Chapter 15

EUIS Project Management: Assessment and Design

Learning Objectives

Upon completing this chapter, you should be able to:

- Identify appropriate person(s) to conduct an EUIS study.
- Define the scope of an EUIS project.
- Explain the role of a project sponsor.
- Explain the role of the project manager.
- Define project objectives in demonstrable, measurable terms.
- Choose appropriate means of gathering data for assessment.
- Prepare a flowchart to describe business processes.
- Design an interview guide, questionnaire, and observation guide.
- List the components of a project proposal.
- Understand the role of the request for proposal (RFP).
- Compare vendor responses to RFPs with a view to selecting appropriate hardware and/or software.

15.1 INTRODUCTION

The eight-step EUIS project management model described in part V provides a systematic process for analysis, design, and implementation of EUIS projects. Although this model parallels the standard systems development life cycle in many respects, it also differs in significant ways. These differences reflect a heavy emphasis on the organizational aspects of implementing information technologies and restructuring business processes. The EUIS model also reflects a much higher level of collaboration between end users and technical staff.

The applicability of the EUIS project management model depends on the nature and scope of the project. Moreover, business managers may be expecting quick, inexpensive solutions. EUIS analysts may be expected to meet tight deadlines rather than come up with ideal solutions. An 80 percent solution delivered within a week might be preferred to a 100 percent solution delivered in two to three months. In general, EUIS analysts and project leaders would be expected to be familiar with the spectrum of project methodologies and select the appropriate tools and methodologies for the project at hand.

This chapter describes the first five assessment and design steps of the EUIS project management model. These steps include:

Step 1 Define project scope
Step 2 Plan the project
Step 3 Assess project requirements
Step 4 Describe proposed solution in detail
Step 5 Select or develop project solution

The purpose and expected outcomes (deliverables) for each step are identified, followed by a discussion of specific tasks and methodologies that an analyst or project team might employ. It also includes guidelines for preparing the deliverables for each of these first five steps. The implementation and institutionalization phases will be covered in chapter 16.

15.2 STEP ONE: DEFINING THE PROJECT SCOPE

Purpose: *Establish clear understanding of problems or opportunities to be addressed, boundaries (scope) of the project, expected benefits, and resources required.*

Deliverables:

- Project proposal that defines business objectives, expected benefits, the business units, jobs, tasks, business processes, procedures, and workflows that would be impacted; a description of how work is currently done; and EUIS objectives, required resources, and target dates.
- Statement of expected results for job and business process redesign.
- Preliminary cost-benefit analysis.
- Formal approval of the project sponsor.

The scope of an EUIS project may be as simple as selecting a single application software package for one individual or as complex as implementing a global network of LANs to provide desktop computing in 50 branch offices. Even selecting a software package can vary in complexity depending on the situation. If a large corporation already has established standard software packages, an EUIS analyst might only interview the client to confirm the need, order the software package, see that it is properly installed on the client's PC, and arrange for appropriate training. Without an established corporate standard, however, the analyst may have to do considerably more work in order to be confident that an appropriate package was selected. The analyst may be required to document and prioritize all needed functionality, establish performance criteria, and complete a detailed evaluation of alternative packages against those requirements.

Ideas or requests for projects may originate from various sources. They may be suggested by business personnel or managers seeking opportunities to improve operations, or they may be recommended by the systems organization in an effort to promote new technologies. Sometimes project requests are initiated because of requirements to implement new business strategies, enhance or replace existing systems, or to reengineer business processes. Project ideas also may be generated by empowered work teams, from annual planning and budgeting activities, or through operational changes.

Before projects can be undertaken, however, they must have a sponsor. A *sponsor* is a business leader or organizational unit willing to commit the time and resources required to complete the project. The sponsor plays a critical leadership role in gaining support for the project, communicating goals and objectives, and implementing business process changes.

The initial step of defining project scope usually will be assigned to a project leader, analyst, or possibly a team for large projects. Defining scope may not always be as evident as one expects. The scope depends not only on the business opportunities or problems that need to be addressed, but also on the available time and resources. A manager, for example, may want to implement a department LAN for 20 staff, but may need a solution in two weeks and with only a maximum of $15,000 to spend—a clearly unrealistic budget for the envisioned goal. Obviously, the project would need to be scaled back or implemented in phases as additional budget dollars become available.

In defining the scope of a project, the project leader identifies the extent of the investigation; in other words, the boundaries of the project. The information required includes business objectives; expected benefits; and the organizational units, jobs, tasks, business processes, and workflows that will be affected. It is often helpful to identify clearly what will NOT be included in the project as well, especially if time and resources are limited. It is also necessary to assess the way work is done currently. Based on this information, the project leader develops a preliminary definition of EUIS objectives, a list of resources needed to complete the project, target dates, and a preliminary estimate of project costs. A project sponsor also may require a preliminary cost-benefit analysis at this time. All this information is presented in a project proposal that includes an initial high-level plan for proceeding with the project.

The project proposal must be approved by both the project sponsor (business unit) and a senior manager in the IS or EUIS organization. Approval indicates concurrence with both the scope of the project as defined and a commitment for budget and resources.

Sometimes, however, management may just grant approval to proceed to the next step, project planning, at which time approval must again be sought before proceeding further.

Large organizations with many projects generally have procedures for prioritizing projects prior to approval. The preliminary cost-benefit analysis is usually the basis for comparing projects. In some enterprises, EUIS projects compete for resources only against other EUIS projects, while in others they may compete against all IS projects.

15.2.1 Defining Business Objectives

The first step in defining the project scope is to identify the business objectives. A business objective is a clear statement of what the business unit must do or achieve—the end in mind. Business objectives should be stated in measurable terms so that they provide a basis for measuring success. They should contribute to the enterprise's bottom line by either increasing revenues or decreasing costs.

Examples of business objectives are:

- Decrease the operating costs of the department by 15 percent.
- Increase the number of cases that the department can process by 25 percent without increasing staff.
- Handle 75 percent of all inquiries immediately while the customer is on the telephone, eliminating the need to call back later.
- Match or exceed industry averages on all key benchmarks.
- Reduce insurance claims processing errors to less than 1 percent and the average turnaround to 2 days by implementing a comprehensive knowledge management system that delivers all necessary product and financial information to the desktop.

Business objectives serve to focus project activities. Without a clear statement of business objectives, analysts can waste considerable time studying problems, analyzing business activities, and collecting data that may not be relevant to the sponsor's goals.

15.2.2 Defining Job and Business Process Objectives

In order to affect workplace performance, EUIS projects need to identify specific objectives for improving business processes and job performance. The goal is to streamline tasks and business processes *prior* to automating them. These objectives often are harder to define than the business objectives and require analysts and users to work closely together. The analyst's role is to help users understand the ways in which technology can support work changes. The business users, however, must make the ultimate decisions on how the technology will be implemented in the workplace. The most innovative ideas usually come from individuals or work groups close to the business who understand the technology well enough to have a vision for how it can help the business. Examples of job performance objectives are as follows:

- Estimator errors in calculating construction estimates should be reduced by 75 percent.
- The proposed online help system should reduce data input errors from an average of three per order to less than one in every three orders.
- Improve coordination among geographically dispersed work groups and reduce travel requirements by 50 percent.

- Reduce cycle time to 3 days for issuing a mortgage by making customer database and documents available online so that processing by different departments can be completed simultaneously instead of sequentially.

If objectives for improving job performance or business processes are not defined clearly, it is unlikely that installing hardware and software will result in significant cost savings. This is a seemingly obvious point that is easily overlooked.

15.2.3 Identifying the Impact on the Current System

An initial estimate should be made of the number of business functions, departments, jobs, tasks, business processes, and procedures that will be affected by an EUIS project. Because changing operations in one area often affects others, it is important in defining project scope to find out what other departments or units outside the sponsor's authority might be affected by the project.

15.2.4 Identifying Stakeholders

It also is important to identify all stakeholders, especially those who have the most to lose or gain by maintaining or changing current procedures, functions, or organizational structure. These individuals may not necessarily be the intended users of a proposed system. For example, the marketing department, though not directly affected, might be considered a stakeholder in an order processing department's project to change invoicing procedures. The marketing department might consider delays in invoicing clients as an extra edge in selling because it gives clients a few extra days to pay for shipments. Because of their regular contact with customers, sales personnel can be a good source of information about client preferences, concerns, or complaints with current practices. The marketing department also may be able to use additional customer data that will be collected to target marketing campaigns for new products more effectively.

Getting the buy-in of all stakeholders is usually critical to achieving project results. When stakeholders have an opportunity to voice their perspectives and interests, they are more likely to support the success of the project. Even more important, obtaining the viewpoint of stakeholders helps to ensure that important opportunities or problems are not overlooked. When stakeholders are excluded or overlooked, the likelihood for misunderstanding increases, and support for a project may be only lukewarm at best.

15.2.5 Clarifying and Communicating Project Goals

The statement of scope should clarify project goals and briefly describe the expected results. The primary reason an EUIS study is initiated is that a problem exists (e.g., telephone coverage is poor, customer service complaints have increased, decisions are taking too long, administrative costs are escalating faster than revenue) or an opportunity is identified (e.g., an improvement to customer service). The analyst's role is to determine exactly what the needs are and whether an EUIS solution is appropriate.

The description of expected results includes a logical description—an explanation of *what* the proposed new system will be expected to do. The analyst should avoid physical descriptions, or explanations of *how* it will be done, at this point.

As the expected results are defined, it may become evident that a solution will require interfacing multiple systems. This finding suggests that a combined IS/EUIS solution may be required. When analysts identify this potential, the project leader confers with

management and gets additional IS analysts involved. A joint solution might significantly expand the scope of the project beyond that anticipated by the project sponsor. In such instances, the project sponsor may elect to pursue only the EUIS solution or to expand the project solution to encompass IS development. Project goals and expected results should be communicated so that everyone involved is working toward the same project goals, schedule, and budget.

15.2.6 Defining System Objectives

Based on the initial study, the analyst defines the objectives for the proposed EUIS system. These objectives document what the technical solution must do to meet the business needs. It identifies what is needed in an EUIS solution, including what the boundaries of the system will be, what input and output are needed, and or how business processes will be changed. The following example illustrates these objectives.

The EUIS solution is to provide the six research team leaders with tools to plan and schedule project tasks and assign and track resources, including simultaneous assignment of one resource to multiple tasks. Team leaders need to have the tools available at their own desktop as well as be able to share project information and consolidate information for department-level reporting. Data about resources and time on tasks are input required for the existing internal charge-back system. Therefore, selected software should be compatible or should permit conversion of the data to the charge-back system.

15.2.7 Estimating Resources and Costs Needed

After the scope of the project is agreed upon by the project sponsor and project leader or analyst, an initial estimate is made of the resources and costs needed to complete the project. This estimate must take into consideration the skills and expertise needed to accomplish the project, both system resources and users. It also is essential to identify key people to be involved in the study.

Initial cost estimates include anticipated costs for hardware, software, and resources. Although it is too early in the project to identify specific solutions, the experienced analyst or project leader should have enough information about the problem, objectives, and expected results to identify one or more feasible alternatives that will be investigated in the next phase of the study. For example, if the purpose of a project is to implement a system to manage complex research projects, one alternative to be investigated might be a department LAN with six PCs, one for each research team leader, with project management software. This would be sufficient information to make an initial rough cost estimate.

Although it may be argued that these early cost estimates cannot possibly be accurate, the reality is that most project sponsors will demand at least a preliminary cost estimate before authorizing work to proceed. Early estimates may be used for budgeting or to prioritize projects competing for limited resources, based on cost-benefit analysis.

15.2.8 Preparing a Preliminary Cost-Benefit Analysis

Finally, estimated project benefits are compared to estimated project costs. This tough estimate is intended to help answer the basic question, “Is this project worth doing?” If the benefits appear to far outweigh the costs, the project is likely to be pursued.

If they are roughly proportionate, the project probably will be taken through the next step of investigation to develop more refined estimates. If the estimated costs far exceed the expected benefits or the sponsor's budget, the project proposal probably will recommend that the project not be pursued.
In large enterprises, Step 1 may be completed for many more projects than are ever approved or funded. After projects are approved, work may not begin until many months later. They may be held up for funding approval or until resources are available.

15.3 STEP TWO: PLANNING THE PROJECT

Purpose: *Establish the project approach, make an initial assessment, assemble a project team, and develop a work plan.*

Deliverables:

- Project team assignments.
- Definition of roles and responsibilities.
- Detailed work plan for Step 3 identifying all tasks, accoutabilities, and target dates.
- High-level work plan for entire project indicating major tasks, deliverables, and target dates.

Based on the initial project study and definition of project scope, the project leader prepares a project plan that lists the major tasks and deliverables along with an estimated time schedule. The plan must be reviewed by all members involved in the project, including systems and business areas.
Project planning is an iterative process. The project and plan are dependent upon the amount and accuracy of known information. As new information comes to light, or as known information becomes more accurate, necessary changes in one phase of the project may cause the redesign and reworking of other phases of the project. Thus, the deliverables are evolving constantly until the final project is completed.
Although flexibility is desirable, project managers must guard against *scope creep.* Expanding the project beyond the originally agreed-upon scope generally will require increased cost and time. Although this may be appropriate, it should never be taken on without going back to the project sponsor for approval.

15.3.1 Assigning a Project Manager

The project leader or analyst who conducted the initial study for Step 1 may continue in that role, or a new project manager may be assigned when the project is scheduled to begin. The question of who should manage the project depends on the particular organization and the scope of the project. For small projects, a single EUIS analyst is typically the project leader, charged with planning and implementing the project. In many instances, others are called upon to assist in various phases of the project (e.g., other technical resources, a vendor, or an outside consultant). For large projects, however, an experienced project manager is assigned and charged with organizing a project team or task force.

15.3.2 Assembling an EUPS Project Team or Task Force

Organizations often begin large-scale projects by establishing a project team or task force. This project team works under the leadership of a project manager, perhaps in conjunction with an outside consultant or a designated vendor.

