Planning and Execution

Project integration management views project planning and execution as intertwined and inseparable activities. The main function of creating a project management plan and all other project plans (e.g., the scope management plan, schedule management plan, and so on) is to guide project execution. A good plan should help produce good products or work results. Plans should document what good work results consist of. Updates to plans should reflect knowledge gained from completing work earlier in the project. Anyone who has tried to write a computer program from poor specifications appreciates the importance of a good plan. Anyone who has had to document a poorly programmed system appreciates the importance of good execution.

A commonsense approach to improving the coordination between project plan development and execution is to follow this simple rule: Those who will do the work should plan the work. All project personnel need to develop both planning and executing skills and need experience in these areas. In information technology projects, programmers who have had to write detailed specifications and then create the code from their own specifications become better at writing specifications. Likewise, most systems analysts begin their careers as programmers, so they understand what type of analysis and documentation they need to write good code. Although project managers are responsible for developing the overall project management plan, they must solicit input from the project team members who are developing plans in each knowledge area.

## Providing Strong Leadership and a Supportive Culture

Strong leadership and a supportive organizational culture are crucial during project execution. Project managers must lead by example to demonstrate the importance of creating good project plans and then following them in project execution. Project managers often create plans for things they need to do themselves. If project managers follow through on their own plans, their team members are more likely to do the same.

### **X** *What Went Wrong?*

Many people have a poor view of plans based on their experiences. Top managers often require a project management plan, but then no one follows up on whether the plan was followed. For example, one project manager said he would meet with each project team leader within two months to review their project plans. The project manager created a detailed schedule for these reviews. He cancelled the first meeting due to another business commitment. He rescheduled the next meeting for unexplained personal reasons. Two months later, the project manager had still not met with over half of the project team leaders. Why should



project members feel obligated to follow their own plans when the project manager obviously did not follow his?

Another example of misusing plans comes from a college dean who refused to authorize hiring a new faculty member, even though adjunct faculty staffed half of the classes in that academic discipline. The dean said the department's strategic plan was outdated, and they could not hire anyone else until they had a new strategic plan. The college itself had not updated its strategic plan in over six years, and members of the department suspected the situation was related to the dean wanting more political power within the department. A faculty member who taught strategic planning quickly wrote a new department strategic plan, got approval from other department members, and sent it to the dean. The department did hire a new faculty member, but no one ever looked at that strategic plan again. Remember that project plans, unlike many other plans, should guide execution, not satisfy personal or political goals.

Good project execution also requires a supportive organizational culture. For example, organizational procedures can help or hinder project execution. If an organization has useful guidelines and templates for project management that everyone in the organization follows, it will be easier for project managers and their teams to plan and do their work. If the organization uses the project plans as the basis for performing and monitoring progress during execution, the culture will promote the relationship between good planning and execution. On the other hand, if organizations have confusing or bureaucratic project management guidelines that hinder getting work done or do not measure progress against plans, project managers and their teams will be frustrated.

Even with a supportive organizational culture, project managers may sometimes find it necessary to break the rules to produce project results in a timely manner. When project managers break the rules, politics will play a role in the results. For example, if a particular project requires use of nonstandard software, the project manager must use his or her political skills to convince concerned stakeholders of the need to break the rules on using only standard software. Breaking organizational rules—and getting away with it—requires excellent leadership, communication, and political skills.

## Capitalizing on Product, Business, and Application Area Knowledge

In addition to possessing strong leadership, communication, and political skills, project managers also need to possess product, business, and application area knowledge to execute projects successfully. It is often helpful for information technology project managers to have prior technical experience or at least a working knowledge of information technology products. For example, if the project manager were leading a Joint Application Design (JAD) team to help define user requirements, it would be helpful for him or her to understand the

language of the business and technical experts on the team. See Chapter 5, Project Scope Management, for more information on JAD.

Many information technology projects are small, so project managers may be required to perform some technical work or mentor team members to complete the project. For example, a three-month project to develop a Web-based application with only three team members would benefit most from a project manager who can complete some of the technical work. On larger projects, however, the project manager's primary responsibility is to lead the team and communicate with key project stakeholders. He or she would not have time to do any of the technical work. In this case, it is usually best that the project manager understand the business and application area of the project more than the technology involved.

However, it is very important on large projects for the project manager to understand the business and application area of their project. For example, Northwest Airlines completed a series of projects in the last ten years to develop and upgrade its reservation systems. The company spent millions of dollars and had more than seventy full-time people working on the projects at peak periods. The project manager, Peeter Kivestu, had never worked in an information technology department, but he had extensive knowledge of the airline industry and the reservations process. He carefully picked his team leaders, making sure they had the required technical and product knowledge. ResNet was the first large information technology project at Northwest Airlines led by a business manager instead of a technical expert, and it was a roaring success. Many organizations have found that large information technology projects require experienced general managers who understand the business and application area of the technology, not the technology itself. (You can read the entire ResNet case study from the companion Web site listed in the second Suggested Reading for Chapter 3.)

