Chapter 14

EUIS Project Management: Foundations and Overview

Learning Objective

Upon completing this chapter, you should be able to:

- Understand the role of conceptual approaches to systems analysis and design.
- Differentiate among the six conceptual approaches to systems investigation described in this chapter.
- List and define characteristics of systems.
- Define the term coordination and how coordination theory may be useful to a systems analyst or project manager.
- Describe the basics of action research and third wave management as problem-solving techniques.
- Define project management and explain its importance.
- Discuss the systems model of change as applied to EUIS project management.
- List the eight EUIS project management steps and identify deliverables for each step.

14.1 INTRODUCTION

Designing and implementing end-user information systems (EUIS) that support business process restructuring and facilitate knowledge work can be a formidable challenge to managers and information systems professionals. Part II of this text provided background on business value, human factors, business process and job design, and organizational change. Chapter 13 discussed how innovations (here, technologies) are adopted, infused, and assimilated by enterprises. Chapter 13 also advocated the use of strategic planning to link EUIS to the achievement of business goals and objectives. The next three chapters (14, 15, and 16) describe EUIS Project Management which is a systematic approach for analyzing business requirements and developing effective solutions that are in the form of projects.

Where does one begin EUIS investigations? How are projects planned and managed? Answers are not simple and differ markedly from enterprise to enterprise and situation to situation. Fortunately, however, conceptual models exist that can help guide the work of analysts and designers. Insights on processes and outcomes that others have collected have been compiled and can be adapted to the work at hand.

Kurt Lewin, the noted social psychologist (see chapter 9), said “Nothing is so useful as a good theory.” A theory helps us explain and predict events that are of interest to us. Theories help explain why something happens or what will happen under given circumstances. Theories provide the foundation for the conceptual approaches to EUIS analysis and design that help the analyst understand the information needs of individuals, workgroups, and the organization. These approaches also can be used as a framework for project teams to define problems and work toward effective solutions. Theory results in conceptual models that are useful in understanding business functions and work processes. Theory is a basis for deter- mining how these functions and processes can be restructured to meet more effectively business goals and objectives. An attempt is made here to offer both traditional and evolving theory that explains how workplace problems are assessed and technological interventions are designed, implemented, and evaluated.

To suggest different perspectives from which an EUIS project can begin and then be evaluated, conceptual approaches to EUIS systems analysis are presented. Systems theory and coordination theory are examined. Systems theory is the basis for systems analysis and has applications for both technical and work (social) systems investigations. Coordination theory suggests that we look at how systems coordinate activities. Conceptual approaches to problem solving, action research, and third wave problem solving, introduced in earlier chapters, are expanded here with regard to their application to systems design. The chapter concludes with a summary and overview of the EUIS project management model, the framework this text will follow as it offers specific how-to's on EULS analysis, design, implementation, and evaluation.

14.2 EUIS PROJECTS AND PROJECT MANAGEMENT

EUIS assessment, design, implementation, and evaluation generally are done on a project basis. A *project* is an activity with defined goals and starting and stopping points. Projects may be limited in scope to the information needs of a single individual. More comprehensive projects may address the needs of a work group or an entire department (e.g., analyze the needs of the Law Division and implement an integrated system for document management). Large projects may involve multiple departments or offices.

14.2.1 Examples of EUIS Projects

Many EUIS projects are small and can be solved quickly by the analyst ad hoc. The planning method described in this text, however, supports projects that require planning and integration, and should be adapted for projects of varying sizes. Projects such as the following make up the majority of projects addressed by EUIS analysts:

- Developing a document management system to reduce paper files and speed retrieval.
- Providing productivity tools for specific work groups
- Networking microcomputers in regional offices with the home office.
- Providing the marketing research department with the ability to download data from data warehouses and perform statistical analyses.
- Designing and implementing a knowledge management system for the sales department.
- Providing training programs to support new technology or business process redesign.
- Analyzing work flow for the vice president of a regional service unit to recommend where time could be saved by using word processing, spreadsheets, database applications, and so forth.