The difference between a project team and a task force is the way responsibilities are assigned. If participants are assigned full time to the project, being relieved of other responsibilities, it is considered a project team. If participants are assigned part time to the project while continuing regular job responsibilities, it is considered a task force. Task forces are used most often in organizations that do not have an EUIS department or when the project will impact a number of different departments or business units, all of whom need not be involved full time.

The project leader should choose individuals who represent the major users of the proposed new system and other major stakeholders. In selecting members of the task force, Larry Penwell, a former systems planning specialist for General Electric, recommends that the leader ask himself or herself the following questions:

- Who is pushing for the change?
- Who stands to lose from any change?
- Who are key organizational players?
- Who has power to designate dollars toward the project?

The individuals who are described by answers to these four questions are likely candidates for the task force. In addition, it is recommended that the task force be made up of representatives from as many types of jobs and departments as possible. Task force members should be interested in working on the project and have the time to devote to it. Because of the desirability of top-down support for a project, highly ranked individuals should be included. The project manager must assess the specific skills required to carry out the project and select individuals with the right expertise.

It should be kept in mind that the project manager does not always get to choose task force members. Sometimes senior executives appoint representatives from their areas with little or no consultation with the project manager. The project manager must take appropriate steps to build an effective working relationship among team members and ensure that the team has access to information and expertise needed to complete critical tasks.

Getting the right mix of individuals on the task force is important to the success of the project. This same team may have responsibility for implementation, and implementation (discussed in chapter 16) requires strong coordination and good communications skills. The task force itself is not a closed committee; members share the team's ideas with others in their organizations. This communication should be two way. Team members disseminate information and gather information, ideas, and issues from nonmembers to take back to the task force meetings. Task force members should be empowered to represent the views of their organizations and make decisions on their behalf.

Task force members may require training in tools or methodologies that will be used to carry out the project. The project manager plans appropriate training sessions to achieve

the necessary knowledge base for the project team. The project team must clearly understand the process and be strongly committed to the success of the project.

15.3.3 The Vendor as Investigator

Most equipment manufacturers (vendors) have a staff for client consultation. Sometimes for a fee, sometimes for no fee (assuming the organization buys the vendor's line of equipment or software), a manufacturer will offer advice or even conduct the needs assessment. Typically, highly trained, experienced vendor analysts can help an organization identify tasks and functions where EUTS support can make the worker more efficient and effective.

With a thorough understanding of how to conduct a needs assessment, vendor representatives may be in a good position to assess the current situation and design a new system. An obvious outcome is that the needs assessment will result in a recommendation that the organization buy the vendor's goods. While not denying that the vendor may have a good solution, such an approach does negate the possibility of choosing another vendor's solution that may be equally desirable or less expensive. Vendor studies also tend to focus on problems for which the vendor has a solution and to ignore problems that their technology cannot solve. For example, a local area network vendor may not notice or attend to a phone system deficiency.

Despite such drawbacks, organizations with an extremely good opinion of a given vendor often choose to have its representatives conduct or assist in the needs assessment. Deciding to be a single-vendor organization has potential benefits in terms of discounts, service, and (hopefully) elimination of compatibility problems. Organizations with an approved vendor list may not have a choice but must select from a given vendor's solutions. In such situations, vendors are an appropriate choice for systems assessment.

15.3.4 The Outside Consultant as Investigator

An organization may determine that it needs outside, independent assistance in managing or executing a project. The organization may not have personnel with the required expertise or enough time to devote to the project or may simply want fresh views on how it operates. In such a case, the organization may choose among hundreds of consulting firms and individual consultants to aid in the project. Usually, consultant-aided projects are large in scope. Guidelines for selecting an outside consultant include the following:

- Choose the *right* consultant.
- Know what you want the consultant to do.
- Work closely with the consultant at all stages of the project.
- Make time available for people in your organization to work with the consultant.
- Ensure that the consultant follows up once the plan is in place.

The analyst or manager charged with working with the consultant must first choose the best person for the job. Picking up a directory of consultants and choosing one at random is risky. Choosing the right consultant may mean getting recommendations from others who have done similar projects, or perhaps using that directory but having the prospective consultant offer names and phone numbers of previous clients. Not to be overlooked is the need to select an individual or firm with whom the project leader can

work. Business philosophy and working styles are two factors to consider, as the project leader and the consultant will be working closely together.
The next task is to ensure that the consultant has whatever is needed to conduct the assessment. Agreement on project scope, objectives, and expected outcomes are important. Ancillary to the investigation are office space for the consultant and clerical assistance. The wise organization will choose a consultant with a track record of success and will give that person (or firm) all the support needed to conduct the assessment.
Continuous monitoring, discussion, and feedback are desirable throughout the study. The adage that work expands to fit the time allotted can be applicable in the consultant—client relationship. Keeping communications channels open throughout the process is a part of good project management. The best consultant is involved with the project at all stages and monitors the project as it is implemented and then evaluated. Such follow-up on the part of the consultant shows professionalism and interest. Moreover, such a consultant is available to help change strategies or plans if necessary.

15.3.5 Managing the Project

With the decision to begin an EUIS investigation, the project manager, in conjunction with (perhaps) an outside consultant and/or task force, plans the project. Perhaps the most difficult question facing the task force is "How long will the project take?" Developing a realistic estimate of time for completing a project is essential to the planning. To develop a timetable, the task force must establish the activities for investigating the problem (e.g., if questionnaires are to be used, time is needed for development, distribution, and recording). With an overview of activities, the task force is in a position to estimate time needed to complete the project, as well as describe where the investigation should be at any given time.
Figure 15-1 is a hypothetical timetable (PERT chart) developed by a project team. Determining a timetable can rest heavily on team consensus, intuition, expert opinions,

Figure 15-1 Timetable for an EUIS project

TASK	TIME ALLOWED
Prepare formal study approach.	2 weeks
Obtain top-management approval.	I week
Explain project to those who may be affected.	1 week
Develop assessment tools.	2 weeks
Validate assessment tools.	2 weeks
1l~ain study teams.	1 week
Collect data.	3 weeks
Compile and analyze data.	3 weeks
Develop feasibility report.	2 weeks
Present feasibility report to top management.	1 week

and historical data (how long did such a project take the last time?). The amount of time required depends on the scope, complexity, and urgency of the project. Once these are developed, the project manager can chart the timetable on a Gantt charts such as the one in Figure 15-2, preferably using project management software.
Whereas the timetable in Figure 15-1 shows only length of time required to complete each task, the Gantt chart also shows start and end dates. It is evident on the Gantt chart

that some activities can be done concurrently, but others are dependent upon the completion of prior tasks. A Gantt chart shows which activities overlap and which are serial. The Gantt chart can help the project manager (and team members) stay on schedule. As tasks are completed, the project manager can use the Gantt chart to compare the time the team expected each step in the project to take with the time it actually took.

The same project mapped out on project management software is shown in Figure 15-3. It shows the dependency among tasks. Project management software is available from several software vendors and was discussed in more detail in chapter 4, "Work Group Computing."

15.4 STEP THREE: ASSESSING PROJECT REQUIREMENTS

Purpose: *Understand and document the structure and purpose of the current system. Determine requirements for a new system. Evaluate alternative solutions and recommend the preferred solution.*

MONTH / PROJECT NAMA		JANUARY					FEBRUARY				MARCH				APRIL				M
Phases	S/C*	2	9	16	23	30	6	13	20	27	6	13	20	27	3	10	17	24	1
Prepare formal study approach	S																		
	C	X	X	X															
Obtain top-management approach	S																		
	C		X																
Explain project to those affected	S																		
	C			X	X	X													
Develop assessment tools	S																		
	C					X	X												
Validate assessment tools	S																		
	C																		
Train study teams	S																		
	C																		
Collect data	S																		
	C																		
Compile and analyze data	S																		
	C																		
Develop feasibility report	S																		
	C																		
Present feasibility report to top-management	S																		
	C																		
*S = Schedule; C = Completed																			

Figure 15-2 A Gantt chart for project management

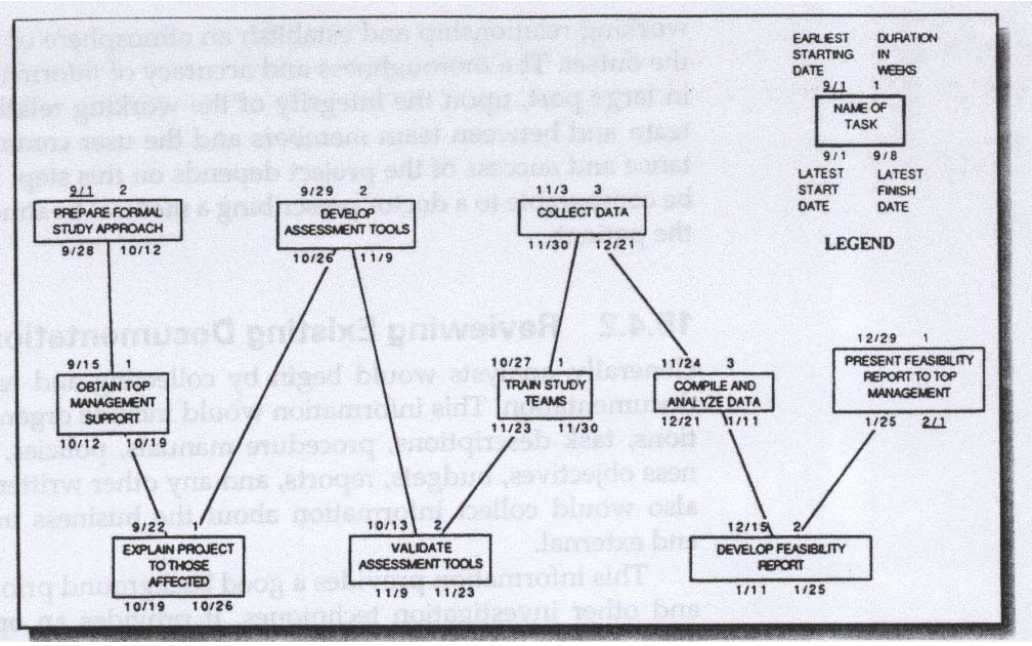


Figure 15-3 A timetable for an EUIS project using project management software
Source: Courtesy of Dr. Larry Penwell, Mary Washington University

Deliverables:
A set of user-reviewed and accepted models of the current system, including tasks, business processes, procedures, job descriptions, work flows, and inputs and outputs.

- A requirements model for a new system.
- A comparison of alternative solutions.
- The proposed project solution.
- Possibly a prototype of the proposed solution.
- A more refined set of project costs and benefits.

15.4.1 Documenting the Current System

EUIS analysts must first understand the current system before proposing a new system. The depth to which the analysis should go depends on the project objectives. When the primary objective is streamlining an existing system, the analysis probably will need to be thorough with accurate documentation. When the primary objective is to redesign the business process, the analysis will focus on identifying critical requirements that must be addressed by a new system. A general understanding of the current business process may be adequate, but detailed documentation may not be necessary.

Analysts begin the requirements analysis by carefully documenting all existing systems within the agreed-upon project scope. It is especially critical to understand customer requirements and how the unit in question contributes to the enterprise mission. Where does it fit on the value chain, for example? In addition, analysts seek to understand the political, sociotechnical, and business environments.

This documentation process requires a great deal of planning and personal contact with business personnel. It is important for analysts to build a good working relationship and

establish an atmosphere of trust and cooperation from the outset. The thoroughness and accuracy of information compiled will depend, in large part, upon the integrity of the working relationships among the project team and between team members and the user community. The ultimate acceptance and success of the project depends on this step. Neglecting this step would be comparable to a doctor prescribing a medical treatment without first examining the patient.

15.4.2 Reviewing Existing Documentation

Generally, analysts would begin by collecting and reviewing available written documentation. This information would include organization charts, job descriptions, task descriptions, procedure manuals, policies, mission statements, business objectives, budgets, reports, and any other written documentation. Analysts also would collect information about the business unit's clients, both internal and external.

This information provides a good background prior to conducting interviews and other investigation techniques. It provides an opportunity for analysts to begin building rapport and avoids wasting people's time asking for information that is available already.

15.4.3 Identifying and Gathering Information

After reviewing existing documentation, the analyst or task force plans appropriate strategies for gathering additional data required to describe the existing system. Complete information is needed about current technology jobs and performance requirements, business processes, procedures, workflows, and business and organizational factors. Answers to the following questions are needed:

1. *Who* performs each procedure within the system? Why is this person doing the activity? Should someone else be doing it?
2. *What* is being done? Exactly what procedures are followed? Why are they used? (Often, procedures are followed for years and no one knows why.) Is the procedure needed at all?
3. *Where* is the work done? Why is it done in this location? Could it be done better somewhere else?
4. *When* is the procedure done? Is it done at an appropriate time? What are the delays in getting work done? Is this the best time?
5. *How* is the procedure performed? Could it be done in a more efficient manner? Would additional training or technology enable the procedure to be done better, more cheaply, or more efficiently?

Responses to these questions offer opportunities for job and business process redesign. In describing the current system, analysts look for opportunities to streamline processes and apply technology Robert M. Curtice of Arthur D. Little, Inc. explains that principles of good redesign and the wise use of technology include:'

- Increasing the scope of individual jobs, and reducing the number of hand-offs required to complete tasks.
- Assigning tasks without regard to organizational boundaries.
- Moving control mechanisms to the beginning of the process, focusing on preventing rather than fixing problems.

- Eliminating bottlenecks, cross-checks, and nonvalue-added steps.
- Bringing information to work, not vice versa.
- Entering data once, at the source, and making it available on a shared basis when and where needed.
- Using systems so that those who make the rules don't have to be the ones to apply them.
- Effectively using global communications networks to short-circuit middle managers who buffer information flow.