## Project Execution Tools and Techniques

Directing and managing project execution requires specialized tools and techniques, some of which are unique to project management. Project managers can use specific tools and techniques to perform activities that are part of execution processes. These include:

- **Project management methodology:** As mentioned earlier, many experienced project managers believe the most effective way to improve project management is to follow a methodology that describes not only what to do in managing a project, but how to do it. For example, if Nick and his senior management had agreed that they would have weekly status review meetings in Ahmed's office where Nick and his key project team

members would provide short presentations on specific topics, the execution of the project would have gone much more smoothly.

- **Project management information systems:** As described in Chapter 1, there are hundreds of project management software products available on the market today. Many large organizations are moving toward powerful enterprise project management systems that are accessible via the Internet. Project managers or other team members can create Gantt charts that include links to other planning documents. For example, Nick or one of his teammates could have created a detailed Gantt chart for the biotech project and created a link to other key planning documents. Nick could have shown the summary tasks during the status review meetings, and if top management had questions, they could link to supporting detail. They could also have set baselines for completing the project and tracked their progress toward achieving those goals.

Although these tools and techniques can aid in project execution, project managers must remember that positive leadership and strong teamwork are critical to successful project management. Project managers should delegate the detailed work involved in using these tools to other team members and focus on providing leadership for the whole project to ensure project success.

### ✓ *What Went Right?*

Malaysia's capital, Kuala Lumpur, has become one of Asia's busiest, most exciting cities. With growth, however, came traffic. To help alleviate this problem, the city hired a local firm in mid-2003 to manage a MYR \$400 million (U.S. \$105 million) project to develop a state-of-the-art Integrated Transport Information System (ITIS). The Deputy Project Director, Lawrence Liew, explained that they broke the project into four key phases and focused on several key milestones. They deliberately kept the work loosely structured to allow the team to be more flexible and creative in handling uncertainties. They based the entire project team within a single project office to streamline communications and facilitate quick problem solving through ad hoc working groups. They also used a dedicated project intranet to exchange information between the project team and sub-contractors. The new system is planned for completion in mid-2005.<sup>9</sup>

Project managers and their teams are most often remembered for how well they executed a project and handled difficult situations. As John Madden often says when announcing Super Bowl events, the key to winning is good execution. When one *losing* coach was asked what he thought about his team's execution, he responded, "I'm all for it!"

<sup>9</sup> Parkes, Sarah, "Crosstown Traffic," *PM Network* (August 2004).

## MONITORING AND CONTROLLING PROJECT WORK

On large projects, many project managers say that 90 percent of the job is communicating and managing changes. Changes are inevitable on most projects, so it's important to develop and follow a process to monitor and control changes.

Monitoring project work includes collecting, measuring, and disseminating performance information. It also involves assessing measurements and analyzing trends to determine what process improvements can be made. The project team should continuously monitor project performance to assess the overall health of the project and identify areas that require special attention.

The project management plan, work performance information, performance reports, and change requests are all important inputs for monitoring and controlling project work. Key tools and techniques for performing this process include using a project management methodology and a project management information system, as described for project execution. Additional tools and techniques include expert judgment and earned value management, described in detail in Chapter 7, Project Cost Management.



### *Media Snapshot*

Few events get more media attention than the Olympic Games. Imagine all the work involved in planning and executing an event that involves thousands of athletes from around the world with millions of spectators. The 2002 Olympic Winter Games and Paralympics took five years to plan and cost more than \$1.9 billion. PMI awarded the Salt Lake Organizing Committee (SLOC) the Project of the Year award for delivering world-class games that, according to the International Olympic Committee, "made a profound impact upon the people of the world."<sup>10</sup>

Four years before the Games began, the SLOC used a Primavera software-based system with a cascading color-coded WBS to integrate planning. A year before the Games, they added a Venue Integrated Planning Schedule to help the team integrate resource needs, budgets, and plans. For example, this software helped the team coordinate different areas involved in controlling access into and around a venue, such as roads, pedestrian pathways, seating and safety provisions, and hospitality areas, saving nearly \$10 million.

When the team experienced a budget deficit three years before the games, they separated "must-have" from "nice-to-have" items and implemented a rigorous expense approval process. According to Matthew Lehman, SLOC managing director, using classic project management tools turned a \$400 million deficit into a \$100 million surplus.