- Equipping a conference room with hardware and meeting management software, then training and supporting managers in using it effectively.
- Implementing an imaging and workflow management system to streamline processing of invoicing and collections.

14.2.2 Project Management Defined

Project management is a structured process for planning, directing, and monitoring tasks and resources required to achieve some business result. The final result sought in an EUIS project is a working business system incorporating some combination of people, technology and business processes and structure. Project management involves the coordination of:

- activities or tasks.
- people with skills to perform the tasks.
- time schedules.
- budgets.
- intermediate results from completing tasks, referred to as deliverables or project milestones.
- review points to assure quality is achieved in the results.
- communication among all stakeholders.

The *project manager* is the person responsible for directing an EUIS project. Responsibilities of this role, usually assigned to a senior specialist, generally include planning the project, selecting the project team, assigning tasks, coordinating all project activities, keeping project deliverables on schedule, and communicating progress to senior management.
Effective project management is essential to the successful completion of complex projects. Even small projects benefit from at least informal project management. The larger and more complex the project is, the greater the importance is of structured project management.

14.3 CONCEPTUAL APPROACHES TO EUIS ANALYSIS

The conceptual approaches described here offer perspectives for either initiating, analyzing, or evaluating projects. The value of these approaches is in the structure they provide for helping groups of people focus on problems and work toward effective solutions. Several approaches that have proven useful for EUIS analysis are: (1) organizational communications, (2) functional, (3) information resource management (IRM), (4) decision support systems (DSS), (5) quality of work life (QWL),' and (6) management of computing resources (MCR).
These six approaches represent different perspectives that decision makers are concerned with in examining the information needs of departments, work groups[1] or individual worker. The ability to see problems from different perspectives is important to understanding the interests of various stakeholders in a process and is a cornerstone for innovation.

For example, a professional writer may expect EUIS to solve her grammar and communications problems. An accountant may want a system to address the firm's auditing practices. The data entry operator may be concerned that the interface of the new system is easy on the eyes. The chief information officer may want a system that takes advantage of the organization's existing database and existing hardware inventory. The chief executive officer may look at the project's value from a standpoint of how it helps in personal decision making tasks. Understanding the perspectives of all stakeholders is important for anyone who is planning EUIS. The issue is complex in that more often than not, perspectives overlap. The value of identifying perspectives is in establishing a frame of reference for the analyst, organizational development professional, managers, *and* the end users to understand that the same system can be planned for and evaluated in a number of different ways.

14.3.1 Organizational Communications Approach

Using an *organizational communications approach*, analysts examine how individuals and groups communicate. The logic is that if communication among workers is good, individuals are able to work well. The goal is to empower users by giving them communication tools. For example, analysts might want to focus the investigation on how communications patterns have emerged and how individuals and groups communicate. Technical solutions such as electronic mail, listservs, meeting management systems, or knowledge management could be considered as a way to support more frequent, more timely, and more efficient/effective organizational communications.

14.3.2 Functional Approach

As the term implies, when using a *functional approach*, the analyst and manager examine business functions such as accounting, finance, or human resources management. The emphasis is on *functions*, not tasks. A *task* is an activity that enables the *function* (job) to be done. EUIS should help the worker do a function better, not merely make a task easier.

For example, entering data into a spreadsheet is a task; accounting is a function. When accountants first began using spreadsheets, the task of inputting data into a budget was improved. Taking a functional approach, the accounting function, *not* the data entry task, would be examined to determine the types of support tools required to improve worker or department performance. This approach may identify opportunities for work process restructuring.

14.3.3 Information Resource Management Approach

Using an *information resource management* (IRM) *approach*, the analyst regards information as a resource of the organization to be managed much like any other resource—money, people, materials, facilities. By quantifying the value of the information resources of an organization, analysts can attempt to ascertain where and how this resource can be used effectively.