Analysts use a variety of methods and techniques to gather information required for EUIS projects. Each system study is different, and analysts must select the most appropriate tools for the task at hand. It is important to know a variety of techniques and why and when to use them.

The techniques used to make an investigation more a science than a guessing game follow basic principles used in any scientific inquiry. Sources of data are described as either primary or secondary. *Primary data* reflects first-person accounts (eyewitnesses); secondary data are reports of those accounts. For example, a letter written by a president is a primary source document; an eyewitness report of an event is also a primary source document. When these documents are recorded by a reporter, however, the reporter's account becomes secondary data.

A primary source for data for most organizational studies is personal interviews. In addition, the analyst can choose from a variety of other research tools. Following is a discussion of various primary and secondary sources. These research techniques are offered as examples only; it is the analyst's job to determine which one(s) are appropriate in a given situation. In selecting a methodology, the analyst considers the scope of the problem, the potential impact on the organization, and the urgency of the problem. Data collected at this stage are used to document the current system and requirements for the new system.

15.4.3.1 Secondary Sources

Secondary data—data found in books, journals, files, and so on—may provide invaluable information about a specific problem. Any information that is not collected directly by the user is considered secondary.

The Internet is an excellent source of information on almost any topic, and the text companion Web site includes many useful references. Many Web sites, trade journals, and business magazines publish articles about technology solutions. Appendix 2 also contains a list of journals and magazines that may aid the analyst. For example, case studies or results of research projects in the *MIS Quarterly* or the *Information Technology, Learning and Performance Journal* can explain how a similar problem was solved in another organization or by someone else. Announcements and critiques of new products published in trade journals such as PC *World* or *InfoWorld* help identify new opportunities. Information exchange articles in publications such as *Knowledge Management Magazine, CIO* magazine, and others can provide the analyst with new ideas and contacts for learning how particular problems can be solved.

Large organizations often have technical libraries, which subscribe to various industry research services and may provide access to various online retrieval services. These

sources can provide useful information and save time when researching technology alternatives. For example, industry research services regularly perform evaluations of PC software products and publish detailed comparisons of features and performance.

15.4.3.2 Interviews

Interviews are face-to-face meetings between an information giver and an information gatherer. The interview is the primary research method used in most companies. Key to success in using the method is knowing what information is needed and why. Interviews are most beneficial when they are planned carefully. Analysts should consult various sources, such as the project sponsor, to determine who is in the best position to provide needed information. It is also good practice to ask each interviewee if there is someone else with whom the analyst should talk. Analysts should plan in advance precisely what information they expect to obtain when talking with each interviewee.

Interviews can be *open* or *structured. Open interviews,* which are exploratory in nature, are used when analysts require a small number of interviewees to explain processes, offer opinions, or forecast needs. When many individuals are interviewed about the same topic or when specific data are needed, structured interviews are recommended. ***Structured interviews*** make use of preestablished questions that guide the interviewer.

A structured *interview guide* helps ensure that everyone is asked the same questions. The interview guide standardizes data collection and makes responses easier to compile and compare. A guide also improves the reliability of the investigation because it ensures that all respondents are asked questions in the same order and the same words.

To develop a reliable and valid interview guide takes skill and practice. Figure 15-4 offers some tips for developing an interview guide. Figure 15-5a presents a hypothetical situation for which an analyst constructed an interview guide. The interview guide that the analyst developed for this situation is shown in Figure 15-5b. Take a few moments to look at this example. Before examining the analyst's interview guide, formulate five questions that you think would be appropriate for this situation. Then compare your response to the example shown.

In solving problems, analysts frequently need to gather information from both managerial and support personnel. While a well-constructed interview guide is important, the skill of the interviewer is also important in collecting data. Interviewing skills are perfected with practice. It is important for the interviewer to remain as objective as possible. The tone in which a question is asked, for example, can lead the interviewee to respond a particular way. Also, when more than one interviewer is collecting data using the same interview guide, special training may be needed to establish the procedure and tone to be used in the interview.

1. Know the kind of data that are needed.
2. When appropriate, ask for "yes" and "no" responses.
3. Word questions so that they are easily understood.
4. Attempt to keep the interview guide short.
5. Always be prepared for explanations of answers.
6. A final question should always be an "open" question. For example, "What other information regarding this subject would you like to share?"

Figure 15-4 Tips for developing an interview guide

a. Situation: Users are having trouble locating documents and using files on the customer database. Inconsistent file names and incomplete data ifies are common. Information required to answer customer inquiries is not available. In order to answer customer inquiries, users generally must research questions and call the customer back.
b. Possible interview guide for situation described in 15-5a:
   - Do you encounter any problems when looking for information needed to answer customer inquiries?
   - If yes, can you give me examples of problems you have encountered? If no, are you aware of any problems encountered by others?
   - Who is responsible for file updates? Why?
   - How many times a day do you retrieve a file?
   - Do you personally make changes in documents or files?
   - Are you satisfied with the current system?
   - Can you suggest ways that would make it easier to find information?
   - Is there anything else that you feel is important to addressing this issue?

Figure 15-5
a. A hypothetical situation requiring development of an interview guide
b. The analyst's interview guide for a knowledge management system

Promptly after each interview, analysts should prepare a written summary of their findings. It is a good idea to take notes during the interview, but avoid too much time writing and not enough listening. Take down just enough information during the interview to assure accurate recall of details. Interviewers should, as a matter of courtesy, explain that they would like to take some notes and get the interviewees' agreement. Because interviewers must ask questions, record answers, and pay attention to the content of answers simultaneously, it may be advantageous for more than one project team member to attend each interview. In this way, the task can be divided. This process can be streamlined by putting the interview guide on a PC and using a laptop during the interview to capture information directly into a database. With a little practice, interviewers can become adept at capturing notes while conducting the interview.

15.4.3.3 Telephone Interviews

Telephone interviews, though conducted by phone, are designed to collect the same kinds of information as an in-person interview. Typically, telephone interviews are conducted when the interviewer and interviewee are at distant locations. Telephone interviews are appropriate for quick questions or when a survey needs to be completed rapidly. A drawback is that interviewees usually do not elaborate on telephone inquiries to the same degree that they might if the interview were conducted in person. An advantage is that those who are reluctant to give you a half-hour, face-to-face interview may be willing to give you the time on the phone, if they can be caught at a convenient time.

15.4.3.4 Questionnaires

A written or printed *questionnaire* is used when information is needed from a large sample of people or when time and expense do not permit personal interviews. Questionnaires can be completed by respondents at their leisure. Unlike a personal interview or telephone call, respondents can place the questionnaire in a to-do stack, and it can be lost or viewed as unimportant, so response rates for questionnaires tend to be low.

Guidelines for Effective Questionnaire Development

The analyst can use the following suggestions to ensure that (1) the questionnaire is well designed, (2) respondents fill it out honestly, and (3) it is returned promptly.

1. Have a strong opening paragraph or a cover letter with the questionnaire that explains the purpose of the survey. If appropriate, explain how the respondent can learn of the results. If appropriate, have an executive-level office endorse the project and author the cover letter.
2. Keep it short! The shorter the questionnaire, the more likely it is to be completed and returned. Rather than place it in a to-do pile, the recipient of a one-page questionnaire may fill it in on the spot.
3. Make the questionnaire as easy to complete as possible. When appropriate, ask dichotomous (two-choice) questions (yes/no, male/female, etc.) and offer checklists. Example: Static electricity can be a problem at my workstation. Yes No
4. Word forced-choice questions so that they are easy to understand.
   Example:
   Which of the following projects should be started first?
   — An upgrade to the corporate e-mail system
   — Intranet Web site to connect field offices with the home office
   — An electronic indexing system for manual and desk files Knowledge management system for the customer service department
5. Use ranking questions when preferences are solicited. Example: On a scale of 1 to 4, rank the following electronic mail features for their potential value to your work (1= most potential; 4 least potential):
   — Mailing list development
   — Message filtering capabilities
   — Message filing system Spell checker
6. Intensity-scale questions and answers reflect the degree of positive or negative feeling. Example: Rate these proposals from 1 to 7 based on the following scale:
   1 = Something we absolutely should *not* do
   4 = Neutral
   7 = Absolutely necessary Install a voice message system 1 2 3 4 5 6 7
   Initiate a company-wide calendaring system 1 2 3 4 5 6 7
   Begin projects using desktop publishing 1 2 3 4 5 6 7
7. No matter how structured the questionnaire, it should end with an unstructured, open-ended question. Examples: What issues relative to improving the Help Desk has this survey failed to address? Do you have suggestions for ways in which computing could aid you in your job? What other services from the Help Desk would be helpful to you in performing your job?

Digital distribution and connection or surveys now otters a more effective alternative to paper-based questionnaires. Various survey software is available to create questionnaires and make them available over an Intranet, Extranet, or the Internet. Compilation of data can be automated and results immediately available for viewing and printing. Groupware, such as *Group Systems* by GroupSystems.com, allows administration of

surveys over a network, over the Internet, or distributed on diskette. Results are calculated by the system and immediately available.

15.4.3.5 Observation

Observation is perhaps the oldest method of problem solving. Assessment by observation may be as simple as sifting down with an electronic mail user and identifying instances in which features could aid the process. Observation could be as complex as designing a schedule in which the investigator completes numerous random observations of workers and their activities. In formal, complex observation efforts, analysts may use time or document logs, or work sampling techniques.

Time or Document Logs. Logs are recordings (loggings) of work activities. Depending upon the activity examined, the log may be classified as *time* or *document.* For example, time logs are used in determining how much time an executive spends using a personal computer during the day. Time logs also may be a listing of the number of times a day a worker makes a phone call. Document logs typically are used to determine the number and type of documents a worker processes during a given period.

An analyst uses *work sampling* techniques in examining current system outputs with an eye to determining how they might be improved. For example, a review of the organization's house organs (newsletters) might result in a recommendation for a more powerful desktop publishing system. In an engineering consulting corporation, a review of contract proposals might result in a recommendation for new printers or new type fonts. Work sampling can be as easy as examining two newsletters or as involved as examining 20 proposals.

15.4.3.6 Summary of In formation-Gathering Techniques

Analysts choose one or more techniques appropriate to the problem/opportunity being investigated. Knowing the kinds of information needed to make informed choices guides the task force in selecting appropriate methodology. Figure 15-6 charts the advantages and disadvantages of six primary data collection instruments.

15.4.4 Developing Models of the Current System

AU collected information is then analyzed and used to develop a series of models that describe the current systems. Analysts have a variety of tools and techniques available. Many standard IS tools such as flowcharts, data flow diagrams, structure charts, and entity relationship diagrams also can be useful to document EUIS systems. Tools selected depend on the scope of the project.

Analysts will find that many of the processes and procedures in the desktop environment are much less structured than those for which traditional transaction processing systems have been developed. This is an especially challenging aspect of the job. It may be tempting to overlook or only casually document the many exceptions to standard procedures. This omission, however, can seriously affect user acceptance of new systems. These informal procedures can constitute a considerable proportion of the department work. The current system may handle 80 percent of the volume as routine, standard cases. However, the remaining 20 percent of the volume may require the

majority of the time and attention of department personnel. Informal procedures tend to represent the work- arounds that people have devised to handle all the

Technique	When to Use It	Advantages	Disadvantages	Results
Flowchart	Process of doing work is taking too long or appears to be ineffective.	Provides graphic description of work,	May also need to interview key people to chart a process.	identification of work delays, unnecessary storage, and transportation.
interview Guide	Scope of problem is small. Opinions of key personnel are vital,	Requires top-level involvement. Quantitative results.	Time consuming. Skilled interviewers required. In-terviewees not always available.	Identification of organization's needs. Applications. Areas need-ing more study.
Questionnaires	Scope of problem is large.	Less time consuming than interviews. Skilled interviewers not required. Quantitative results.	Paper intensive. Analysis is diffi-cult. Limited ac-curacy. Writing good questions is difficult. Words are inexact.	Identification of department needs. Applications.
Observation Guide	Scope of problem limited to a given department or location,	Skilled interviewers not required. Quantitative re-suits. Only way to collect some in-formation.	Time consuming. Requires careful planning. Mea-sures only overt acts.	identification of individual and de-partment needs. Applications.
Time or Document Log	Quantitative measures of work activities are required.	Skilled interviewers not required. Quantitative results,	Time consuming, disruptive, inac-curate. Follow-up interview often required.	Identification of quantity or type of work performed. Applications.
Work Sampling	Problem is identifiable as quality of output.	Skilled interviewers not required.	Subjective results. Time consuming.	Identification of department or unit needs. Applications.
Secondary sources	Interested in new technologies or new approaches to using technology,	Online sources are available and up to date.	May be time consuming.	Identification of new opportunities to use technology.

Figure 15-6
Advantages and disadvantages of seven techniques for gathering information

However, the remaining 20 percent of the volume may require the majority of the time and attention of department personnel. Informal procedures tend to represent the work-arounds that people have devised to handle all the situations that aren't accommodated well by the current system. If analysts assume that the current system is truly representative of processing needs, the new system may carry forward many of the shortcomings of the old.

Analysts may need to analyze information flows, communication patterns, error patterns, problem logs, and other representative information in addition to work flows to get an accurate picture of the entire current system. They need to assess problems with me current system and identify what needs to be changed and why. Following is a discussion of tools that may be useful to describe systems. Note that these are the same tools that will be used later in the design stage of an EUIS project.

15.4.4.1 Representing In formation about Systems

A variety of tools are available for documenting current operations, system specifications, and user needs. These tools provide systematic or structured methods for collecting and representing information about systems and operations. Data collection and analysis are time consuming and must be completed carefully. Analysts must avoid any temptation to rush the process or assume that they understand user needs. Both the ultimate business results and user acceptance depend to a large extent on how well everyone on the project team understands the business needs and how these needs can be met.

