Hoffer S. 195 - 211

"Modern System analysis & Design"

TABLE 6-1 Elements of Project Initiation

- Establishing the Project Initiation Team
- Establishing a Relationship with the Customer
- Establishing the Project Initiation Plan
- Establishing Management Procedures
- Establishing the Project Management Environment and Project Workbook

Depending upon the size, scope, and complexity of the project, some project initiation activities may be unnecessary or may be very involved. Also, many organizations have established procedures for assisting with common initiation activities.

Project planning, the second activity within PIP, is distinct from general information systems planning which focuses on assessing the information systems needs of the *entire* organization (discussed in Chapter 5). Project planning is the process of defining clear, discrete activities and the work needed to complete each activity within a *single* project. The objective of the project planning process is the development of a *Baseline Project Plan* (BPP) and the *Statement of Work* (SOW). The BPP becomes the foundation for the remainder of the development project. The SOW produced by the team clearly outlines the objectives and constraints of the project for the customer. As with the project initiation process, the size, scope, and complexity of a project will dictate the comprehensiveness of the project planning process and resulting documents. Further, numerous assumptions about resource availability and potential problems will have to be made. Analysis of these assumptions and system costs and benefits forms a **business case**. The range of activities performed during project planning are listed in Table 6-2.

Business case: The justification for an information system, presented in terms of the tangible and intangible economic benefits and costs, and the technical and organizational feasibility of the proposed system.

Deliverables and Outcomes

The major outcomes and deliverables from the project initiation and planning phase are the Baseline Project Plan and the Statement of Work. The **Baseline Project Plan (BPP)** contains all information collected and analyzed during project initiation and planning. The plan reflects the best estimate of the project's scope, benefits, costs, risks, and resource requirements given the current understanding of the project. The BPP specifies detailed project activities for the next life cycle phase—analysis—and less detail for subsequent project phases (since these depend on the results of the analysis phase). Similarly, benefits, costs, risks, and resource requirements will be-

Baseline Project Plan (BPP): A major outcome and deliverable from the project initiation and planning phase which contains the best estimate of a project's scope, benefits, costs, risks, and resource requirements.

TABLE 6-2 Elements of Project Planning

- Describing the Project Scope, Alternatives, and Feasibility
- Dividing the Project into Manageable Tasks
- Estimating Resources and Creating a Resource Plan
- Developing a Preliminary Schedule
- Developing a Communication Plan
- Determining Project Standards and Procedures
- Identifying and Assessing Risk
- Creating a Preliminary Budget

come more specific and quantifiable as the project progresses. The BPP is used by the project selection committee to help decide whether the project should be accepted, redirected, or canceled. If selected, the BPP becomes the foundation document for all subsequent SDLC activities; however, it is also expected to evolve as the project evolves. That is, as new information is learned during subsequent SDLC phases, the baseline plan will be updated. Later in the chapter we describe how to construct the BPP.

The **Statement of Work (SOW)** is a short document prepared for the customer that describes what the project will deliver and outlines all work required to complete the project. The SOW assures that both you and your customer gain a common understanding of the project and is a very useful communication tool. The SOW is a very easy document to create because it typically consists of a high-level summary of the BPP information (described later). A sample SOW is shown in Figure 6-2. Depending upon your relationship with your customer, the role of the SOW may vary. At one extreme, the SOW can be used as the basis of a formal contractual agreement outlining firm deadlines, costs, and specifications. At the other extreme, the SOW can simply be used as a communication vehicle to outline the current best estimates of what the project will deliver, when it will be completed, and the resources it may consume. A contract programming or consulting firm, for example, may establish a very formal relationship with a customer and use a SOW that is extensive and formal. Alternatively, an internal development group may develop a SOW that is only one-to-two pages in length and is intended to inform customers rather than to set contractual obligations and deadlines.

Statement of Work (SOW): Document prepared for the customer during project initiation and planning that describes what the project will deliver and outlines generally at a high level all work required to complete the project.

ASSESSING PROJECT FEASIBILITY

All projects are feasible given unlimited resources and infinite time (Pressman, 1992). Unfortunately, most projects must be developed within tight budgetary and time constraints. This means that assessing project feasibility is a required activity for all information systems projects and is potentially a large undertaking. It requires that you, as a systems analyst, evaluate a wide range of factors. Typically, some of these factors will be more important than others for some projects and relatively unimportant for other projects. Although the specifics of a given project will dictate which factors are most important, most feasibility factors are represented by the following categories:

- *Economic*
- *Technical*
- *Operational*
- *Schedule*
- *Legal and Contractual*
- *Political*

Together, the culmination of these feasibility analyses form the business case that justifies the expenditure of resources on the project. In the remainder of this section, we will examine various feasibility issues. We begin by examining issues related to economic feasibility and demonstrate techniques for conducting this analysis. This is followed by a discussion of techniques for assessing technical project risk. Finally, issues not directly associated with economic and technical feasibility, but no less important to assuring project success, are discussed.