The SLOC also used an Executive Roadmap, a one-page list of the top 100 Games-wide activities, to keep executives apprised of progress. Activities were tied to detailed project

<sup>10</sup> Foti, Ross. "The Best Winter Olympics, Period." *PM Network* (January 2004) p. 23.

information within each department's schedule. A 90-day highlighter showed which managers were accountable for each integrated activity. Fraser Bullock, SLOC Chief Operating Officer and Chief, said, "We knew when we were on and off schedule and where we had to apply additional resources. The interrelation of the functions meant they could not run in isolation—it was a smoothly running machine."<sup>11</sup>

Two important outputs of monitoring and controlling project work include recommended corrective and preventive actions. Corrective actions should result in improvements in project performance. Preventive actions reduce the probability of negative consequences associated with project risks. For example, if project team members have not been reporting hours that they worked, a corrective action would be to show them how to enter the information and let them know that they need to do it. A preventive action might be modifying a time-tracking system screen to avoid common errors people made in the past. Forecasts are also important outputs of monitoring and controlling. Forecasts estimate conditions and events in the project's future based on past information. For example, project managers often provide forecasts of the amount of money they will need to complete a project based on past performance (see Chapter 7, Project Cost Management). Two other outputs of monitoring and controlling project work are recommended defect repairs and requested changes.

## INTEGRATED CHANGE CONTROL

**Integrated change control** involves identifying, evaluating, and managing changes throughout the project life cycle. The three main objectives of integrated change control are:

1. Influencing the factors that create changes to ensure that changes are beneficial: To ensure that changes are beneficial and that a project is successful, project managers and their teams must make trade-offs among key project dimensions, such as scope, time, cost, and quality.
2. Determining that a change has occurred: To determine that a change has occurred, the project manager must know the status of key project areas at all times. In addition, the project manager must communicate significant changes to top management and key stakeholders. Top management and other key stakeholders do not like surprises, especially ones that mean the project might produce less, take longer to complete, cost more than planned, or be of lower quality than desired.

<sup>11</sup> Ibid. 23.

3. Managing actual changes as they occur: Managing change is a key role of project managers and their teams. It is important that project managers exercise discipline in managing the project to help minimize the number of changes that occur.

Important inputs to the integrated change control process include the project management plan, work performance information (usually in the form of performance reports), requested changes, recommended preventive and corrective actions, recommended defect repair, and deliverables. Important outputs include approved and rejected change requests, approved corrective and preventive actions, approved and validated defect repair, deliverables, and updates to the project management plan and project scope statement.

The project management plan provides the baseline for identifying and controlling project changes. A **baseline** is the approved project management plan plus approved changes. For example, the project management plan includes a section describing the work to perform on a project. This section of the plan describes the key deliverables for the project, the products of the project, and quality requirements. The schedule section of the project management plan lists the planned dates for completing key deliverables, and the budget section of the project management plan provides the planned cost for these deliverables. The project team must focus on delivering the work as planned. If the project team or someone else causes changes during project execution, they must revise the project management plan and have it approved by the project sponsor. Many people refer to different types of baselines, such as a cost baseline or schedule baseline, to describe different project goals more clearly and performance toward meeting them.

Performance reports provide information on how project execution is going. The main purpose of these reports is to alert the project manager and project team of issues that might cause problems in the future. The project manager and project team must decide if corrective or preventive actions are needed, what the best course of action is, and when to act. For example, suppose one of the key deliverables in a project management plan for the opening case is installation of a new server for the project. If one of the project team members reports that he or she is having problems coordinating the purchase and installation of this server, the project manager should assess what will happen to the project if this deliverable is a little late. If late installation will cause problems in other areas of the project, the project manager should take necessary actions to help the team member complete this task on time. Perhaps the purchase request is held up because one of the purchasing clerks is on vacation. The project manager could talk to the head of the purchasing department to make sure someone processes the order. If nothing can be done to meet the planned installation date, the project manager should alert the other people who would be affected by this schedule change. The project manager should also look at the big picture of how the project is going. If there is a consistent trend that

schedules are slipping, the project manager should alert key stakeholders and negotiate a later completion date for the project.

Change requests are common on projects and occur in many different forms. They can be oral or written, formal or informal. For example, the project team member responsible for installing the server might ask the project manager at a progress review meeting if it is all right to order a server with a faster processor than planned, from the same manufacturer for the same approximate cost. Since this change is positive and should have no negative effects on the project, the project manager might give a verbal approval at the progress review meeting. Nevertheless, it is still important that the project manager document this change to avoid any potential problems in the future. The appropriate team member should update the section of the scope statement with the new specifications for the server. Still, keep in mind that many change requests can have a major impact on a project. For example, customers changing their minds about the number of pieces of hardware they want as part of a project will have a definite impact on the scope and cost of the project. Such a change might also affect the project's schedule. The project team must present such significant changes in written form, and there should be a formal review process for analyzing and deciding whether to approve these changes.