15.4.4.2 Equipment and Human Resources Inventory

A vital step in any comprehensive analysis is inventorying the organization's current technology and human resources. In large organizations, listing resources may not be an easy task. One department may have all IBM products; another may be using Gateway products; others maybe using a collection of several vendors' products. An accurate inventory of current technologies is important to making future decisions, particularly where equipment compatibility and user preferences must be considered. The inventory list can be referred to in future phases of the study.

Large IS departments already may have this information and may have established long-range architecture strategies. If this is the case, EUIS analysts must see that proposed solutions fit with the corporate architecture. If the solution is outside the corporate IS architecture, the analyst must work with the appropriate IS personnel to justify the use of a new technology.

Human resources inventories are lists of job responsibilities and skills of employees who will be affected by the new system. It also is recommended that a list be kept of those individuals with technical skills because they will be invaluable when it comes to designing and implementing the new system.

15.4..4.3 Flowcharts

A flowchart is a graphic description of work activities. The flow of a work process is represented in sequence from the point of input through processing to final output. Flowcharts can be used to document work flow, system flow, document flows, or business process flows. While the technology and human resources inventories describe tangibles, the flowchart describes the process. The flowchart typically takes a standard form, using specific symbols that describe the activity being examined. Standard templates are available that conform to standards developed by the International Standards Organization (ISO).

To speed the flowcharting process, computer programs or preprinted forms may be used to describe work activities. Flowcharts sketch out how work is accomplished currently. With such a picture, the analyst can determine if work is being accomplished in the most efficient way. Figure 15-7 depicts a flowcharting template, and Figure 15-8 is an example of work that has been flowcharted with ISO symbols.

Other means of describing business processes also may be used. For example, narrative descriptions are sometimes used instead of symbols. Steps in the business process are

described in narrative words or text that identify who, when, where, why, and how an activity is being performed.

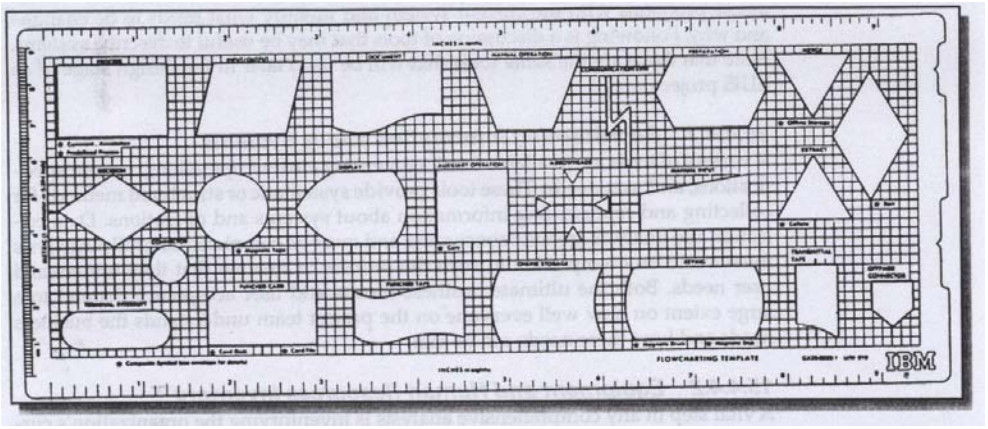


Figure 15.7 An IBM flowcharting template based on ISO standards
Source: Reprinted by permission by International Business Machines Corporation.

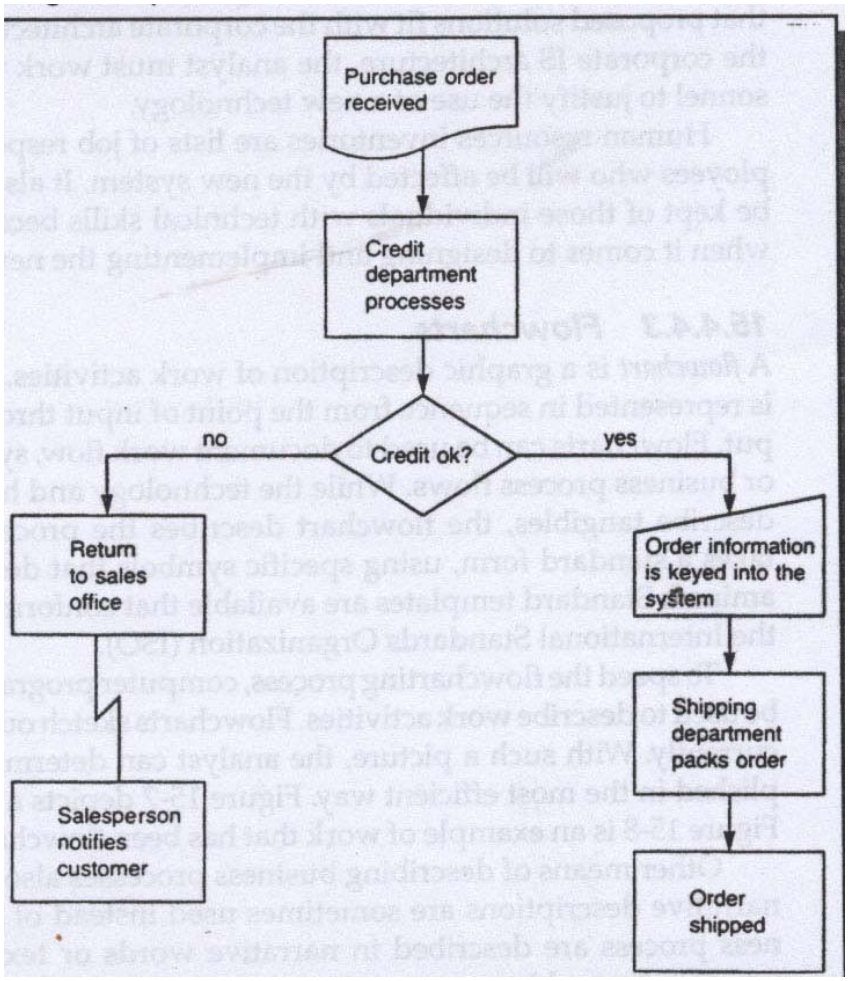


Figure 15.8 An example of business process that has been flowcharted using ISO symbols

15.4.4.4 Data Flow Diagrams (DFDs)

Data flow diagrams (DFDs) are network representations of existing or proposed systems. They form the cornerstone for structured systems analysis and design methodologies. The diagrams use four symbols to represent any system at any level of detail. The four entities, as illustrated in Figure 15-9, that must be represented are:

- **Data stores.** Depicted by an open-ended rectangle, data stores represent repositories for data that are not moving. For example, a data store may represent data in a file cabinet, computer file, database, desk drawer, reference book, or other locations.
- **Processes**. Processes, depicted by rectangles with rounded corners, represent transformations of incoming data flow(s) to outgoing data flow(s).
- **External entities**. Depicted as rectangles, external entities are sources or destinations outside the specified system boundary.
- **Data flows**. Data flows represent movement of data in the system. Arrows are used to represent the direction of flow and can connect external entities to processes, processes to processes, or processes to data stores.

DFDs represent systems graphically. They provide a means to describe, understand, and discuss the boundary of a system and its inputs, outputs, processes, and subprocesses. DFDS provide a logical representation, simply showing what a system does, rather than a physical description of how it is done. They are analogous to road maps, showing all possible paths. They do not show specific starting or stopping points, decision points, or timing of events. Processes are described at several levels of detail, beginning with a broad overview and progressing to more specific levels. Each level of detail is represented in a separate diagram, numbered

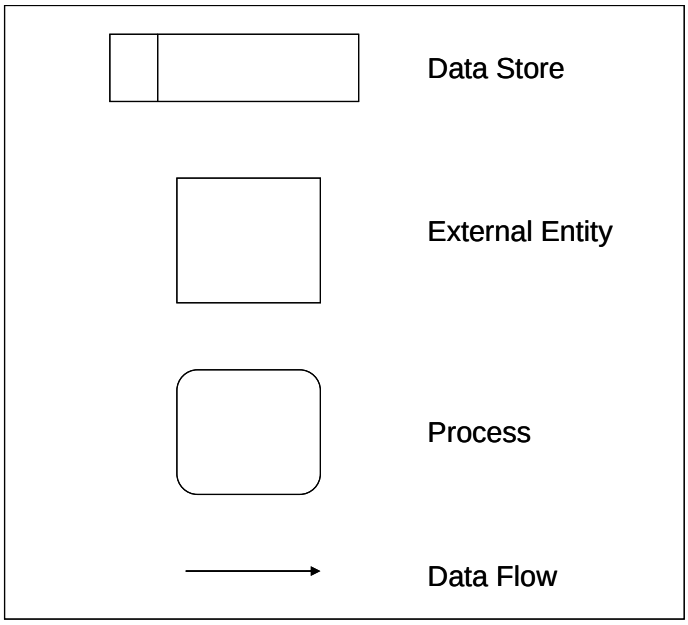


Figure 15-9 Data flow diagram (DFD) symbols

starting with zero. The definition of the highest (broadest) level of the system is called the *context-level diagram.* It represents the business view of the system that shows the

system at the center with external entities providing data to and receiving data from the system.

The context level diagram is extremely useful for identifying the scope of a project. It contains, by definition, only one process. The concept is simple: Identify the output that is required and then the data needed to produce the output. In other words, by identifying both inputs and outputs, the context diagram helps analysts understand who is affected by the current system (key players or stake-holders) and how broad its impact is. Figures 15-10 and 15-11 depict a context-level diagram of a student registration system and an initial attempt at a level zero data flow diagram.

To develop the skill that is necessary to use this technique typically requires formal training and practice. Anyone familiar with the systems development life cycle methodology has a much more sophisticated understanding of these tools than can be addressed in this text. Keep in mind that the value of data flow diagrams is (1) to help determine the scope of a project, and (2) to describe graphically a working or proposed system.

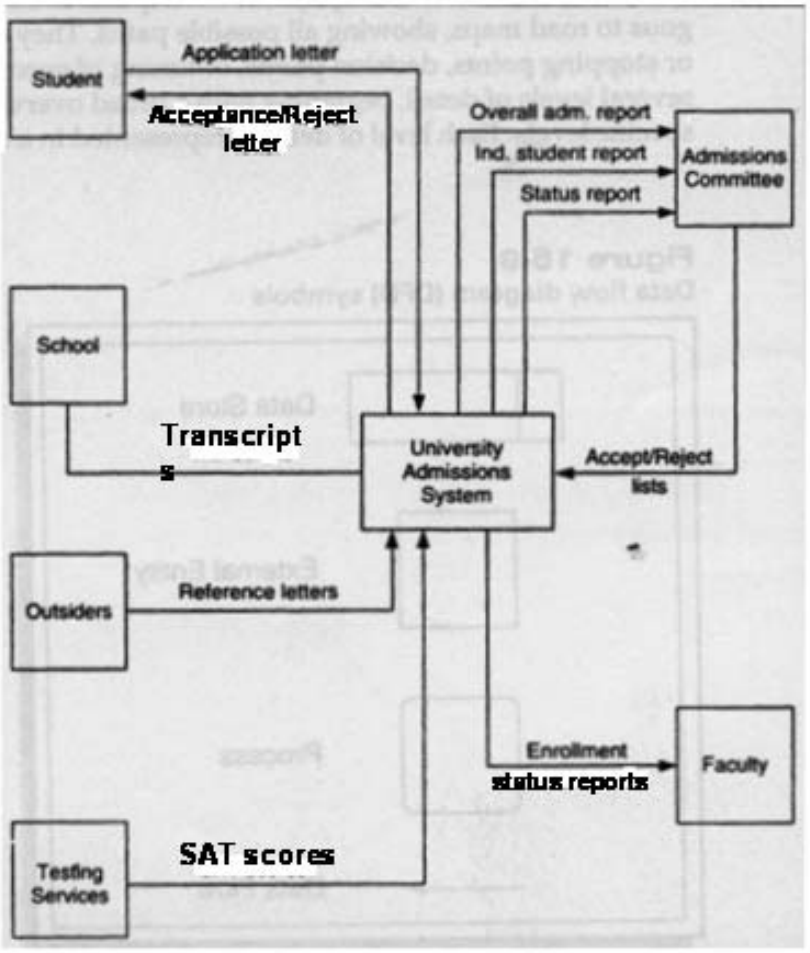


Figure 15-10 Context-level diagram of a university admissions system
Source: Courtesy of Dr. Roger Deveau, University of Massachusetts, Dartmouth