To help you better understand the feasibility assessment process, we will examine a project at Pine Valley Furniture. For this project, a Systems Service Request

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Pine Valley Furniture
Statement of Work

Prepared: 9/20/98

Project Name:	Customer Tracking Systems
PVF Project Manager:	Jim Woo
Customer:	Marketing
Project Sponsor:	Jackie Judson
Project Start / End (projected):	10/1/98–2/1/99

PVF Development Staff Estimates (man-months):

Programmers:	2.0
Jr. Analysts:	1.5
Sr. Analysts:	0.3
Supervisors:	0.1
Consultants:	0.0
Librarian:	0.1
TOTAL:	4.0

Project Description

Goal

This project will implement a customer tracking system for the marketing department. The purpose of this system is to automate the ... to save employee time, reduce errors, have more timely information, ...

Objective

- minimize data entry errors
- provide more timely information
- ...

Phases of Work

The following tasks and deliverables reflect the current understanding of the project:

In Analysis, ...
In Design, ...
In Implementation, ...

(SSR) was submitted by Pine Valley Furniture's (PVF) vice-president of Marketing, Jackie Judson, to develop a Customer Tracking System (Figure 6-3). Jackie feels that this system would allow PVF's marketing group to better track customer purchase activity and sales trends. She also feels that, if constructed, the Customer Tracking System (CTS) would provide many tangible and intangible benefits to PVF. This project was selected by PVF's Systems Priority Board for a project initiation and planning study. During project initiation, senior systems analyst Jim Woo was assigned to work with Jackie to initiate and plan the project. At this point in the project, all project initiation activities have been completed. Jackie and Jim are now focusing on project planning activities in order to complete the BPP.

Figure 6-3
System service request for Customer Tracking System (Pine Valley Furniture)

Pine Valley Furniture
System Service Request

REQUESTED BY	Jackie Judson	DATE: August 23, 1998
DEPARTMENT	Marketing	
LOCATION	Headquarters, 570c	
CONTACT	Tel: 4-3290 FAX: 4-3270 e-mail: jjudson	

TYPE OF REQUEST	URGENCY
[X] New System	[ ] Immediate – Operations are impaired or opportunity lost
[ ] System Enhancement	[ ] Problems exist, but can be worked around
[ ] System Error Correction	[X] Business losses can be tolerated until new system installed

PROBLEM STATEMENT

Sales growth at PVF has caused a greater volume of work for the marketing department. This volume of work has greatly increased the volume and complexity of the data we need to deal with and understand. We are currently using manual methods and a complex PC-based electronic spreadsheet to track and forecast customer buying patterns. This method of analysis has many problems: (1) we are slow to catch buying trends as there is often a week or more delay before data can be taken from point of sales system and manually enter it into our spreadsheet; (2) the process of manual data entry is prone to errors (which makes the results of our subsequent analysis suspect); and (3) the volume of data and the complexity of analyses conducted in the system seem to be overwhelming our current system—sometimes the program starts recalculating and never returns while for others it returns information that we know cannot be correct.

SERVICE REQUEST

I request a thorough analysis of our current method of tracking and analysis of customer purchasing activity with the intent to design and build a completely new information system. This system should handle all customer purchasing activity, support display and reporting of critical sales information, and assist marketing personnel in understanding the increasingly complex and competitive business environment. I feel that such a system will improve the competitiveness of PVF, particularly in our ability to better serve our customers.

IS LIAISON Jim Woo, 4-6207 FAX: 4-6200 e-mail: jwoo

SPONSOR Jackie Judson, Vice-President, Marketing

-------------------- TO BE COMPLETED BY SYSTEMS PRIORITY BOARD --------------------

[ ] Request approved   Assigned to ____________
                        Start date ____________
[ ] Recommend revision
[ ] Suggest user development
[ ] Reject for reason ____________

Assessing Economic Feasibility

ibility: A ifying the s and costs a develop-

The purpose for assessing **economic feasibility** is to identify the financial benefits and costs associated with the development project; economic feasibility is often referred to as cost-benefit analysis. During project initiation and planning, it will be impossible for you to precisely define all benefits and costs related to a particular project. Yet, it is important that you spend adequate time identifying and quantifying these items or it will be impossible for you to conduct an adequate economic analysis and make meaningful comparisons between rival projects. Here we will describe typical benefits and costs resulting from the development of an information system and provide several useful worksheets for recording costs and benefits. Additionally, several common techniques for making cost-benefit calculations are presented. These worksheets and techniques are used after each SDLC phase as the project is reviewed in order to decide whether to continue, redirect, or kill a project.

it: A benefit ː creation of ystem that l in dollars ty.