When an analyst considers information to be a resource, he or she looks for ways to enhance the use or value of that information. The example in chapter 13 of how analysts used existing databases to develop American Hospital Supply's ordering system and

American Airlines' SABRE system are excellent examples of an information resource approach to systems analysis.

14.3.4 Decision Support Approach

Using a *decision support approach*, analysts examine work activities from the standpoint of quality decisions. The objective of any study to assess computing needs is to determine end users' needs for information that could aid them in their decision-making processes. Emphasis here is on the *quality* of decisions. Quality assessment can link the value of the system back to the organization's mission and critical success factors.

Thus, a decision support approach focuses attention on understanding the business and what information decision makers use to monitor and control business activity. What information is critical, where does it come from, and how is it used? What time frames are important? In some organizations, such as banks or brokerage houses, a delay of a day or even an hour can mean a difference worth thousands of dollars. When the objective is to use information systems to support decision making by providing access to critical information and allowing it to be manipulated, analyzed, and compared easily, the analyst is using a decision support approach.

14.3.5 Quality of Work Life Approach

The *quality of work life (QWL) approach* is based on sociotechnical theory. Using a QWL approach, the analyst looks at the nature of the work being done, worker motivation, and job design. Because EUIS alters the way people work, a QWL approach focuses on opportunities to improve workers' job satisfaction and productivity by providing meaningful jobs in a supportive work environment. The underlying assumption is that a productive, satisfied workforce is critical to meeting the enterprise's service and quality objectives.

The QWL approach promotes worker involvement and satisfaction. When employees feel that the organization is doing all it can to provide a healthy work environment and enable workers to make meaningful contributions to the organization's goals, they are typically more productive and have greater job satisfaction. When it is applied appropriately, EUIS has immense potential to improve QWL. Analysts who begin an EUIS project with workers' motivation and satisfaction as a rationale are using a QWL approach.

14.3.6 Management of Computing Resources Approach

The key goal of the *management of computing resources* (MCR) *approach* is the efficient use of existing technology. In many organizations, computers and communications tools are not used to an optimum level, and because of the dollar investment in the tools, decision makers may want to see how the tools *could be* used better. This is a cart-before-the-horse approach in that applications are an afterthought, not the driving force for the investment in technology. The objective is to do more with the same resources. Although this is not a recommended approach to begin an investigation, it is more common than managers and information systems professionals would like to believe. Outcomes from such an investigation begun this way may be useful, however. The MCR approach is often a means to justify application development. it is used easily in conjunction with other approaches.

Figure 14-1 summarizes these conceptual approaches to examining problems. Keep in mind that a given project may use several approaches at the same time.

Approach	*Goal*	*Example Solution*
Organizational communications	Improve individual and group communications	Meeting management software
Functional	Improve the way work is done	Order entry systems
Information resource management	Use the information we have more effectively	Training class registration systems
Decision support	Improve decision making	Project management systems
Quality of work life	Improve worker job satisfaction	Ergonomics training
Management of computing resources	Use the tools we have more effectively	Advanced presentation software training

Figure 14-1 Conceptual approaches to EUIS analysis summary

14.4 CONCEPTUAL APPROACHES FOR SYSTEMS DESIGN

Several theories/problem solving approaches are useful in understanding the systems analysis and design process. First is systems theory, which is borrowed from the physical and biological sciences. Second is coordination theory, which uses and extends ideas from computer science and behavior sciences. Third is action research, which is based on the work of Kurt Lewin. Fourth is third wave managing/ consulting, which extends ideas from participative management and systems theory. Fifth is a systems model of change that identifies relevant variables to the systems analysis and design process. These approaches are useful because they promote understanding of both technical design (hardware and software) and the systems analysis process itself. Following is a more detailed overview of these selected foundations.

14.4.1 General Systems Theory

Examples of systems. abound: the respiratory system, a car’s exhaust system, a school system, a political system, an economic system, a computer system. Each system is made up of distinct, identifiable components, or parts. A change in any part has a direct effect on the operation of the system. In addition, one system can be a *subsystem* of another system or a *suprasystem* of another. Systems can be technical or social.