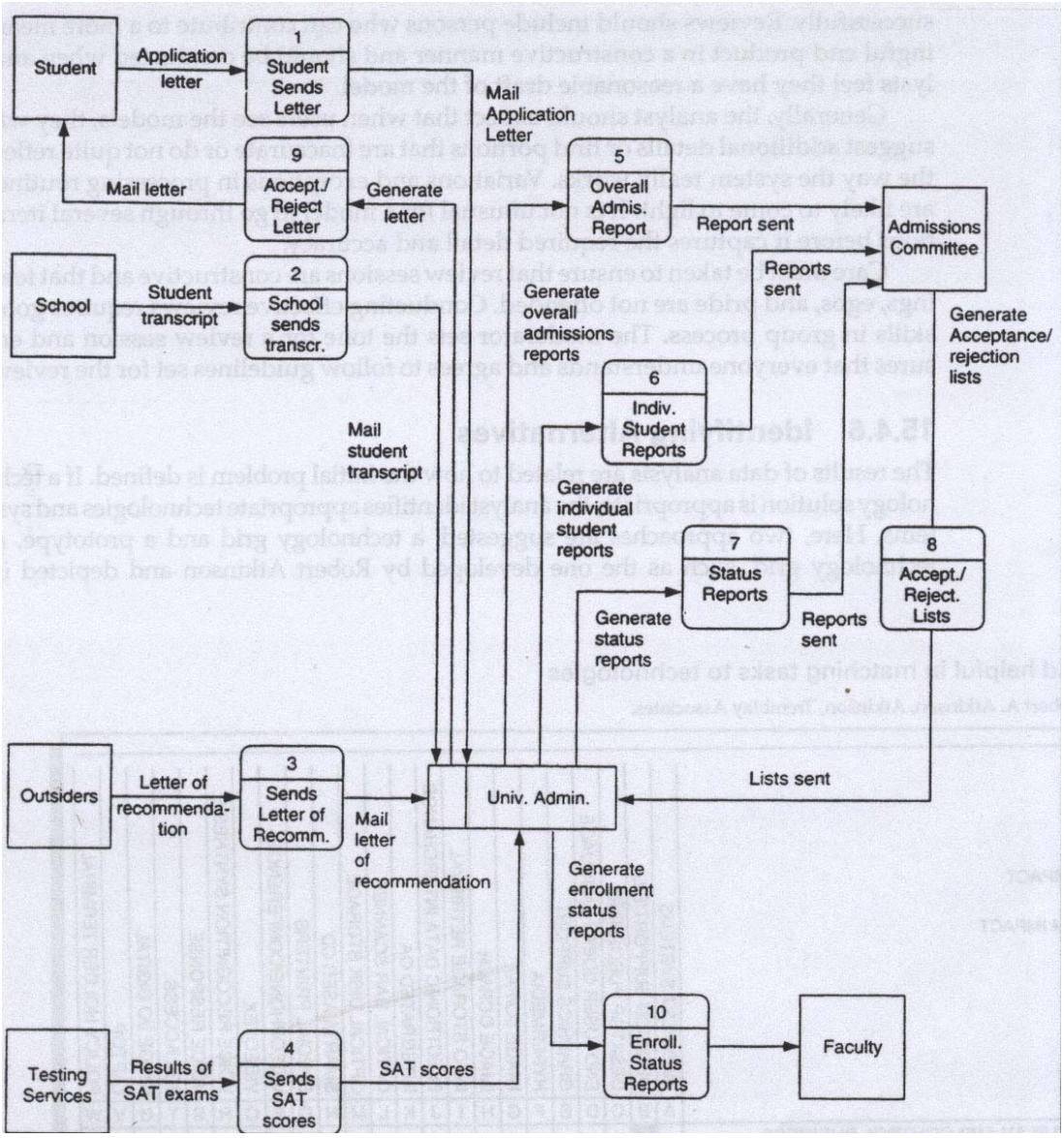


Figure 15-11 Level zero data flow diagram of university admissions system
Source: Courtesy of Dr. Roger Deveau, University of Massachusetts, Dartmouth

15.4.5 Reviewing Findings with Users

As models are developed, analysts review them with the users to verify that they are accurate. Reviews may be informal meetings between an analyst and user or may be formal meeting sessions with a group of users. Roles in formal review sessions include a moderator, recorder, presenter, and reviewers. A formal review is sometimes called a *walkthrough*, defined as a systematic, facilitated process for reviewing proposed models or system specifications to verify accuracy and obtain constructive feedback. A review ensures that the models accurately represent reality and capture all the necessary detail to design and implement the project successfully. Reviews should include persons who can contribute to a more meaningful end product in a constructive manner and should be conducted when analysts feel they have a reasonable draft of the model.

Generally, the analyst should expect that when users see the models, they will suggest additional details or find portions that are inaccurate or do not quite reflect the way the system really works. Variations and exceptions in processing routines are likely to come to light. It is not unusual for a model to go through several iterations before it captures the required detail and accuracy.

Care must be taken to ensure that review sessions are constructive and that feelings, egos, and pride are not offended. Conducting effective reviews requires good skills in group process. The moderator sets the tone for a review session and ensures that everyone understands and agrees to follow guidelines set for the review.

15.4.6 Identifying Alternatives

The results of data analysis are related to how the initial problem is defined. If a technology solution is appropriate, the analyst identifies appropriate technologies and systems. Here, two approaches are suggested: a technology grid and a prototype. A technology grid, such as the one developed by Robert Atkinson and depicted in

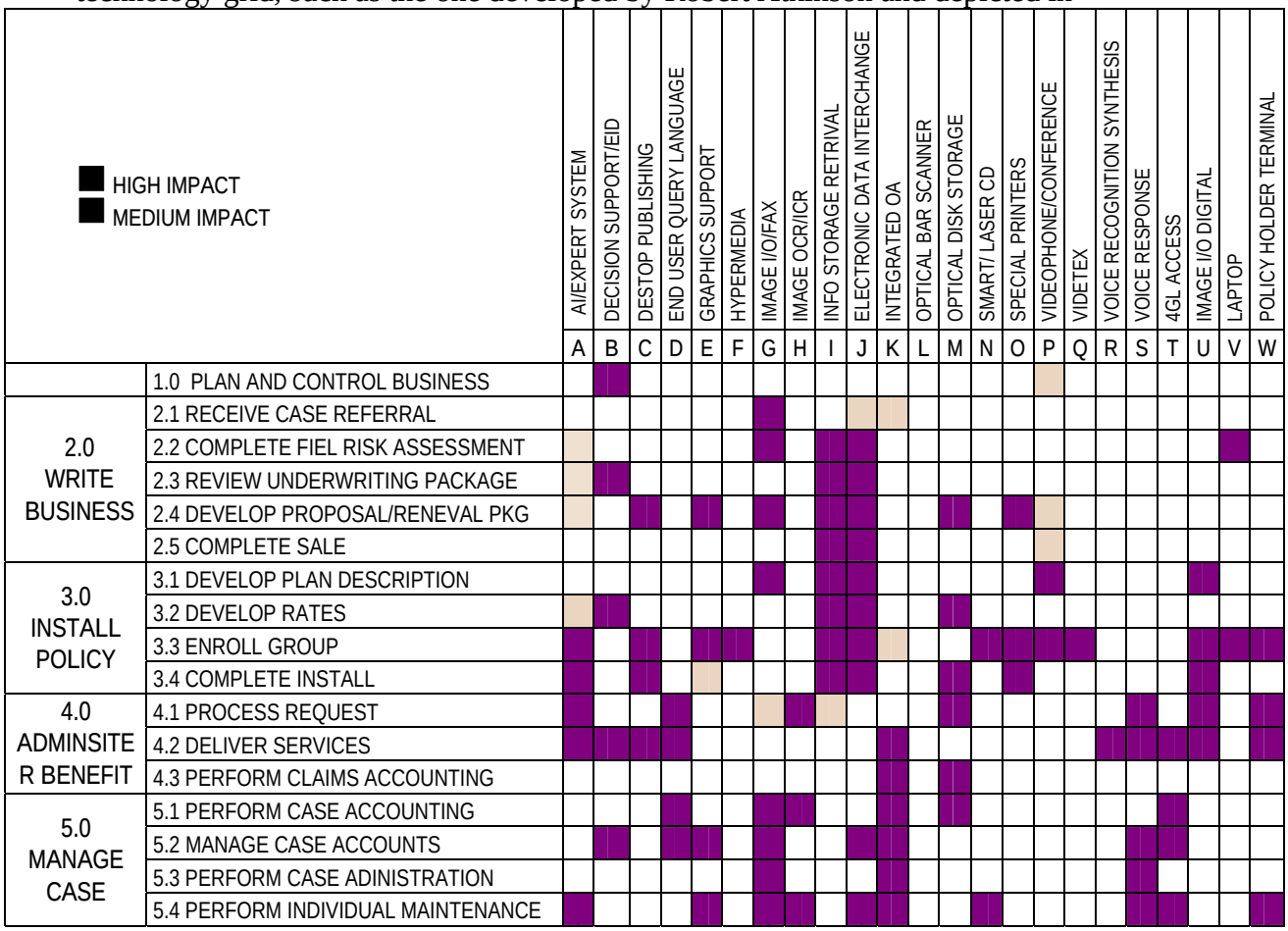


Figure 15-12 A technology grid helpful in matching tasks to technologies
Source: Courtesy of Robert A. Atkinson, Atkinson, Tremblay Associates

Figure 15-12, may be helpful in identifying alternative technology solutions to the problem.[2] Note that steps of a business process are written down the x axis. Technologies that may be effective in accomplishing the task are along they axis. Technologies

that could have a high or medium impact on work are indicated. Simple scanning of Figure 15-12 indicates those technologies that would offer the best payback.

Another useful tool for evaluating alternative solutions is *prototyping*. A prototype is a quick model that serves to verify understanding. It serves primarily to show users how a system will look and feel. A prototype quickly can assess whether the system the project team has in mind matches the users' expectations and needs.

As analysts attempt to match department and individual needs with technologies, they are continually reading, asking questions, listening, and trying to determine if the technology that is already in-house is good enough, or if something else is needed. If the solution requires an investment in new technology or is costly, compromises may need to be made. Other decisions are related to overall systems procurement—size (scope), capacity; and cost. Questions to consider in-dude: Can the solution be installed in an acceptable time frame? Is it compatible with existing architecture? Are alternatives practical and reasonable? Is the required technology available? Is the expertise available to install, operate, and maintain the technology?

After identifying feasible alternatives, analysts begin to take a closer look to determine which solution is most workable and cost effective. The reader should keep in mind that those solutions that affect profitability—product development or delivery systems—or can be linked to organizational goals are the easiest to justify. The best solution is selected based on the established objectives and priorities. The selected solution is detailed in the project proposal along with an explanation of other alternatives considered and why they were rejected.

15.4.7 Determining Requirements for a New System

Once confident that the current system is understood, analysts begin to define the requirements for a new system. Analysts must assess factors such as requirements to interface with other systems, fit with the corporate architecture, and capacity requirements. Must a department database, for example, handle 200 client records, 2,000, or 2 million? How fast will it grow? How many new clients are likely to be added each year? How many people need to access the information and how often? Are they all in the same office area, department, building? All these details, or requirements, need to be documented as part of this step.

15.4.8 Redefining Project Scope

After business requirements have been modeled and verified with users, it may be necessary to redefine the project scope. The analyst should document and explain any variances from the original project scope and estimate the impact on project costs. This information should be presented to the project sponsor for approval. Analysts should never take for granted that additions or deletions can be made in the project scope because the analysis reveals that it is the logical thing to do or users ask for or support the changes. Remember that the project sponsor is responsible for funding the project and for the end result.

The boundaries of EUIS projects may remain fuzzy throughout the planning stages because of the nature of white-collar work. It is important to keep redefining the boundaries, however, to be sure that the work stays on focus and the project stays on schedule and within budget.

15.4.9 Preparing the Project Proposal

The *project proposal* documents the operational, financial, and technical feasibility of a proposed EIJIS project. It describes alternatives considered and explains why the recommended solution was selected. The project proposal indicates the benefits to be derived from application of the technology to the identified needs/oportunities. (See chapter 9 for details on cost-benefit analysis.) The project proposal includes any data necessary for management to make an informed choice. An approved project proposal is, in essence, a contract between the design team and project sponsor. For this reason, details, including the proposed solution, estimated time frames, estimated cost figures, and an overall project plan, should be included. While the project proposal is usually not highly technical, it needs to provide adequate data to enable the decision maker to make one of three choices:

1. *Approve the project.* Approval means that decision makers understand and agreed with the proposed solution. In such a case, the analyst goes to the next step of development.
2. *Mandate further investigation.* Further investigation mean~ that decision makers have questions that need to be addressed.
3. *Terminate the project.* Termination means that the proposed technology solution was not accepted. Projects may be terminated for many reasons. Sometimes projects are terminated because of environmental conditions that the analyst has no control over—cash flow, union activities, and the like. Sometimes the costs far exceed the sponsor's expectations, regardless of whether they are justified by the benefits.

An appropriate format for a project proposal is outlined in Figure 15-13. Note that the management summary provides an overview of the business objectives and proposed solution, the assumptions and constraints, a cost estimate and justification, and schedule. The detailed recommendation describes the business and operational problem or objectives, the project solution, implementation plan, and other alternatives considered.

15.5 STEP FOUR: DESCRIBING THE SOLUTION IN DETAIL

Purpose: Develop detailed specifications for the proposed project solution.
Deliverables:

- Specifications for proposed system, including hardware, system software, application software, networking, and any custom programming required.
- Request for proposal (if required).
- Documentation of proposed new business process design.
- Specifications for all major user solutions.
- Documentation of all tasks to be streamlined, eliminated, and combined with automation.

Management Summary (approximately 3 pages)

- **Project Scope and Solution**
  Describe the business or operational problems/objectives. Provide an overview of the solution clearly identifying business changes.
- **Assumptions/Constraints**

Itemize all assumptions that, if not valid, might significantly alter the solution or make it completely infeasible. Identify constraints that force specific design directions.

- **Estimates/Justification**
  Summarize the major costs associated with developing and implementing the proposed solution, as well as the costs of ongoing production and support. Explain the benefits of the proposed solution.
- **Schedule**
  List the major deliverables with significant dates including critical decision points.

Detailed Recommendation (approximately 10 pages)

- **Project Description**
  Describe the business or operational problems/objectives. This background is intended to be helpful in establishing baseline quantification of the project.
- **Project Solution**
  Capabilities/benefits provided. Describe what will be provided in terms of business or operational capabilities and benefits. Business capabilities might include providing new customer services, establishing new products, and improving competitive monitoring. Operational capabilities might include streamlined work flow, faster response time, and reduced errors. Benefits may be computer in dollar or value-added terms and might include better service and improved marketability.
  Functionality. Detail the various processing functions as well as calculations and reports. *Information needs.* Include high-level models, including context diagram and data flow diagrams for the proposed project.
  Security impacts. Describe security requirements, highlighting additional /nonstandard capabilities.
  Training. Identify the training required by business and systems personnel to complete the development project. Estimate the number of users who will require training and identify what training will be required to ensure a smooth migration to the new system.
  Operational impact. Describe new or changed client work flows, business processes, and jobs.
  Technical requirements. Describe required hardware platforms and interdependencies with existing systems. Identify any special requirements for the project.
  Cost estimates for development, production, and maintenance. Describe all development costs for the detailed analysis through the implementation. Costs may include staff time (work month estimates for business and systems personnel), machine development costs (if mainframe), print, hardware, software, and training. Contrast these costs with the risks and costs of not implementing the solution.
- **Implementation**
  Client involvement. Identify who, what, where, when, and how much of client resources are needed. Detail schedule. Identify who, what, when, and how much time to allow for each task. Include coordination required with other systems. If the project is to be phased, estimate the timing of future phases and explain why phasing was recommended. Impact on other projects/systems. Provide any information concerning dependencies between this project and others. Be sure to consider issues related to the phase-out of the old system.
  Conversion/bridging requirements. Indicate detailed conversion requirements. This should cover the system and manual conversions required, the impact on resources, and timing.
  Other Alternatives Considered (approximately 3 pages)
- **Description of alternatives.**
  Describe the nonrecommended alternatives considered. Reasons for rejection. For each alternative mentioned, identify the reasons for rejection. Reasons might include costs, lack of significant benefits, or maintenance difficulty

Figure 15-13 Project proposal format

- New job descriptions.
- Inventory of skills, knowledge, and information to be trained.
- Documentation of instructional strategies for training all user audiences.
- Documentation of change management strategies for systems implementation.