Determining Project Benefits An information system can provide many benefits to an organization. For example, a new or renovated IS can automate monotonous jobs, reduce errors, provide innovative services to customers and suppliers, and improve organizational efficiency, speed, flexibility, and morale. In general, the benefits can be viewed as being both tangible and intangible. **Tangible benefits** refer to items that can be measured in dollars and with certainty. Examples of tangible benefits might include reduced personnel expenses, lower transaction costs, or higher profit margins. It is important to note that not all tangible benefits can be easily quantified. For example, a tangible benefit that allows a company to perform a task in 50 percent of the time may be difficult to quantify in terms of hard dollar savings. Most tangible benefits will fit within the following categories:

- Cost reduction and avoidance
- Error reduction
- Increased flexibility
- Increased speed of activity
- Improvement of management planning and control
- Opening new markets and increasing sales opportunities

Within the Customer Tracking System at PVF, Jim and Jackie identified several tangible benefits, summarized on a tangible benefits worksheet shown in Figure 6-4. Jackie and Jim had to establish the values in Figure 6-4 after collecting information from users of the current customer tracking system. They first interviewed the person responsible for collecting, entering, and analyzing the correctness of the current customer tracking data. This person estimated that they spent 10 percent of their time correcting data entry error. Given that this person's salary is $25,000, Jackie and Jim estimated an *error reduction* benefit of $2,500. Jackie and Jim also interviewed managers who used the current customer tracking reports. Using this information they were able to estimate other tangible benefits. They learned that *cost reduction or avoidance* benefits could be gained due to better inventory management. Also, *increased flexibility* would likely occur from a reduction in the time normally taken to manually reorganize data for different purposes. Further, *improvements in management planning or control* should result from a broader range of analyses in the new system. Overall, this analysis forecasts that benefits from the system would be approximately $50,000 per year.

fit: A benefit creation of stem that neasured in rtainty.

Jim and Jackie also identified several intangible benefits of the system. Although they could not quantify these benefits, they will still be described in the final BPP. **Intangible benefits** refer to items that *cannot* be easily measured in dollars or with certainty. Intangible benefits may have direct organizational benefits such as the improvement of employee morale or they may have broader societal implications such as the reduction of waste creation or resource consumption. Potential tangible benefits may have to be considered intangible during project initiation and planning since you may not be able to quantify them in dollars or with certainty at this stage in the life cycle. During later stages, such intangibles can become tangible benefits as you better understand the ramifications of the system you are designing. In this case, the BPP is updated and the business case revised to justify continuation of the project to the next phase. Table 6-3 lists numerous intangible benefits often associated with the development of an information system. Actual benefits will vary from system to system. After determining project benefits, project costs must be identified.

TANGIBLE BENEFITS WORKSHEET
Customer Tracking System Project

	Year 1 through 5
A. Cost reduction or avoidance	$ 4,500
B. Error reduction	2,500
C. Increased flexibility	7,500
D. Increased speed of activity	10,500
E. Improvement in management planning or control	25,000
F. Other	0
TOTAL tangible benefits	$50,000

Figure 6-4
Tangible benefits for Customer Tracking System (Pine Valley Furniture)

Determining Project Costs Similar to benefits, an information system can have both tangible and intangible costs. **Tangible costs** refer to items that you can easily measure in dollars and with certainty. From an IS development perspective, tangible costs include items such as hardware costs, labor costs, and operational costs such as employee training and building renovations. Alternatively, intangible costs are those items that you cannot easily measure in terms of dollars or with certainty.

Tangible cost: A cost associated with an information system that can be measured in dollars and with certainty.

TABLE 6-3 Intangible Benefits from the Development of an Information System

• Competitive necessity	• Faster decision making
• More timely information	• Information processing efficiency
• Improved organizational planning	• Improved asset utilization
• Increased organizational flexibility	• Improved resource control
• Promotion of organizational learning and understanding	• Increased accuracy in clerical operations
• Availability of new, better, or more information	• Improved work process that can improve employee morale
• Ability to investigate more alternatives	• Positive impacts on society

Adapted from Parker and Benson, 1988

igible cost: A cost iated with an mation system that t be easily measured in of dollars or with inty.

Intangible costs can include loss of customer goodwill, employee morale, or operational inefficiency. Table 6-4 provides a summary of common costs associated with the development and operation of an information system. Predicting the costs associated with the development of an information system is an inexact science. IS researchers, however, have identified several guidelines for improving the cost-estimating process (see Table 6-5). Both underestimating and overestimating costs are problems you must avoid (Lederer and Prasad, 1992). Underestimation results in cost overruns while overestimation results in unnecessary allocation of resources that might be better utilized.