Change is unavoidable and often expected on most information technology projects. Technologies change, personnel change, organizational priorities change, and so on. Careful change control on information technology projects is a critical success factor. A good change control system is also important for project success.

## Change Control on Information Technology Projects

From the 1950s to the 1980s, a widely held view of information technology (then often referred to as data automation) project management was that the project team should strive to do exactly what they planned on time and within budget. The problem with this view was that project teams could rarely meet original project goals, especially on projects involving new technologies. Stakeholders rarely agreed up front on what the scope of the project really was or what the finished product should really look like. Time and cost estimates created early in a project were rarely accurate.

Beginning in the 1990s, most project managers and top management realized that project management is a process of constant communication and negotiation about project objectives and stakeholder expectations. This view assumes that changes happen throughout the project life cycle and recognizes that changes are often beneficial to some projects. For example, if a project team member discovers a new hardware or software technology that could satisfy the customers' needs for less time and money, the project team and key stakeholders should be open to making major changes in the project.

All projects will have some changes, and managing them is a key issue in project management, especially for information technology projects. Many information technology projects involve the use of hardware and software that is updated frequently. For example, the initial plan for the specifications of the server described earlier may have been cutting-edge technology at that time. If the actual ordering of the server occurred six months later, it is quite possible that a more powerful server could be ordered at the same cost. This example illustrates a positive change. On the other hand, the manufacturer of the server specified in the project plan could go out of business, which would result in a negative change. Information technology project managers should be accustomed to changes such as these and build some flexibility into their project plans and execution. Customers for information technology projects should also be open to meeting project objectives in different ways.

Even if project managers, project teams, and customers are flexible, it is important that projects have a formal change control system. This formal change control system is necessary to plan for managing change.

## Change Control System

A **change control system** is a formal, documented process that describes when and how official project documents may be changed. It also describes the people authorized to make changes, the paperwork required for this change, and any automated or manual tracking systems the project will use. A change control system often includes a change control board (CCB), configuration management, and a process for communicating changes.

A **change control board (CCB)** is a formal group of people responsible for approving or rejecting changes to a project. The primary functions of a change control board are to provide guidelines for preparing change requests, evaluating change requests, and managing the implementation of approved changes. An organization could have key stakeholders for the entire organization on this board, and a few members could rotate based on the unique needs of each project. By creating a formal board and process for managing changes, better overall change control should result.

However, CCBs can have some drawbacks. One drawback is the time it takes to make decisions on proposed changes. CCBs often meet only once a week or once a month and may not make decisions in one meeting. Some organizations have streamlined processes for making quick decisions on smaller project changes. One company created a “48-hour policy,” in which task leaders on a large information technology project would reach agreements on key decisions or changes within their expertise and authority. The person in the area most affected by this decision or change then had 48 hours to go to his or her top management to seek approval. If for some reason the project team’s decision could not be implemented, the top manager consulted would have 48 hours to reverse a decision; otherwise, the project team’s decision was approved. This type of process is a great



way to deal with the many time-sensitive decisions or changes that project teams must make on many information technology projects.

Configuration management is another important part of integrated change control. **Configuration management** ensures that the descriptions of the project's products are correct and complete. It involves identifying and controlling the functional and physical design characteristics of products and their support documentation. Members of the project team, frequently called configuration management specialists, are often assigned to perform configuration management for large projects. Their job is to identify and document the functional and physical characteristics of the project's products, control any changes to such characteristics, record and report the changes, and audit the products to verify conformance to requirements.

Another factor in change control is communication. Project managers should use written and oral performance reports to help identify and manage project changes. For example, on software development projects, most programmers must make their edits to one master file in a database that requires the programmers to "check out" the file to edit it. If two programmers check out the same file, they must coordinate their work before they can check the file back in to the database. In addition to written or formal communication methods, oral and informal communications are also important. Some project managers have stand-up meetings once a week or even every morning, depending on the nature of the project. The goal of a stand-up meeting is to communicate what is most important on the project quickly. For example, the project manager might have an early morning stand-up meeting every day with all of his or her team leaders. There might be a weekly stand-up meeting every Monday morning with all interested stakeholders. Requiring participants to stand keeps meetings short and forces everyone to focus on the most important project events.

Why is good communication so critical to success? One of the most frustrating aspects of project change is not having everyone coordinated and informed about the latest project information. Again, it is the project manager's responsibility to integrate all project changes so that the project stays on track. The project manager and his or her staff must develop a system for notifying everyone affected by a change in a timely manner. E-mail, real-time databases, cell phones, and the Web make it easier to disseminate the most current project information. You will learn more about good communication in Chapter 10, Project Communications Management.