- Specifications for help, reference, or other performance support aids required to support the system.

There is always a tendency for people to resist systems, but, other things being equal, they are less likely to resist ones that are well designed.[3]Assuming that the project proposal is accepted by decision makers, the next step involves developing detailed specifications for the proposed solution. The goal at this point is to describe precisely what the system should be able to do and to provide all the details needed to configure and implement it. A system's specification details the logical and physical design for the proposed system. Whereas the objective of analysis is to "take things apart," the objective of design is to "put the pieces together into a workable solution."

15.5.1 Documenting (Designing) the Proposed Solution

The analysis of the current system and the identification of alternative solutions are the basis for describing the *proposed solution.* Using the same tools used in the initial investigation, analysts develop a model of the proposed system: flowcharts, narratives, data flow diagrams, and the like. In documenting the new system, analysts are proposing a combination of people and technology to meet the defined business requirements.

Analysts must be aware of constraints that may limit design alternatives. Resource constraints include factors such as budget, available resources, and time. Other constraints include established architectures, compatibility with installed hardware and software, make or buy policies, acceptable hardware and software vendors, and enterprise standards.

Analysts also must be aware that design is an iterative process. Design specifications are developed at different levels of detail. Ideally, they are developed from the top down. In reality, designers may have to work from the bottom up or from the middle out. The first draft of a design may have to be revised several times. Design reviews with users will result in additions, deletions, and changes. The design is finished when it is approved by the project sponsor.

Detailed specifications also should describe how the new system will increase the scope of individual jobs; eliminate bottleneck~ redesign business processes; allow simultaneous, distributed access; or implement other business objectives. A more complete list of these considerations was discussed earlier in this chapter. The goal is to show how the proposed solution improves upon the current system as well as the specific requirements of the solution. This description provides the basis for construction of the system or for preparing a request for proposal (RFP) if all or part of the solution will be purchased from a vendor.

15.5.2 Internal EUIS Development

If a portion of the system is to be developed internally, the systems specifications are given to the appropriate development group in the organization. EUIS projects generally make or use on-me-shelf and hardware. However, EUIS development typically is used for projects such as the following.

- Development of Intranet Web sites.
- Development of knowledge management, reference, and help systems.
- Modification or custom development of specialized pieces such as menus.
- Development of end-user solutions with graphical user interface (GUI) tool sets.
- Development of user solutions such as spreadsheets or PC databases.
- Development of image and work flow solutions.
- Development of decision support systems.

The project leader is responsible for ensuring that the systems developers understand systems requirements. However, when outside vendors are used to develop and deliver the system, the analyst must be able to evaluate and compare the solutions that are proposed.

15.5.3 Preparing a Request for Proposal (RFP)

To shop for appropriate hardware and software solutions, analysts generally invite vendors to propose their solution for a problem. A *request for proposal* (REP) may be sought for a complete solution or only specific parts. All relevant systems specifications are detailed in the RFP, as follows.

1. An REP calls for vendors to address the identified needs with specific products and their costs.
2. An REP provides an efficient way to send the same set of questions to multiple vendors and to analyze their replies in a consistent manner.
3. An REP also can be used to help hold vendors to their answers by attaching their REP responses to the contract when it is signed.
4. An REP may be used when seeking vendors to outsource training documentation, development of online training, or other training and support services.

RFPs typically include the following.

- A description of the organization and objectives of the system(s) to be developed.
- Criteria for responses, including the conditions under which the procurement will be made, such as a firm fixed price or a cost plus incentive. Timetables for responses, as well as anticipated decision dates and target implementation dates, also are included.
- Descriptions of the solutions to be developed, including (if appropriate) data from the needs analysis stage. Descriptions also should include required functions and features, conversion requirements, and budgetary allotments.
- Request for description of the group or vendor's ability to respond, such as number of people available to work on the project, its financial viability, and (of course) price proposals.
- Identification of the process that will be used to evaluate the system once it is in operation.

15.5.4 Evaluating Vendor Responses to a Request for Proposal

An overgeneralization is that there are three kinds of vendors:

- *Aggressive—takes* part in the design and development process.
- *Passive—takes* the order, delivers, and presents an invoice.

- *Monopolistic—is* the sole provider of the service.

Large enterprises typically have procedures to follow in identifying vendors in any given procurement effort. Increasingly, end-user computing is a multi-vendor environment. Prices for services of these three types of vendors vary markedly. Enterprises that are not required by law or policy to put out RFPs often have agreements with specific vendors that result in lower prices (quantity discounts) or better service (service agreements). In such cases, evaluation of responses may be limited to determining that the vendor understands systems objectives and is prepared and able to develop the system. In other cases, comparisons need to be made.

Vendor selection is more than establishing that a specific vendor has a solution to the identified need at the lowest cost. To facilitate the vendor selection process, criteria should be listed, including functionality~ service support, financial strength, contract terms and conditions, product reliability, maintainability availability, research and development activities, and adherence to industry standards.

Figures 15-14 and 15-15 are forms that organizations use to evaluate vendors' responses to RFPs. These forms are used by the project team to evaluate the RFP responses. The forms are useful in selecting vendors because ratings can be quantified and compared. Weightings and grading scheme are established to score the vendor response to each question on the RFP, and a minimum score is identified for continued consideration. It is helpful to identify the "must haves" before the vendor replies are reviewed to speed the selection process.

Evaluation of the selected vendor's responses may take the form of pilot installations or benchmark testing. A *pilot installation* is a test application of the product in a given location. In this case, users confirm that the product is either acceptable or unacceptable. As an alternative, or in addition to a pilot installation, users may be asked to evaluate hands-on operation of various products. In such a case, users play an important role in product selection.

A benchmark test involves comparing prespecified performance with actual performance. It may be done by bringing in two or more alternative products and comparing features and performance. Benchmark testing usually is done under conditions as similar as possible to the final production environment.

Ascertaining that proposed hardware or software solutions address identified needs is the first step. Once that determination is made, comparison of vendor products should not be on a lowest-cost basis alone. Other considerations are ease of use, compatibility with chosen hardware, vendor training options and support, clarity of manuals, cost of licensing, and the personal preferences of users. The single most important criterion is fit with business tasks. How closely does the software support doing tasks the way the business operates or the business processes and job performance specifications call for them to be done?

VENDOR SELECTION RATING FORM
Vendor _____
Name of Evaluator —Signature of Evaluator _____
Date of Evaluation_____
Please rate each vendor on the following criteria. The overall rating for each criterion should be between 5 (highest) and 1 (lowest). Brief comments also would be useful.

RATING

1. Proposer's understanding of the scope and magnitude of the work to be accomplished, as evidenced by the proposal. _____
   Comments:
2. Qualifications and experience of the Proposer's assigned personnel. _____
   Comments:
3. Proposer's ability to provide the service and system features required. _____
   Comments:
4. Quality of hardware/software configuration. _____
   Comments:
5. Flexibility and longevity of proposed system. _____
   Comments:
6. Ability of the Proposer to initiate and complete the project within the time frame specified in this RFP. _____
   Comments:
7. Prior experience of the Proposer in providing systems of similar scope and complexity____
   Comments:
8. Quality of technical support. _____
   Comments:
9. Quality of training and maintenance programs. _____
   Comments:
10. Total cost of the Proposed contract. _____
    Comments:
11. Compliance with other terms, conditions , and provisions of the RFP. _____
    Comments:

Overall Comments:

Figure 15-14 A form for evaluating a vendor's response to an RFP

15.6 STEP FIVE: SELECTING OR DEVELOPING THE SOLUTION

Purpose: *Bring a working version of the system to a usable stage. Write and test all customized software, applications, procedures, documentation, and training materials.*

VENDOR COMPARISON FORM
RANK THE THREE VENDORS 1 TO 3 ON EACH CRITERIA; TIE SCORES ARE ALLOWED

	VENDOR A	VENDOR B	VENDOR C
Ease of operation	1	2	1
Compatibility with corp. architecture	1	1	1
Fit with business tasks	1	1	1
Special needs*	1	2	3
Technical requirements	1	1	1
Vendor support (reputation)	3	2	1
Experience with proposed system	1	3	2
Growth/adaptability	1	1	1
Cost (Rental)** (monthly)	($2,393)	($2,637)	($2,131)
	2	3	1
Total	12	16	12

* Special needs include high-quality print, proportional spacing, super and subscripts, and special characters

**This is the rental price on the basic system with compared optional features. The final rental figure may vary somewhat depending on the final configuration of optional equipment selected

Figure 15-15 A vendor comparison form. Nine key factors for comparing and selecting vendors.

Deliverables:
- Fully configured and tested model of system.
- Physical site plans.
- Conversion plan.
- Fully tested documentation, procedure manuals, training materials, and job aids.
- Test cases, procedures, and training databases.
- Quality control measures and monitoring procedures.
- Change management strategies.
- Evaluation criteria for assessing extent to which business objectives are achieved.
- Detailed implementation plan.

Assuming that the decision is made to begin development, the next step is to Se-led or design the new system. This step entails analyzing outcomes of the assessment stage and applying work requirements to available technologies. Keeping in mind the problem to be solved, the goal is to determine the best way to design the new *system.*
The best way to design a system is based on the scope and strategic importance of the project. If the system is to be designed externally, the proposal should outline the development strategy. If the development is to be done internally, several options may be considered. The IS or EUIS department may build a new system from scratch, following the traditional systems development life cycle (SDLC) methodology. Alternatively, they might use a prototyping methodology. Users may develop their own systems with guidance from the EUIS department. Another option would be to purchase

an on-the-shell system and modify **it** to meet the goals identified in the assessment stage. The solution also may be some combination of these approaches. No one best way to develop a system exists; decisions are based on the scope of the project, available resources, costs, the technology to be implemented, and strategic importance to the firm.

15.6.1 Selecting Application Software

Selecting application software may be as simple as confirming that a user's request for a spreadsheet package is justified and securing a copy of the corporate standard package, or it may require a complex process of matching specific requirements to unknown alternatives in the marketplace.

Once identified, the information about alternatives must be reviewed, evaluated, and validated. Criteria for selecting among the alternatives include the following.

- Does the package do what the user needs? Are the specified tasks and business processes supported? If not, how will they be handled? Is the package designed to support only individual tasks or does it support work groups or facilitate work flow?
- Is the package compatible with existing or planned hardware, system software, and networks? How easy or difficult is it to install?
- Is the package easy to learn? How long will it take for a new user to get started? To develop proficiency? Are training or training materials available? Is the documentation effective?
- How flexible is the package? Can the software be modified or customized? Does it have potential to meet future needs? Does it provide for alternative ways of doing tasks or is it highly structured?
- How well does the software package perform? Does it meet requirements for throughput, response times, storage, and network traffic?
- How much does the package cost per user? Per network? Is a site license available? Can volume discounts be negotiated?
- How reliable is the vendor? Does your enterprise have experience with this vendor? Are they responsive? Do they have a good track record?
- What support is available from the vendor? Is a technical hotline available? Can they meet special requirements and make modifications if necessary? Is training available for users and technical support personnel?

Many factors must be considered when selecting application software. Analysts must be especially careful to verify vendor claims about what a package will or will not do. It is important to consider not only what the package will do but how it does it. Marketing brochures are long on wind and short on substance, and they should not be relied upon exclusively to measure what a product will do. Often, publicized features may fall far short of meeting expectations. Analysts should test software using actual examples of work that is processed in the business unit. It is highly recommended that users have an opportunity to test real work prior to making a final software selection.

15.6.2 Selecting Hardware, System Software, Networks

The specifications developed during Step 5 provide the basis for selecting hardware, system software, and networks. If an RFP was solicited from vendors, the responses will provide detailed information about alternatives under consideration.

Even if no acquisition is necessary, an estimate is needed of the additional demand on existing facilities. Are memory and hard disk capacities adequate to handle new software and solutions? Will new software be compatible with existing solutions? How will they be integrated? Who will add them to the menu? A host of issues needs to be addressed.
Application requirements should drive the selection of hardware, system software, and networks. In reality, however, when existing systems are already in place, it is usually unrealistic to consider total replacement unless the systems are out of date. Therefore, EUIS analysts often find selection of new hardware, system software, or networks constrained by the need to use or interface with existing systems.
EUIS analysts may need to have specifications reviewed by appropriate groups such as computer operations, technical support groups, and others with special technical skills. Selecting hardware, system software, and networks is a complex process of identifying all the requirements, assessing existing capabilities and constraints, evaluating alternatives, and choosing the best solution.