-time cost: A cost associated with project start-up development, or system -up.

Besides tangible and intangible costs, you can distinguish IS-related development costs as either one-time or recurring (the same is true for benefits although we do not discuss this difference for benefits). **One-time costs** refer to those associated with project initiation and development and the start-up of the system. These costs typically encompass activities such as system development, new hardware and software purchases, user training, site preparation, and data or system conversion. When conducting an economic cost-benefit analysis, a worksheet should be created for capturing these expenses. For very large projects, one-time costs may be staged over one or more years. In these cases, a separate one-time cost worksheet should be created for each year. This separation will make it easier to perform present value calculations (see below). **Recurring costs** refer to those costs resulting from the ongoing evolution and use of the system. Examples of these costs typically include

urring cost: A cost resulting from the ongoing ution and use of a system.

- Application software maintenance
- Incremental data storage expense
- Incremental communications

TABLE 6-4 Possible Information Systems Costs

Types of Costs	Examples	Types of Costs	Examples
Procurement	Consulting costs	Project-Related	Application software
	Equipment purchase or lease		Software modifications to fit local systems
	Equipment installation costs		Personnel, overhead, et al., from in-house development
	Site preparation and modifications		Training users in application use
	Capital costs		Collecting and analyzing data
	Management and staff time		Preparing documentation
Start-Up	Operating system software		Managing development
	Communications equipment installation	Operating	System maintenance costs (hardware, software, and facilities)
	Start-up personnel		Rental of space and equipment
	Personnel searches and hiring activities		Asset depreciation
	Disruption to the rest of the organization		Management, operation, and planning personnel
	Management to direct start-up activity		

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TABLE 6-5 Guidelines for Better Cost Estimating

1. Assign the initial estimating task to the final developers.
2. Delay finalizing the initial estimate until the end of a thorough study.
3. Anticipate and control user changes.
4. Monitor the progress of the proposed project.
5. Evaluate proposed project progress by using independent auditors.
6. Use the estimate to evaluate project personnel.
7. Study the cost estimate carefully before approving it.
8. Rely on documented facts, standards, and simple arithmetic formulas rather than guessing, intuition, personal memory, and complex formulas.
9. Don't rely on cost-estimating software for an accurate estimate.

Adapted with the permission of the Association for Computing Machinery. Copyright ©1992 A.L. Lederer and J. Prasad.

- New software and hardware leases
- Supplies and other expenses (for example, paper, forms, data center personnel)

Both one-time and recurring costs can consist of items that are fixed or variable in nature. Fixed costs refer to costs that are billed or incurred at a regular interval and usually at a fixed rate (a facility lease payment). Variable costs refer to items that vary in relation to usage (long distance phone charges).

During the process of determining project costs, Jim and Jackie identified both one-time and recurring costs for the project. These costs are summarized in Figures 6-5 and 6-6. These figures show that this project will incur a one-time cost of $42,500 and a recurring cost of $28,500 per year. One-time costs were established by discussing the system with Jim's boss who felt that the system would require

ONE-TIME COSTS WORKSHEET
Customer Tracking System Project

	Year 0
A. Development costs	$20,000
B. New hardware	15,000
C. New (purchased) software, if any	
1. Packaged applications software	5,000
2. Other ______	0
D. User training	2,500
E. Site preparation	0
F. Other ______	0
TOTAL one-time cost	$42,500

Figure 6-5
One-time costs for Customer Tracking System (Pine Valley Furniture)

ure 6-6
urring costs for Customer
:king System (Pine Valley
iture)

RECURRING COSTS WORKSHEET *Customer Tracking System Project*	Year 1 through 5
A. Application software maintenance	$25,000
B. Incremental data storage required: 20 MB × $50. (estimated cost/MB = $50)	1,000
C. Incremental communications (lines, messages, . . .)	2,000
D. New software or hardware leases	0
E. Supplies	500
F. Other ______	0
TOTAL recurring costs	$28,500

approximately four months to develop (at $5,000 per month). To effectively run the new system, the Marketing department would need to upgrade at least five of their current workstations (at $3,000 each). Additionally, software licenses for each workstation (at $1,000 each) and modest user training fees (ten users at $250 each) would be necessary.

As you can see from Figure 6-6, Jim and Jackie believe the proposed system will be highly dynamic and will require, on average, five months of annual maintenance, primarily for enhancements as users expect more from the system. Other ongoing expenses such as increased data storage, communications equipment, and supplies should also be expected. You should now have an understanding of the types of benefit and cost categories associated with an information systems project. It should be clear that there are many potential benefits and costs associated with a given project. Additionally, since the development and useful life of a system may span several years, these benefits and costs must be normalized into present-day values in order to perform meaningful cost-benefit comparisons. In the next section, we address the relationship between time and money.