Table 4-3 lists suggestions for performing integrated change control. As described earlier, project management is a process of constant communication and negotiation. Project managers should plan for changes and use appropriate tools and techniques such as a change control board, configuration management, and good communication. It is helpful to define procedures for making timely decisions on small changes, use written and oral performance reports to help identify and manage changes, and use software to assist in planning, updating, and controlling projects.

**Table 4-3: Suggestions for Performing Integrated Change Control**

View project management as a process of constant communication and negotiation.

Plan for change.

Establish a formal change control system, including a change control board (CCB).

Use good configuration management.

Define procedures for making timely decisions on smaller changes.

Use written and oral performance reports to help identify and manage change.

Use project management and other software to help manage and communicate changes.

Focus on leading the project team and meeting overall project goals and expectations.

Project managers must also provide strong leadership to steer the project to successful completion. They must not get too involved in managing project changes. Project managers should delegate much of the detailed work to project team members and focus on providing overall leadership for the project in general. Remember, project managers must focus on the big picture and perform project integration management well to lead their team and organization to success.

## CLOSING PROJECTS

The last process in project integration management is closing the project. In order to close a project, you must finalize all activities and transfer the completed or cancelled work to the appropriate people. The main outputs of closing projects are:

- **Administrative closure procedures:** It is important for project teams and other stakeholders to develop and follow a step-by-step process for closing projects. In particular, administrative closure procedures should define the approval process for all project deliverables.
- **Contract closure procedures:** Many projects involve contracts, which are legally binding agreements. Contract closure procedures describe the methodology for making sure the contract has been completed, including delivery of goods and services and payment for them.
- **Final products, services, or results:** Project sponsors are usually most interested in making sure they receive delivery of the final products, services, or results they expected when they authorized the project.
- **Organizational process asset updates:** The project team should provide a list of project documentation, project closure documents, and historical information produced by the project in a useful format. This information is considered a process asset. For example, project teams often write a

lessons-learned report at the end of a project, and this information can be a tremendous asset for future projects. (See Chapter 10, Project Communications Management for more information on creating lessons-learned reports and Appendix D on the companion Web site for a template for documenting lessons learned.)

## USING SOFTWARE TO ASSIST IN PROJECT INTEGRATION MANAGEMENT

As described throughout this chapter, project teams can use various types of software to assist in project integration management. Project teams can create documents with word processing software, give presentations with presentation software, track information with spreadsheets, databases, or customized software, and transmit information using various types of communication software.

Project management software is also an important tool for developing and integrating project planning documents, executing the project management plan and related project plans, monitoring and controlling project activities, and performing integrated change control. Small project teams can use low-end or mid-range project management software products to coordinate their work. For large projects, however, like managing the Olympic Games described in the Media Snapshot, organizations may benefit most from high-end tools that provide enterprise project management capabilities and integrate all aspects of project management. All projects can benefit from using some type of project management information system to coordinate and communicate project information.

As you can see, there is a lot of work involved in project integration management. Project managers and their teams must focus on pulling all the elements of a project together to successfully complete projects.

## CASE WRAP-UP

Without consulting Nick Carson or his team, Nick's CEO hired a new person, Jim, to act as a middle manager between himself and the people in Nick's department. The CEO and other top managers really liked Jim, the new middle manager. He met with them often, shared ideas, and had a great sense of humor. He started developing standards the company could use to help manage projects in the future.

For example, he developed templates for creating plans and progress reports and put them on the company's intranet. However, Jim and Nick did not get along. Jim accidentally sent an e-mail to Nick that was supposed to go to the CEO. In this e-mail, Jim said that Nick was hard to work with and preoccupied with the birth of his son.

Nick was furious when he read the e-mail and stormed into the CEO's office. The CEO suggested that Nick move to another department, but Nick did not like that option. Without considering the repercussions, the CEO offered Nick a severance package to leave the company. Because of the planned corporate buyout, the CEO knew they might have to let some people go anyway. Nick talked the CEO into giving him a two-month sabbatical he had not yet taken plus a higher percentage on his stock options. After discussing the situation with his wife and realizing that he would get over \$70,000 if he resigned, Nick took the severance package. He had such a bad experience as a project manager that he decided to stick with being a technical expert. Jim, however, thrived in his position and helped the company improve their project management practices and ensure success in a highly competitive market.

## CHAPTER SUMMARY

Project integration management is usually the most important project management knowledge area, since it ties together all the other areas of project management. A project manager's primary focus should be on project integration management.