15.6.3 Securing Needed Contracts

Contracts are used to document the obligations and responsibilities of two or more parties. Contracts for software may take the form of purchase agreements, leases, license and maintenance agreements, service and consulting agreements, and evaluation and nondisclosure agreements. Large enterprises generally have special staff who negotiate vendor contracts, and analysts would be expected to work with them. In small firms, however, analysts may be responsible for negotiating the contract. In that case, analysts may want to have contracts reviewed by a legal advisor prior to signing.
The up-front financial consideration for a product is only part of the cost, and not necessarily the vendor's greatest source of profit. Maintenance and training fees easily can exceed initial cost over a four- or five-year period. Even after an evaluation, things can go wrong with software and hardware. That's why an acceptance period is important, even after entering an agreement to' license or purchase a product. After an initial acceptance or burn-in period, the vendor's warranty usually begins. The warranty should include, at minimum, the vendor's services necessary to keep the product operating in accordance with the defined performance specifications at no additional charge.
Once the contract is signed, there is the matter of compliance. What happens if the product or the vendor fails to perform, or if the vendor goes bankrupt or is acquired by another company? What rights does the enterprise have to terminate an agreement, and can any part of the investment he recovered? All promises and agreements should be documented in writing. This is critical to avoid misunderstandings, as well as to protect the enterprise in the event of nonperformance.

15.6.4 Modifying/Customizing Software

Many excellent off-the-shelf software programs are available to address EUIS requirements. These programs include desktop publishing, presentation packages, groupware, spreadsheets, word processing, graphics, and database applications packages. Such applications are often bundled as suites of services. Networking tools include voice mail, e-mail, and LAN management applications. Industry-specific

programs include university course registration programs, human resource systems, real estate management systems, and hundreds of others. in some cases, off-the-shelf programs only have to be configured for the hardware environment. In other cases, the original package must be modified to fit a particular hardware system configuration or particular application. In such cases, the organization may (1) hire the person/firm who sold the program to modify it to defined requirements, or (2) buy the source code and do whatever is needed to make it work within the enterprise's computer environment.

15.6.5 Constructing Software Solutions, Menus, Interfaces

Even when all hardware and software are purchased, some customization is required. User solutions need to be developed by the project team, users need to be taught to construct them, or some combination needs to occur. Examples of needed solutions include department databases, spreadsheets, or macros to create form letters with variables that can be merged with customer databases. Sometimes menu systems are needed to integrate various solutions. Fonts may have to be installed and software configured with appropriate print drivers.

Development of user solutions is an area where project teams sometimes fail to pay adequate attention. The users must struggle on their own, with only introductory startup training. This problem is a major cause of poor use and failure to achieve the envisioned productivity. gains. For example, a user learning word processing for the first time cannot realistically be expected to start With building sophisticated macros to automate document production. Instead, analysts might build this initial application. Then as users gain skill, someone with the interest and aptitude could be selected to learn more advanced features of the product to build additional solutions.

How much of the application development the project team does and how much is left to end users is a key question. The answer depends on the experience level of the user community. In any event, all these requirements must be identified in advance and responsibility assigned so that they do not surface as problems after installation.

15.6.6 Testing the System Solution

User solutions and systems should be tested thoroughly prior to implementation. This is equally as important for a single spreadsheet or merge document application as it is for a complex system. Testing verifies that an application or system produces accurate and reliable results and operates the way it is supposed to under conditions of both correct and incorrect input.

Systems that are not well tested in advance can cause considerable disruption and wasted time during implement3tion and can even result in significant financial loss if calculations are incorrect. The system test plan should include all the things the application or system must do. All the business activities and combinations of business activities should be tested. Basic functions or transactions will be obvious, such as checking whether the deduction and payment amounts are correct, when, for example, recording an invoice payment in a client database. However, it's important to test combinations, such as what happens when a partial payment is entered one day and another payment and a credit are recorded the next day. Are the payment totals correct? Was the credit correctly deducted from the remaining balance? What if the credit exceeds the remaining balance? Does the balance show an overpayment?

All the anticipated problems (business error conditions) and the responses when an end user does something incorrect (error messages) also should be tested.
For example, suppose a payment is recorded for a client who is not yet in the database. Does the system respond with an appropriate error message? Testing should be done under conditions as close as possible to actual business procedures using actual data. The test plan should include both the test cases and the expected outcomes against which the system output will be checked.

15.6.7 User-Developed Solutions

As organizations progress into the Information Age, everyone becomes a user, and users will eventually (if not now) have the skills to build their own systems. This is both the dream and the worst nightmare of Information Systems departments. As a dream, user-developed systems could help eliminate systems backlogs. User-developed systems are bound to be valuable to the user and address specific needs.
As a nightmare, user-developed systems can cause problems related to data reliability and security. It has been estimated that 80 percent of user-developed systems have flaws or bugs.[4] User-developed systems may not use the organization's computing resources efficiently. They may also result in output that cannot be used as input for the next step of a process; coordination of development efforts may be difficult.

15.6.8 Developing Training Programs

Training is such an important part of effective system use that it is discussed in a separate chapter (chapter 6). Training programs and materials are developed during Step 5 so that they will be ready and tested for the implementation phase. A frequent mistake in systems development is to wait until the end of the development phase when implementation is almost ready to begin before addressing training. Effective training programs take considerable time to develop. Remember, training specialists need time to learn a new system themselves before they can develop training materials or programs.

15.6.9 Developing Online Help, Reference, or Training

Online help, reference, and other performance support system (PSS) tools offer many cost-effective alternatives to traditional stand-up classroom training. However, sufficient lead time is required for planning and development.
Knowledge management and PSSs are much better suited than traditional classroom training to support jobs that are redesigned to provide broader job scope. PSSs provide information at the workers' fingertips to support complex, information-based jobs that have high learning requirements. They are an important adjunct with other EUIS systems to support business process restructuring. Online help, reference, and knowledge management generally are developed by users and go through the same project cycle as other system components. PSSs are most effective when they are integrated tightly with other systems and are readily available at the desktop to support job performance directly.

15.6.10 Developing and Documenting New Procedures

Any time new systems are introduced, work procedures usually need to be modified. Especially when business objectives include restructuring business processes, this step

can involve significant planning and effort. Work procedure changes may affect just a few people or hundreds of people m multiple departments. As with user application or systems development, analyses completed during Steps 3 and 4 provide the basis for redesigning business processes and procedures during Step 5. The objective is to take advantage of new systems to simplify and streamline business processes. These concepts are discussed in more detail in chapter 12, "Business Process and Job (Re)Design."

New work flows and procedures need to be documented thoroughly to support training and job performance. Procedures explain precisely what has to be done and how it should be done. They may be more or less formal depending on the nature of the work. The more complex the tasks are and higher the level of coordination involved is, the more likely it is that formal procedures are required. Well-documented procedures ensure that employees know what is expected of them. In other words, procedures define expected performance and provide a road map for achieving it. Documentation may take many forms such as reference manuals, job aids, or electronic performance support systems, as discussed in the previous section.

15.6.11 Developing Change Management Strategies

Managing the change involved with implementing information systems is complex and should be specifically planned for during the detailed design phase. Explicit strategies are required during each phase of the project to effectively address requirements and issues. Change management cannot be treated simply as an add-on; it must be integrated throughout the project. Business process changes must be identified early and often are the starting place for projects. Change management "unfreezing" techniques, such as awareness meetings, pilot tests, and extensive communications with the user community, can be vital to the eventual use of a new system. Training programs should be designed and management issues, such as conversion plans and documenting new work procedures, must be addressed.

Because of the complexity related to change management, human factors, training, and performance support, these issues are addressed in separate chapters of this text. Keep in mind, however, that the requirements identified in chapters 6 ("Training End Users"), 7 ("Support and Help Desk Management"), 8 ("Management Issues"), 10 ("Human Factors"), and 11 ("Organizational Change"), are addressed throughout the EUIS project management. The EUIS Project Management Model in Chapter 14 shows the relationships between various activities and actions throughout the project. The Model provides a valuable timeline for addressing appropriate issues at each phase of a project.

15.6.12 Conversion Plans

A conversion plan spells out how the old system will be phased out and how the new system will be activated. Conversion plans will vary considerably depending upon factors such as risk, cost, training requirements, and the complexity of the system. A conversion plan is important because it is often necessary to maintain ongoing production levels while implementing new systems. Careful planning is needed to avoid losing information or other problems. When significant amounts of data have to be converted, temporary staff may have to be hired to handle the workload. The objective is to ensure a smooth transition from the old system to the new.

15.6.13 Physical Site Plans

Physical site planning (facilities planning) can be a complex process. Planners need to consider factors such as layout, lighting, power, wiring and cabling, security systems, and furniture. Analysts may require the advice of specialists such as building specialists, space designers, engineers, architects, ergonomists, or electrical technicians. Site planning is discussed in more detail in chapter 10, "Human Factors," and in chapter 16 under "Implementation."

15.6.14 Implementation Plan

The implementation plan is a written explanation of expected changes and exactly when and where the proposed changes will take place. The plan identifies all activities and tasks to be completed, specifies how long each activity/task will take, who is responsible, and the required completion date. In developing an implementation plan, the project leader must have detailed delivery information from the vendor, as well as tasks and responsibilities of individuals in the business unit. In addition, the Human Resource Inventory is useful. The implementation plan is customized to the specific project needs.

The project manager must meet with all individuals charged with implementing the new technology getting their commitment to perform given activities in the required time frame. The implementation plan maybe in narrative (written) form, charts (see Figures 15-2 and 15-3), or any other descriptive format. It should explain the structure for the entire implementation, eliminating any surprises for implementers or users. For large projects, implementation requires close coordination of many diverse activities. A project manager may find it necessary to meet on a daily basis with all key players to ensure that activities are coordinated and important details are not overlooked.

The plan also may be viewed as a public relations document. Outlining what is happening, why it is happening, when it will happen, and the impact the technology will have on everyone is vital to the communication process. The communication process, in turn, is integral to acceptance of change. it is especially important to remember that communication is a two-way process. Successful implementation mandates that the planners and those to be affected by new systems have an accurate picture of what is—and what will be—happening. Such communication can minimize misinformation (rumors) and is a key tenet of successful implementation strategies.

In addition, the implementation plan serves as a buffer between plans for the change and the actual change. People need advance time to evaluate the impact of the technology and adjust to the idea. Providing this document well ahead of implementation is highly recommended.

Implementation, evaluation, and alignment of business processes are covered in the next chapter.

15.7 SUMMARY

This chapter describes the first five steps of EUIS project management:

1. Define the project scope.
2. Plan the project.

3. Assess project requirements.
4. Describe the proposed solution in detail.
5. Select or develop the project solution.

To initiate a project, a project sponsor must be willing to commit the resources required to complete the project. The project sponsor plays a critical leadership role in major change efforts. The first step is to clarify the problem and define the scope of the investigation. This step in project management includes identifying business objectives, system objectives, and business process and performance improvement objectives for the project. The analyst makes an initial estimate of project costs and benefits and prepares a high-level project plan and schedule. This information is summarized in a project proposal that is presented to the project sponsor for approval.

If the initial proposal is approved, the next step is to develop a detailed project plan. Decisions about who should lead an EUIS study depend on who in the enterprise is charged with responsibility for EUIS projects, and the size and scope of the project. An IS department might assign one or two analysts or, for large projects, management may appoint a project team or task force representing several departments to aid in the investigation. Sometimes an outside consultant or an equipment vendor may be used during an investigation.

The third step is a more detailed analysis of project requirements. This assessment begins by gathering information to document the current system in detail. The success of the project depends upon the value of the information obtained in the assessment stage, and good rapport with users is critical. Analysts start by collecting and reviewing existing documentation and then employ various assessment tools—interviews, questionnaires, observation guides, work sampling—to gather additional information.

The gathered information is analyzed and summarized using various models to represent the current system and alternative solutions. The results are described to the project sponsor or other senior managers in a project proposal that documents the current system, requirements for the new system, alternatives considered, and what the study team recommends. Included is a more refined cost-benefit analysis and sometimes a design prototype. The project sponsor will determine whether it is feasible to continue the project.

Once the project proposal is approved, the fourth step is to analyze the proposed solution in detail. Analysts detail system specifications, including specific recommendations as to categories of equipment, number of units, software, solutions, and requirements for modifying or developing software in-house. Itis equally important at this point to develop detailed specifications for changes required in tasks, business processes, procedures, and job performance. If an outside vendor is to be used, the request for proposal (RFP) outlines the enterprise's requirements in detail and asks that vendors respond with a description of appropriate technologies, cost, and other considerations deemed important (such as training).

Evaluating the proposals, whether for hardware or software, requires the team to determine which vendors have addressed the identified need and then to rank the vendors as to suitability. At this point, checklists that compare vendor responses are useful tools.

The fifth step is to select or build[1]'the project solution. The objective is to bring a working version of the system to a usable stage. The project team must configure the

system, and write and test all customized software, solutions, procedures, documentation, and training materials.

KEY TERMS

- Context-level diagram
- Data flow diagram (D~FD)
- Flowchart
- Interview guide
- Pilot installation
- Primary data
- Project proposal
- Project scope
- Project sponsor
- Prototyping
- Questionnaire
- Request for proposal (RFP
- Secondary data
- Time log
- Walkthrough
- Work sampling

DISCUSSION QUESTIONS

1. What is meant by defining the project scope? Why is this step important?
2. Who is the best person to conduct an EUIS analysis?
3. Given the following situations, how would you plan to collect data? Which instrument(s) would be most effective? Support your answer.
   a. A large New York City organization wants its geographically dispersed divisional vice presidents to be able to collaborate on complex projects without constantly travelling.
   b. A book company in the Midwest wants to update its sales force on new books and services.
   c. The claims department of an insurance company can't keep up with the number of telephone calls it receives each day.
   d. The costs of printing and distributing the *Employee Manual* are going up. What are the alternatives to having it published outside the company?
   e. Despite installation of a LAN in the Law Division with a PC on every desktop, most of the legal staff are continuing to process work as it has been done in the past.
   f. The customer service representatives in the life insurance division frequently do not have the information necessary to answer customer inquiries. They must take a message, research the information, and then call the client back. It often takes two to three days to respond to customer inquiries.