The Time Value of Money Most techniques used to determine economic feasibility encompass the concept of the *time value of money* (TVM). TVM refers to the concept of comparing present cash outlays to future expected returns. As previously discussed, the development of an information system has both one-time and recurring costs. Furthermore, benefits from systems development will likely occur sometime in the future. Since many projects may be competing for the same investment dollars and may have different useful life expectancies, all costs and benefits must be viewed in relation to their *present value* when comparing investment options.

A simple example will help in understanding the TVM. Suppose you want to buy a used car from an acquaintance and she asks that you make three payments of $1,500 for three years, beginning next year, for a total of $4,500. If she would agree to a single lump sum payment at the time of sale (and if you had the money!), what amount do you think she would agree to? Should the single payment be $4,500? Should it be more or less? To answer this question, we must consider the time value of money. Most of us would gladly accept $4,500 today rather than three payments ... dollar today (or $4,500 for that matter) is worth more than a

dollar tomorrow or next year, because money can be invested. The rate at which money can be borrowed or invested is called the *cost of capital*, and is called the **discount rate** for TVM calculations. Let's suppose that the seller could put the money received for the sale of the car in the bank and receive a 10% return on her investment. A simple formula can be used when figuring out the **present value** of the three $1,500 payments:

Discount rate: The rate of return used to compute the present value of future cash flows.

Present value: The current value of a future cash flow.

$$PV_n = Y \times \left[\frac{1}{(1+i)^n}\right]$$

where PV_n is the present value of Y dollars n years from now when i is the discount rate.

From our example, the present value of the three payments of $1,500 can be calculated as

$$PV_1 = 1500 \times \left[\frac{1}{(1+.10)^1}\right] = 1500 \times .9091 = 1363.65$$

$$PV_2 = 1500 \times \left[\frac{1}{(1+.10)^2}\right] = 1500 \times .8264 = 1239.60$$

$$PV_3 = 1500 \times \left[\frac{1}{(1+.10)^3}\right] = 1500 \times .7513 = 1126.95$$

where PV_1, PV_2, and PV_3 reflect the present value of each $1,500 payment in year one, two, and three, respectively.

To calculate the *net present value* (NPV) of the three $1,500 payments, simply add the present values calculated above ($NPV = PV_1 + PV_2 + PV_3 = 1363.65 + 1239.60 + 1126.95 = \$3730.20$). In other words, the seller could accept a lump sum payment of $3,730.20 as equivalent to the three payments of $1,500, given a discount rate of 10 percent.

NPV

Given that we now know the relationship between time and money, the next step in performing the economic analysis is to create a summary worksheet reflecting the present values of all benefits and costs as well as all pertinent analyses. Due to the fast pace of the business world, PVF's System Priority Board feels that the useful life of many information systems may not exceed five years. Therefore, all cost-benefit analysis calculations will be made using a five-year time horizon as the upper boundary on all time-related analyses. In addition, the management of PVF has set their cost of capital to be 12% (that is, PVF's discount rate). The worksheet constructed by Jim is shown in Figure 6-7.

Cell H11 of the worksheet displayed in Figure 6-7 summarizes the NPV of the total tangible benefits from the project. Cell H19 summarizes the NPV of the total costs from the project. The NPV for the project ($35,003) shows that, overall, benefits from the project exceed costs (see cell H22).

The overall return on investment (ROI) for the project is also shown on the worksheet in cell H25. Since alternative projects will likely have different benefit and cost values and, possibly, different life expectancies, the overall ROI value is very useful for making project comparisons on an economic basis. Of course, this example shows ROI for the overall project. An ROI analysis could be calculated for each year of the project.

The last analysis shown in Figure 6-7 is a break-even analysis. The objective of the break-even analysis is to discover at what point (if ever) benefits equal costs (that is, when break-even occurs). To conduct this analysis, the NPV of the yearly cash flows are determined. Here, the yearly cash flows are calculated by subtracting both the one-time cost and the present values of the recurring costs from the present value of the yearly benefits. The overall NPV of the cash flow reflects the total cash flows for all preceding years. Examination of line 30 of the worksheet shows that break-even occurs between years 2 and 3. Since year three is the first in