Before selecting projects to pursue, it is important for organizations to follow a strategic planning process. Information technology projects should support the organization's overall business strategy. Common techniques for selecting projects include focusing on broad organizational needs, categorizing projects, performing financial analyses, developing weighted scoring models, and using balanced scorecards.

Project integration management includes the following processes:

- Developing the project charter involves working with stakeholders to create the document that formally authorizes a project. Project charters can

have different formats, but they should include basic project information and signatures of key stakeholders.

- Developing the preliminary project scope statement involves further work with stakeholders, especially users of the project's products, services, or results, to develop the high-level scope requirements. A good preliminary project scope statement can help prevent scope creep.
- Developing the project management plan involves coordinating all planning efforts to create a consistent, coherent document—the project management plan. The main purpose of project plans is to facilitate action.
- Directing and managing project execution involves carrying out the project plans by performing the activities included in it. Project plan execution should require the majority of a project's budget.
- Monitoring and controlling project work is needed to meet the performance objectives of the project. The project team should continuously monitor project performance to assess the overall health of the project.
- Integrated change control involves coordinating changes that affect the project's deliverables and organizational process assets. A change control system often includes a change control board (CCB), configuration management, and a process for communicating changes.
- Closing the project involves finalizing all project activities. It is important to follow good procedures to ensure that all project activities are completed and that the project sponsor accepts delivery of the final products, services, or results of the project.

## DISCUSSION QUESTIONS

1. Describe project integration management. How does project integration management relate to the project life cycle, stakeholders, and the other project management knowledge areas?
2. Briefly describe the strategic planning process. Which project selection method(s) do you think organizations use most often for justifying information technology projects?
3. Summarize key work involved in each of the seven processes for project integration management.
4. Describe a well-planned and executed project with which you are familiar. Describe a disastrous project. What were some of the main differences between these projects?
5. Discuss the importance of following a well-integrated change control process on information technology projects. What do you think of the suggestions made in this chapter? Think of three additional suggestions for integrated change control on information technology projects.

## EXERCISES

1. Write a two-page paper based on the opening case. Answer the following questions:
  - a. What do you think the real problem was in this case?
  - b. Does the case present a realistic scenario? Why or why not?
  - c. Was Nick Carson a good project manager? Why or why not?
  - d. What could Nick have done to be a better project manager?
  - e. What should top management have done to help Nick?
2. Use spreadsheet software to create Figures 4-2 through 4-5 in this text. Make sure your formulas work correctly.
3. Perform a financial analysis for a project using the format provided in Figure 4-3. Assume the projected costs and benefits for this project are spread over four years as follows: Estimated costs are \$100,000 in Year 1 and \$25,000 each year in Years 2, 3, and 4. Estimated benefits are \$0 in Year 1 and \$80,000 each year in Years 2, 3, and 4. Use an 8 percent discount rate. Create a spreadsheet (or use the business case financials template provided on the companion Web site) to calculate and clearly display the NPV, ROI, and year in which payback occurs. In addition, write a paragraph explaining whether you would recommend investing in this project, based on your financial analysis.
4. Create a weighted scoring model to determine grades for a course. Final grades are based on three exams worth 15%, 20%, and 25%, respectively; homework is worth 20%; and a group project is worth 20%. Enter scores for three students. Assume Student 1 earns 100% (or 100) on every item. Assume Student 2 earns 80% on each of the exams, 90% on the homework, and 95% on the group project. Assume Student 3 earns 90% on Exam 1, 75% on Exam 2, 80% on Exam 3, 90% on the homework, and 70% on the group project. You can use the weighted scoring model template, create your own spreadsheet, or make the matrix by hand.
5. Develop an outline (major headings and subheadings only) for a project management plan to create a Web site for your class, and then fill in the details for the introduction or overview section. Assume that this Web site would include a home page with links to a syllabus for the class, lecture notes or other instructional information, links to the Web site for this textbook, links to other Web sites with project management information, and links to personal pages for each member of your class and future classes. Also, include a bulletin board and chat room feature where students and the instructor can exchange information. Assume your instructor is the project's sponsor, you are the project manager, your classmates are your project team, and you have one year to complete the project.

6. Critique the sample project management plan mentioned in the first Suggested Reading. Write a two-page paper summarizing your opinion of this real plan. What did you like or dislike about the plan? How could it be improved?