4. Assume you are assigned to write a questionnaire to determine your department's desktop publishing needs.
   a. Write one ranking question.
   b. Write one intensity-scale question.
   c. Write one open-ended question.

5. If you were to ask, "What electronic mail features would you use?" what answers might you receive? Rewrite the question to get the response you are looking for.
6. Getting company employees to agree to sit for an interview or complete a questionnaire is frequently difficult. List some ideas for getting them to participate in your investigation.
7. What is a project proposal? Who prepares it? Who reads it? What are its major subsections?
8. What is a request for proposal (RFP)? What are its major subsections?
9. How would you go about comparing the proposals you've received from five vendors?

APPLICATION EXERCISES

1. Using one of the examples in discussion question 3, draft an interview guide, questionnaire, or observation form that you might use in collecting the needed information.
2. Use flowchart symbols to trace the way grades are processed at your university, beginning with the student handing in the final exam. Then, model the same process using a data flow diagram. Compare the advantages and disadvantages of each of these methods for documenting an existing system.
3. Select an actual EUIS problem and define the scope of a project required to solve it. Choose problems from your university, your job, or even your personal information processing requirements. Use a context diagram to model the scope of the system. Identify departments, users, and all stakeholders that would be involved in a solution. Define business objectives, system objectives, and business process and performance improvement objectives for the project.

SUGGESTED READINGS

Davenport, Thomas H. Process Innovation: Reengineering Work through Information Technology (Cambridge, MA: Harvard Business School Press, 1992).

Katzenbach, Jon. Real Change Leaders: How You Can Create Growth and High Performance at Your Company. (New York: Times Business, division of Random House Inc., 1995).

Pfeiffer, William S., and Keller, Charles H. *Proposal Writing: The Art of Friendly and Winning Persuasion.* (Upper Saddle River: Prentice Hall, 1999).

ENDNOTES

1. Curtice, Robert M., "Toward the Information-Based Organization: Redesigning Business Processes to Create a High-Performance Business," presentation to the 10th Annual EwIM Conference, St. Louis, MO, September 1991.

2. Atkinson, Robert A., “Integrated Information Management: Catalyst for Business Change,” in the proceedings of *EwIM Ten: Realizing the Value of Information Technology* (September 4—6, 1991)
3. Markus, Lynne M., “Power, Politics, and MIS Implementation,” in *Readings in Human-Computer Interaction* (Los Altos, CA: Morgan-Kaufmann Publishers, 1987) p. 69.
4. Ibid.

Case Study Rhône-Poulenc Rorer Commits to a Worldwide Desktop Standard

Like most large enterprises today, French pharmaceutical Rhône-Poulenc Rorer (RPR) is challenged to meet current business needs while also having sufficient flexibility to respond to future needs. A pharmaceutical subsidiary of life sciences company, Rhône-Poulenc S.A., (1998 sales of US$14.7 billion with 65,000 employees in 160 countries), RPR has 28,000 employees and 1998 revenues of US$6 billion. A pending merger with German pharmaceutical Hoechst Marion Roussel (HMR) will form Aventis, one of the world's largest life sciences corporations.

Knowing that today's IT decisions would impact their ability to respond to future business opportunities and help them to remain globally competitive, RPR needed to evaluate and quantify the financial benefits and costs of migrating to a worldwide desktop standard. The existing desktop platform consisted of various editions of Microsoft Office as well as other software products. The complexity and difficulties of exchanging information was expected to increase with the anticipated merger. The company was considering implementing Office 2000 as a worldwide desktop standard, but wanted to determine if the benefits would justify the costs and implementation challenges.

Like all organizations, RPR has both IT and business concerns. The complexity and speed of change in today's global marketplace identify universal problems and opportunities. In particular, after identifying the business drivers, RPR established three primary objectives in considering whether to implement Office 2000 as a worldwide desktop standard.

- **Information Exchange**. RPR is a worldwide company where global configuration and multinational support are vitally important. In addition, document collaboration to facilitate productivity with merger partner, Hoechst Marion Roussel, was critical. RPR wanted true multinational support with consistent worldwide file formats.
- **Knowledge Management**. RPR needed better communication tools along with tools that support richer analysis to help make better decision making.
- **Reduce Desktop Operating** Costs. One of RPR's priorities is to reduce IT management and administration costs for implementing and supporting desktop computing. They sought to reduce deployment and management complexities. They also wanted to reduce help desk support with better tools and more customized help.

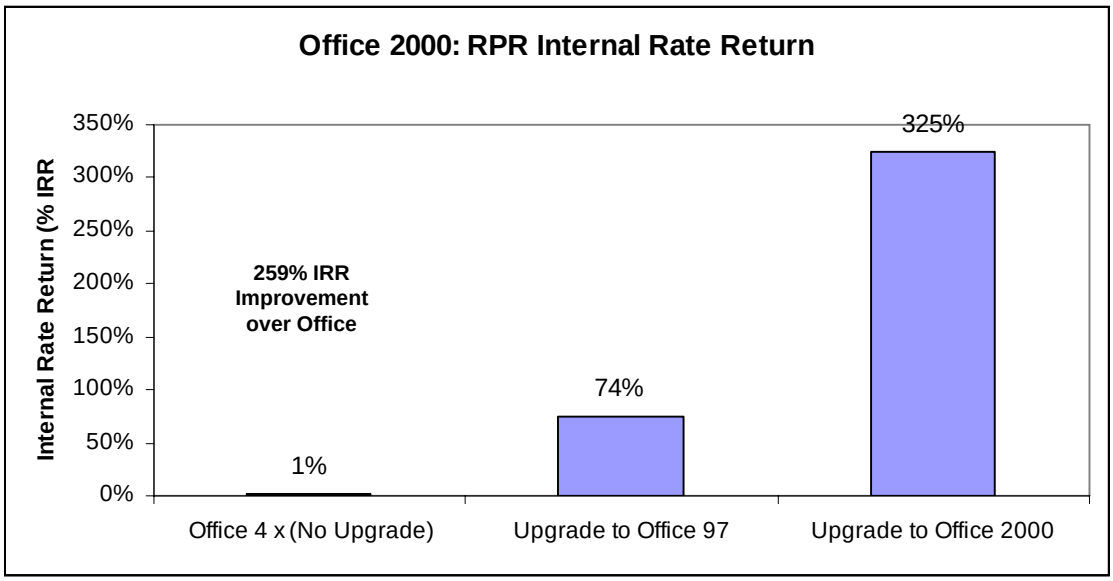
With the increased power and functionality of the Office 2000 platform, it was not immediately clear what the costs would be to implement and support it and whether the company would achieve sufficient productivity benefits to justify it. Moreover, RPR wanted to look at the total cost of ownership, not just the initial implementation costs. The company decided to bring in an outside vendor to conduct the cost-benefit analysis. The vendor selected was Giga Information Group. Using Giga Information Group's Total Economic Impact (TEI) methodology, RPR determined that upgrading to Microsoft ® Office 2000 would have extremely positive business benefits by reducing desktop operating costs and positively impacting both personal and organizational productivity. From a financial perspective comparing an upgrade from Office 97 to Office 2000, the TEI cash flow analysis estimated that RPR's Office 2000 investment over three years could achieve an internal rate of return ranging from 134% to 333%. In comparison to Office 97, Office 2000:

- Reduces desktop operating costs by 17%
- Offers a potential 16% to 25% improvement in productivity

Mr. Guillaume Prache, RPR's CFO, stated, "The TEl analysis illustrates that deploying Office 2000 will enable full compatibility with the PC's of ~ur partner in the Aventis merger, while reducing costs and increasing business productivity compared to other

options." The graph below illustrates RPR's estimated Internal Rate of Return (IRR) of upgrading to Office 2000:

Office 2000: APR Internal Rate of Return



eNote: 333°/a is the maximum IRR if Office 2000 is fully implemented (Office Server Extensions, OLAP, etc.) within one year of deployment. If it is not fully implemented until two years after deployment, the IRR is reduced to 210%. If no enterprise features are deployed, the IRR is reduced to approximately 134% due to the reduction in desktop operating costs.

Business benefits of IT investments are more than just showing that the investment reduces IT costs. IT must also show that the investment increases business productivity, or value for the entire organization. Giga's TEI methodology calculates this by estimating both increases in benefits and reduction in costs, along with considering the investment's flexibility and risk. After being presented with the TEI analysis, RPR's chief financial officer, Mr. Guillaume Prache, made a strategic business decision to commit to Office 2000. He said, "The Giga TEI analysis is compelling because it quantiliably shows how deploying Office 2000 addresses both present and future organizational needs."

- **Reduces Desktop Operating Costs by 17%**. In RPR's environment, deploying Office 2000 is estimated to save 17% annually in desktop operating costs. Measurable savings are associated with new deployment tools and wizards, such as the Custom Installation and Office Profile Wizard, deploying a single worldwide executable with multilingual support, and other features that are focused on decreasing end-user support. End-user support, including help desk calls and peer-to-peer support, are projected to decrease due to self-repairing applications and the ability for RPR to customize the Office 2000 Help.
- **Potential to Increase Organizational Productivity between 16% and 25%**. While decreasing costs are important to all IT organizations, showing an increase in organizational productivity that results in greater organizational effectiveness is

equally critical to achieving overall success. Increasing organizational productivity through Office 2000 enterprise features, like Web collaboration and information sharing or richer data analysis tools, is an optional benefit that is not available with previous versions of Office.

These potential gains in organizational productivity and document management are enabled by Web collaborative features such as Office Server Extensions, integrated NetMeeting, Web publishing with HTML, and rich analysis tools such as OLAP integration with Excel 2000. From a development perspective, Office 2000 has an integrated common development platform, Visual Basic® for Applications (VBA), which makes creating and deploying worldwide enterprise solutions more efficient.

The TEI analysis estimates these optional benefits to increase RPR's organizational productivity between 16% and 25%. The exact value of the producivity gains are determined when RPR decides to upgrade from Office 4.3 to either Office 97 or Office 2000 with those Office 2000 feahires implemented. If these features are implemented within the first year, RPR will realize the greatest business return—25% increase in business productivity. However, if RPR delays implementing these optional features until the second year, the additional organizational productivity gains will be approximafely 16%. These featuers are treated like financial options: if they are never deployed during the Office 2000 lifecycle, they expire and will have no value.

Value Clearly Measured with Giga's TEl Methodology

TEI expands beyond traditional cost analysis to measure benefits, flexibility and risk, by assessing the overall financial impact of a specific technology. The TEl methodology, which for this analysis used RPR's data as inputs, quantifies the impacts of technology changes on all areas of an organization by measuring the estimated changes to the environment, not the absolute value of the technology.

A key benefit of the TEI methodology is that previously "intangible" benefits can be made tangible through a process of defining, benchmarking, and valuing these benefits based on real options modeling. The TEI analysis also shows why flexibility and risk are important to consider when conducting business benefit analyses. Giga's option valuation methods are based on widely accepted financial modeling techniques. For example, with Office 2000, the TEI calculations estimated that RPR's Internal Rate of Return could vary between 134% and 333% depending on which Office 2000 enterprise features, like Office Server Extensions, are utilized and when these features are implemented. Critical to RPR realizing these returns is the timing and execution of implementing these features.

The analysis demonstrated that there was greater economic value for RPR to deploy Office 2000 in one deployment cycle, rather than incrementally deploy each business unit and wait for the business unit to adopt the technology before deploying the subsequent business units.

When presented with the Office 2000 TEI analysis, Mr. Caryle Maranhao, RPR IS Global Project Manager for Office 2000, noted, "The TEI methodology is an effective way to create a comprehensive business case. Based on the TEI analysis, we are confident that Office 2000 will assist us in achieving our IT and business synergy

goals." RPR believed that Office 2000 would meet their business needs today as well as position them to take advantage of future business opportunities.

Aligning People, Processes, and Technology

As part of the cost benefit analysis, RPR also clearly identified the stakeholders, their success metrics, and strategy for achieving success (see the following ***figure).*** This part of the analysis fundamentally aligns people, processes and a new technology in a way that meets overall business needs.

With the TEI analysis, the potential impact that a worldwide desktop platform could have on RPR's environment—both from a business and IT perspective— became quantifiably clear. The total potential benefit is estimated at a three-year minimum internal rate of return of 134%. This IRR could be as high as 333% depending upon when various enterprise features are implemented. The TEI model clearly presented RPR with a complete business case for Office 2000. As a result, RPR made the decision to commit to Office 2000 as their worldwide desktop standard.

At the time that this case was written, selected business units had already begun their Office 2000 deployment. It was still too early, however, to evaluate the results.

Aligning People, Processes, and Technology

STAKEHOLDER	SUCCESS FACTOR	KEY PERFORMANCE INDICATOR	OFFICE 2000 BENEFIT
Business Unit Manager	Research new drugs.	Time to get newly discovered compound to market	Better data analysis tools.
End-users	Systems that are easier to use; focus on results and business process	Reduce document collaboration time. Reduce amount of time spent in meetings	Improved real-time team collaboration processes. Multi-language support. Improved document collaboration
IT Staff	Increased user satisfaction and reduced support calls.	High user satisfaction. Less costly to deploy, administer and maintain	Reduce end-user downtime and peer-to-peer support

For more information vi~ the World Wide Web, go to:
www.microsoft.com/office/enterprise/ www.gigaweb.com/
Source: © 1999 Microsoft Corporation. Used with permission. Accessed 10/29/00
http://www.microsoft .com/office/evaluation/studies .htm

CASE STUDY QUESTIONS

1. What were Rhone-Poulenc Rorer's main objectives for upgrading to a worldwide standard desktop?
2. What are the main people, technology, process, and organizational issues in this case?

3. What influence did the anticipated merger with German pharmaceutical Hoechst Marion Roussel play in the decision to adopt a worldwide desktop standard?
4. What information did the cost-benefit analysis provide and what were some of the implications for how RPR implements the worldwide desktop platform?