Measuring Web ROI

Over the past few years, the World Wide Web has been getting a lot of attention by all types of businesses. Yet, with all the hype and activity on the Web, many businesses struggle with economically justifying their Web-based systems. Forrester Research predicts that an average corporate Web site used only for product promotion cost $681,000 in 1997 (Radosevich, 1996). A full-blown electronic commerce site with on-line transaction processing was estimated to cost $4,224,000! When designing a Web site, organizations must consider a broad range of costs that you may not consider when building a more traditional information system (see Table 6-7). When building Web sites, a big variation in costs was found not only among the types of sites but also depending on whether the site was built and maintained by the company itself or outsourced to a company specializing in the design and management of Web-based systems—in some cases, costs were found to be more than 10 times lower when outsourced. In addition to having difficulty estimating costs, identifying tangible benefits is also often difficult. For example, Hershey Foods (www.hershey.com) has developed a promotional site to provide visitors with information on financial performance and chocolate recipes. Hershey made a decision early on to keep its site simple. According to Tom Loser, Webmaster and database administrator for Hershey, "We can't afford to sell a single candy bar over the net, so ours is just an information source" (Radosevich, 1996; p. 94). Consequently, many of the benefits derived from its site may show no measurable economic benefits. Nonetheless, Hershey feels that the site provides valuable benefits and has no plans to discontinue its Web presence.

TABLE 6-7 Web-based System Costs

Cost Category	Examples
Platform costs	• Web-hosting service • Web server • Server software • Software plug-ins • Firewall server • Router • Internet connection
Content and service	• Creative design and development • Ongoing design fees • Web project manager • Technical site manager • Content staff • Graphics staff • Support staff • Site enhancement funds • Fees to license outside content • Programming, consulting, and research • Training and travel
Marketing	• Direct mail • Launch and ongoing public relations • Print advertisement • Paid links to other Web sites • Promotions • Marketing staff • Advertising sales staff

benefits or costs at this point in a project, such financial hurdles for a project may be unattainable. In this case, simply doing as thorough an economic analysis as possible, including producing a long list of intangibles, may be sufficient for the project to progress. One other option is to run the type of economic analysis shown in Figure 6-7 using pessimistic, optimistic, and expected benefit and cost estimates during project initiation and planning. This range of possible outcomes, along with the list of intangible benefits and the support of the requesting business unit, will often be enough to allow the project to continue to the analysis phase. You must, however, be as precise as you can with the economic analysis, especially when investment capital is scarce. In this case, it may be necessary to conduct some typical analysis phase activities during project initiation and planning in order to clearly identify inefficiencies and shortcomings with the existing system and to explain how a new system will overcome these problems. Thus, building the economic case for a systems project is an open-ended activity; how much analysis is needed depends on the particular project, stakeholders, and business conditions. Also, conducting economic feasibility analyses for new types of information systems is often very difficult (see box titled "Measuring Web ROI").

Technical feasibility: A process of assessing the development organization's ability to construct a proposed system.

Assessing Technical Feasibility

The purpose of assessing **technical feasibility** is to gain an understanding of the organization's ability to construct the proposed system. This analysis should include

an assessment of the development group's understanding of the possible target hardware, software, and operating environments to be used as well as system size, complexity, and the group's experience with similar systems. In this section, we will discuss a framework you can use for assessing the technical feasibility of a project in which a level of project risk can be determined after answering a few fundamental questions.

It is important to note that all projects have risk and that risk is not necessarily something to avoid. Yet it is also true that, because organizations typically expect a greater return on their investment for riskier projects, understanding the sources and types of technical risks proves to be a valuable tool when you assess a project. Also, risks need to be managed in order to be minimized; you should, therefore, identify potential risks as early as possible in a project. The potential consequences of not assessing and managing risks can include the following outcomes:

1. Failure to attain expected benefits from the project
2. Inaccurate project cost estimates
3. Inaccurate project duration estimates
4. Failure to achieve adequate system performance levels
5. Failure to adequately integrate the new system with existing hardware, software, or organizational procedures

You can manage risk on a project by changing the project plan to avoid risky factors, assigning project team members to carefully manage the risky aspects, and setting up monitoring methods to determine whether or not potential risk is, in fact, materializing.

The amount of technical risk associated with a given project is contingent on four primary factors: project size, project structure, the development group's experience with the application and technology area, and the user group's experience with development projects and application area. Aspects of each of these risk areas are summarized in Table 6-8. Using these factors for conducting a technical risk assessment, four general rules emerge:

1. *Large projects are riskier than small projects.* Project size, of course, relates to the relative project size that the development group is familiar working with. A "small" project for one development group may be relatively "large" for another. The types of factors that influence project size are listed in Table 6-8.
2. *A system in which the requirements are easily obtained and highly structured will be less risky than one in which requirements are messy, ill-structured, ill-defined, or subject to the judgement of an individual.* For example, the development of a payroll system has requirements that may be easy to obtain due to legal reporting requirements and standard accounting procedures. On the other hand, the development of an executive support system would need to be customized to the particular executive decision style and critical success factors of the organization, thus making its development more risky (see Table 6-8).
3. *The development of a system employing commonly used or standard technology will be less risky than one employing novel or non-standard technology.* A project has a greater likelihood of experiencing unforeseen technical problems when the development group lacks knowledge related to some aspect of the technology environment. A less risky approach is to use standard development tools and hardware environments. It is not uncommon for experienced system developers to talk of the difficulty of using leading-edge (or in their words, *bleeding edge*) technology (see Table 6-8).