## RUNNING CASE

Manage Your Health, Inc. (MYH) is a Fortune 500 company that provides a variety of health care services across the globe. MYH has more than 20,000 full-time employees and more than 5,000 part-time employees. MYH recently updated its strategic plan, and key goals include reducing internal costs, increasing cross-selling of products, and exploiting new Web-based technologies to help employees, customers, and suppliers work together to improve the development and delivery of its health care products and services. Below are some ideas the Information Technology department has developed for supporting these strategic goals:

1. Recreation and Wellness Intranet Project: Provide an application on the current intranet to help employees improve their health. A recent study found that MYH, Inc. pays 20 percent more than the industry average for employee health care premiums, primarily due to the poor health of its employees. You believe that this application will help improve employee health within one year of its rollout so that you can negotiate lower health insurance premiums, providing net savings of at least \$30/employee/year for full-time employees over the next four years. This application would include the following capabilities:
  - Allow employees to register for company-sponsored recreational programs, such as soccer, softball, bowling, jogging, walking, and other sports.
  - Allow employees to register for company-sponsored classes and programs to help them manage their weight, reduce stress, stop smoking, and manage other health-related issues.
  - Track data on employee involvement in these recreational and health-management programs.
  - Offer incentives for people to join the programs and do well in them (e.g., incentives for achieving weight goals, winning sports team competitions, etc.).
2. Health Coverage Costs Business Model: Develop an application to track employee health care expenses and company health care costs. Health care premiums continue to increase, and the company has changed insurance carriers several times in the past ten years. This application should allow

business modeling of various scenarios as well as tracking and analyzing current and past employee health care expenses and company health care costs. This application must be secure and run on the current intranet so several managers and analysts could access it and download selective data for further analysis. The new application must also import data from the current systems that track employee expenses submitted to the company and the company's costs to the insurance provider. You believe that having this data will help you revise policies concerning employee contributions to health care premiums and help you negotiate for lower premiums with insurance companies. You estimate that this application would save your company about \$20/employee/year for full-time employees over the next four years and cost about \$100,000 to develop.

3. **Cross-Selling System:** Develop an application to improve cross-selling to current customers. The current sales management system has separate sections for major product/service categories and different sales reps based on those products and services. You see great opportunities to increase sales to current customers by providing them discounts when they purchase multiple products/services. You estimate that this system would increase profits by \$1 million each year for the next three years and cost about \$800,000 each year for development and maintenance.
4. **Web-Enhanced Communications System:** Develop a Web-based application to improve development and delivery of products and services. There are currently several incompatible systems related to the development and delivery of products and services to customers. This application would allow customers and suppliers to provide suggestions, enter orders, view the status and history of orders, and use electronic commerce capabilities to purchase and sell their products. You estimate that this system would save your company about \$2 million each year for three years after implementation. You estimate it will take one year and \$3 million to develop and require 20 percent of development costs each year to maintain.

## TASKS

1. Summarize each of the above-proposed projects in a simple table format suitable for presentation to top management. Include the name for each project, identify how each one supports business strategies, assess the potential financial benefits and other benefits of each project, and provide your initial assessment of the value of each project. Write your results in a one- to two-page memo to top management, including appropriate back-up information and calculations.
2. Prepare a weighted scoring model using the template provided under Appendix D on the companion Web site for this text to evaluate these



four projects. Develop at least four criteria, assign weights to each criterion, assign scores, and then calculate the weighted scores. Print the spreadsheet and bar chart with the results. Also write a one-page paper describing this weighted scoring model and what the results show.

3. Prepare a business case for the Recreation and Wellness Intranet Project. Assume the project will take six months to complete and cost about \$200,000. Use the business case template provided under Appendix D on the companion Web site for this text
4. Prepare a project charter for the Recreation and Wellness Intranet Project. Assume the project will take six months to complete and cost about \$200,000. Use the project charter template provided in this text and the sample project charter provided in Chapter 3 (Table 3-4) as a guide.
5. Prepare a stakeholder analysis for this project, using the template provided under Appendix D on the companion Web site for this text and example in this chapter as a guide. Be creative in making up information about stakeholders.

## ADDITIONAL RUNNING CASES AND OTHER APPENDICES

Appendix C provides additional case studies and questions you can use to practice applying the concepts, tools, and techniques you are learning throughout this and subsequent chapters. Review the running cases provided in Appendix C and on the companion Web site ([www.course.com/mis/schwalbe4e](http://www.course.com/mis/schwalbe4e)). Appendix D includes templates for various project management documents. For additional sample documents based on real projects, visit the author's Web site at [www.kathyschwalbe.com](http://www.kathyschwalbe.com). Appendix E and the CD-ROM included with this text include a computer simulation where you can also practice applying the project management process groups and knowledge areas.