TABLE 6-8 Project Risk Assessment Factors

Risk Factor	Examples
Project Size	Number of members on the project team
	Project duration time
	Number of organizational departments involved in project
	Size of programming effort (e.g., hours, function points)
Project Structure	New system or renovation of existing system(s)
	Organizational, procedural, structural, or personnel changes resulting from system
	User perceptions and willingness to participate in effort
	Management commitment to system
	Amount of user information in system development effort
Development Group	Familiarity with target-hardware, software development environment, tools, and operating system
	Familiarity with proposed application area
	Familiarity with building similar systems of similar size
User Group	Familiarity with information systems development process
	Familiarity with proposed application area
	Familiarity with using similar systems

Adapted from Cash, McFarlan, McKenney, and Applegate, 1992

4. *A project is less risky when the user group is familiar with the systems development process and application area than if unfamiliar.* Successful IS projects require active involvement and cooperation between the user and development groups. Users familiar with the application area and the systems development process are more likely to understand the need for their involvement and how this involvement can influence the success of the project (see Table 6-8).

A project with high risk may still be conducted. Many organizations look at risk as a portfolio issue: considering all projects, it is okay to have a reasonable percentage of high-, medium-, and low-risk projects. Given that some high-risk projects will get into trouble, an organization cannot afford to have too many of these. Having too many low-risk projects may not be aggressive enough to make major breakthroughs in innovative uses of systems. Each organization must decide on its acceptable mix of projects of varying risk.

A matrix for assessing the relative risks related to the general rules described above is shown in Figure 6-9. Using the risk factor rules to assess the technical risk level of the Customer Tracking System, Jim and Jackie concluded the following about their project:

1. The project is a relatively *small project* for PVF's development organization. The basic data for the system is readily available so the creation of the system will not be a large undertaking.

		Low Structure	High Structure
High Familiarity with Technology or Application Area	Large Project	(1) Low risk (very susceptible to mismanagement)	(2) Low risk
	Small Project	(3) Very low risk (very susceptible to mismanagement)	(4) Very low risk
Low Familiarity with Technology or Application Area	Large Project	(5) Very high risk	(6) Medium risk
	Small Project	(7) High risk	(8) Medium-low risk

Figure 6-9
Effects of degree of project structure, project size, and familiarity with application area on project implementation risk (Adapted from: Cash et al., 1992)

3. The *development group is familiar* with the technology that will likely be used to construct the system, as the system will simply extend current system capabilities.

4. The *user group is familiar* with the application area since they are already using the PC-based spreadsheet system described in Figure 6-3.

Given this risk assessment, Jim and Jackie mapped their information into the risk framework of Figure 6-9. They concluded that this project should be viewed as having "very low" technical risk (cell 4 of the figure). Although this method is useful for gaining an understanding of technical feasibility, numerous other issues can influence the success of the project. These non-financial and non-technical issues are described in the following section.

Assessing Other Feasibility Concerns

In this section, we will briefly conclude our discussion of project feasibility issues by reviewing other forms of feasibility that you may need to consider when formulating the business case for a system during project planning. The first relates to examining the likelihood that the project will attain its desired objectives, called **operational feasibility**. Its purpose is to gain an understanding of the degree to which the proposed system will likely solve the business problems or take advantage of the opportunities outlined in the systems service request or project identification study. For a project motivated from information system planning, operational feasibility includes justifying the project on the basis of being consistent with or necessary for accomplishing the IS plan. In fact, the business case for any project can be enhanced by showing a link to the business or information systems plan. Your assessment of operational feasibility should also include an analysis of how the proposed system will affect organizational structures and procedures. Systems that have substantial

Operational feasibility: The process of assessing the degree to which a proposed system solves business problems or takes advantage of business opportunities.

Schedule feasibility: The process of assessing the degree to which the potential time frame and completion dates for all major activities within a project meet organizational deadlines and constraints for affecting change.

(2) Another feasibility concern relates to project duration and is referred to as assessing schedule feasibility. The purpose of assessing **schedule feasibility** is for you, as a systems analyst, to gain an understanding of the likelihood that all potential timeframes and completion date schedules can be met and that meeting these dates will be sufficient for dealing with the needs of the organization. For example, a system may have to be operational by a government-imposed deadline, by a particular point in the business cycle (such as the beginning of the season when new products are introduced), or at least by the time a competitor is expected to introduce a similar system. Further, detailed activities may only be feasible if resources are available when called for in the schedule. For example, the schedule should not call for system testing during rushed business periods or for key project meetings during annual vacation or holiday periods. The schedule of activities produced during project initiation and planing will be very precise and detailed for the analysis phase. The estimated activities and associated times for activities after the analysis phase are typically not as detailed (e.g., it will take two weeks to program the payroll report module) but are rather at the life-cycle phase level (e.g., it will take six weeks for physical design, four months for programming, and so on). This means that assessing schedule feasibility during project initiation and planning is more of a "rough-cut" analysis of whether the system can be completed within the constraints of the business opportunity or the desires of the users. While assessing schedule feasibility you should also evaluate scheduling tradeoffs. For example, factors such as project team size, availability of key personnel, subcontracting or outsourcing activities, and changes in development environments may all be considered as having possible impact on the eventual schedule. As with all forms of feasibility, schedule feasibility will be reassessed after each phase, when you can specify with greater certainty the detailed steps and their duration for the next phase.

Legal and contractual feasibility: The process of assessing potential legal and contractual ramifications due to the construction of a system.

(3) A third concern relates to assessing **legal and contractual feasibility** issues. In this area, you need to gain an understanding of any potential legal ramifications due to the construction of the system. Possible considerations might include copyright or nondisclosure infringements, labor laws, antitrust legislation (which might limit the creation of systems to share data with other organizations), foreign trade regulations (for example, some countries limit access to employee data by foreign corporations), and financial reporting standards as well as current or pending contractual obligations. Contractual obligations may involve ownership of software used in joint ventures, license agreements for use of hardware or software, nondisclosure agreements with partners, or elements of a labor agreement (for example, a union agreement may preclude certain compensation or work-monitoring capabilities a user may want in a system). A common situation is that development of a new application system for use on new computers may require new or expanded, and more costly, system software licenses. Typically, legal and contractual feasibility is a greater consideration if your organization has historically used an outside organization for specific systems or services that you now are considering handling yourself. In this case, ownership of program source code by another party may make it difficult to extend an existing system or link a new system with an existing, purchased system.

Political feasibility: The process of evaluating how key stakeholders within the organization view the proposed system.

(4) A final feasibility concern focuses on assessing **political feasibility** in which you attempt to gain an understanding of how key stakeholders within the organization view the proposed system. Since an information system may affect the distribution of information within the organization, and thus the distribution of power, the construction of an IS can have political ramifications. Those stakeholders not supporting the project may take steps to block, disrupt, or change the intended focus of the project.

In summary, depending upon the given situation, numerous feasibility issues must be considered when planning a project. This analysis should consider economic, technical, operational, schedule, legal, contractual, and political issues related to the project. In addition to these considerations, project selection by an organization may be influenced by issues beyond those discussed here. For example, projects may be selected for construction given high project costs and high technical risk if the system is viewed as a strategic necessity; that is, a project viewed by the organization as being critical to its survival. Alternatively, projects may be selected because they are deemed to require few resources and have little risk. Projects may also be selected due to the power or persuasiveness of the manager proposing the system. This means that project selection may be influenced by factors beyond those discussed here and beyond items that can be analyzed. Understanding the reality that projects may be selected based on factors beyond analysis, your role as a systems analyst is to provide a thorough examination of the items that can be assessed. Your analysis will ensure that a project review committee has as much information as possible when making project approval decisions. In the next section, we discuss how project plans are typically reviewed.

BUILDING THE BASELINE PROJECT PLAN

All the information collected during project initiation and planning is collected and organized into a document called the Baseline Project Plan. Once the BPP is completed, a formal review of the project can be conducted with project clients and other interested parties. This presentation is called a *walkthrough* and is discussed later in the chapter. The focus of this review is to verify all information and assumptions in the baseline plan before moving ahead with the project. As mentioned above, the project size and organizational standards will dictate the comprehensiveness of the project initiation and planning process as well as the BPP. Yet, most experienced systems builders have found project planning and a clear project plan to be invaluable to project success. An outline of a Baseline Project Plan is provided in Figure 6-10, which shows that it contains four major sections:

1. Introduction
2. System Description
3. Feasibility Assessment
4. Management Issues

The purpose of the *Introduction* is to provide a brief overview of the entire document and outline a recommended course of action for the project. The entire Introduction section is often limited to only a few pages. Although the Introduction section is sequenced as the first section of the BPP, it is often the final section to be written. It is only after performing most of the project planning activities that a clear overview and recommendation can be created. One activity that should be performed initially is the definition of project scope.

When defining scope for the Customer Tracking System within PVF, Jim Woo first needed to gain a clear understanding of the project's objectives. To do this, Jim briefly interviewed Jackie Judson and several of her colleagues to gain a clear idea of their needs. He also spent a few hours reviewing the existing system's functionality, processes, and data use requirements for . . .