## SUGGESTED READINGS

1. ABC I-Net Project Team. ABC I-Net Sample Project Management Plan, (October 9, 2001).

*This 44-page sample project management plan is from a real project to upgrade the intranet and Internet infrastructures for a major corporation. It describes the benefits of the project, scope, critical success factors, cost estimate, management approach, and other important items. This sample project management plan is not perfect, but it does provide a real example of a plan created by a real project team. You can download this entire sample plan and other sample documents from the author's Web site at [www.kathyschwalbe.com](http://www.kathyschwalbe.com) or from the companion Web site for the text. The name of this document is ABC I-Net.doc.*

- Ashurst, Colin and Niel F. Dohert. "Towards the Formulation of a 'Best Practice' Framework for Benefits Realisation in IT Projects," *Electronic Journal of Information Systems Evaluation (EJISE)*, (December 2003).

*This paper introduces a framework for establishing how explicitly and proactively organizations practice benefits realization management for information technology projects. The initial empirical results have shown that there is a very significant gap between the best practice framework and the practice of benefits realization management. The majority of organizations and projects studied adopted the traditional measures of project success, namely delivery on time and on budget, and there was little evidence of any explicit focus on benefits delivery or business change.*

- Badir, Yuosre F., Remi Founou, Claude Stricker, and Vincent Bourquin. "Management of Global Large-scale Projects Through a Federation of Multiple Web-based Workflow Management Systems," *Project Management Journal* (September 2003).

*A special challenge in project management is in dealing with global large-scale projects (GLSPs). This article by members of the Swiss Federal Institute of Technology describes a conceptual framework for Web-based information and project management that helps GLSP management teams monitor, control, and coordinate multiple workflows between organizations.*

- Clay, Melanie, Helen M. Edwards, and John Maguire. "Establishing the Strategic Context of IT Projects — A Case Study from the Automotive Industry," *Electronic Journal of Information Systems Evaluation* (December 2003).

*This case study demonstrates that many factors can affect an information technology project's evaluation and procurement. One of the most critical, however, is a sound basis from which to make judgments on the need for a system. Many new information systems require changes in current business processes. In this case study, benefits from a new bar-coding system could only be achieved after implementing business process improvements.*

- IEEE Computer Society. "Std 1058-1998." *IEEE Standard for Software Project Management Plans* (1998).

*This standard describes the format and content of software project management plans. It identifies the minimum set of elements that should appear in all software project management plans.*

## KEY TERMS

- **balanced scorecard** — a methodology that converts an organization's value drivers to a series of defined metrics
- **baseline** — the approved project management plan plus approved changes

- **cash flow** — benefits minus costs or income minus expenses
- **change control board (CCB)** — a formal group of people responsible for approving or rejecting changes on a project
- **change control system** — a formal, documented process that describes when and how official project documents may be changed
- **configuration management** — a process that ensures that the descriptions of the project's products are correct and complete
- **cost of capital** — the return available by investing the capital elsewhere
- **directives** — new requirements imposed by management, government, or some external influence
- **discount factor** — a multiplier for each year based on the discount rate and year
- **discount rate** — the rate used in discounting future cash flow; also called the capitalization rate or opportunity cost of capital
- **integrated change control** — identifying, evaluating, and managing changes throughout the project life cycle
- **interface management** — identifying and managing the points of interaction between various elements of a project
- **internal rate of return (IRR)** — the discount rate that results in an NPV of zero for a project
- **net present value (NPV) analysis** — a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time
- **opportunities** — chances to improve the organization
- **organizational process assets** — formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information that help people understand, follow, and improve business processes in a specific organization
- **payback period** — the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project
- **problems** — undesirable situations that prevent the organization from achieving its goals
- **project charter** — a document that formally recognizes the existence of a project and provides direction on the project's objectives and management
- **project integration management** — coordinating all of the other project management knowledge areas throughout a project's life. These processes include developing the project charter, developing the preliminary project scope statement, developing the project management plan, directing and managing the project, monitoring and controlling the project, providing integrated change control, and closing the project
- **project management plan** — a document used to coordinate all project planning documents and guide project execution and control

- **required rate of return** — the minimum acceptable rate of return on an investment
- **return on investment (ROI)** — (benefits minus costs) divided by costs
- **scope creep** — the tendency for project scope to keep getting bigger
- **scope statement** — a document used to develop and confirm a common understanding of the project scope; the first version is often called a preliminary scope statement
- **stakeholder analysis** — an analysis of information such as key stakeholders' names and organizations, their roles on the project, unique facts about each stakeholder, their level of interest in the project, their influence on the project, and suggestions for managing relationships with each stakeholder
- **strategic planning** — determining long-term objectives by analyzing the strengths and weaknesses of an organization, studying opportunities and threats in the business environment, predicting future trends, and projecting the need for new products and services
- **weighted scoring model** — a technique that provides a systematic process for basing project selection on numerous criteria