General systems theory can be used to understand how systems are interrelated and work together for a specific process. Borrowed from the sciences, systems theory is used to explain why things work and do not work. In the recent past, the use of mechanical science was a useful metaphor for understanding how computer systems operate: “There’s a missing cog in the system.” Today, metaphors tend to relate to the biological sciences: “The system has run down.” Such metaphors are useful to the systems designer who needs to make sense of how to put together a system that relies on the operation of a variety of parts and how users interface with those parts.

As used in this text, a system is a set of separate but interrelated components (people, technology, and tasks) that process input (data in the form of voice, data, words, and graphics) into desired output to reach an identified objective. The following discussion of general systems theory will help clarify this definition.

14.4.1.1 Systems Characteristics

Systems—both technical and social—can be identified by their characteristics. In this section, selected systems characteristics are listed and defined, and the terms that describe them are then discussed in terms of their relationship to EUIS.

Open and closed systems **Systems** are often described as either open or closed. These terms refer to whether or not the system is affected by activities outside its boundaries. If a system is open, it is greatly affected by occurrences that are not under its control; if a system is closed, it is *not* affected by occurrences outside itself. It is difficult, however, to imagine a *completely* closed system.

Inputs and outputs Inputs and outputs are the energies that go into and come out of the system, respectively.

Throughput Throughput is the process of transforming input into output.

Boundary Boundary is the term for the area that separates one system from another. A system is bounded by everything controllable by the systems analyst and important to its operation.

Environment A system's environment is anything outside the boundary that has an impact on the operation of the system but which the systems analyst cannot control.

Entropy Entropy (pronounced *en-tropy)* is a tendency toward disorder. The more closed a system is, the more it is subject to entropy.

Interface The interface is the point at which systems meet and interact, transferring the output of one system into the input of another.

Feedback System output is measured against evaluation criteria, or standards. Information comparing what was produced or provided with what was expected to be produced or provided is fed back into the system as input.

Equifinality The concept of equifinality means that equal paths to the same place exist. In other words, there is more than one way to solve a problem.

Knowing this vocabulary is basic to understanding how systems work. Although mechanical systems are designed to achieve coordination, EUIS systems are comprised of people, business processes, structure, and technologies. Using systems characteristics to define or explain how a system operates as an entity by itself or interfaces with other systems helps analysts and managers understand the system more fully.

Understanding the system is important because EUIS systems are often conceptual rather than physical things. Systems are created in the minds of people as a basis for thinking and talking about the things these systems represent. For example, any system or subsystem has a boundary, which is the border between the system being studied and other systems or the environment in which it exists. The boundaries, by choice, may include a certain part of an organization, specific functions, or a certain set of tasks or processes. Because systems are created by people's perceptions, project teams must be careful that all stakeholders are thinking and talking about same things contained within the systems boundaries. Boundaries define the scope of the project—an important and sometimes complex first step.

14.4.1.2 Systems and Subsystems

An organization is made up of a number of subsystems, each with a specific purpose. As shown in Figure 14-2, organizational subsystems can be based on specific business functions, such as operations management, sales, finance, marketing, accounting, and the like. A useful way to describe business systems is to examine the way these subsystems work together to produce value for the organization.

14.4.1.3 Organizations as Systems

To understand better how to use systems terminology, Figure 14-3 shows a system input-processing-output model. An organization has a purpose, which adds value to inputs from the environment by processing them, and it offers the outputs, in the form of products and services, back to the environment. If the system is compensated for the value it adds, it will obtain more resources and will continue its existence. If not, it will use the information feedback loop to adapt and change, or it will cease to exist.

Figure 14-3 also identifies some of the entities in the environment that affect organizations. The environment is the source of iitputs to an organizational system and the receiver of its outputs. For example, people are hired from the environment, and data, information, and raw materials are acquired from the environment. These inputs are used to generate products and services offered to the environment. Customers provide feedback regarding an organization's products

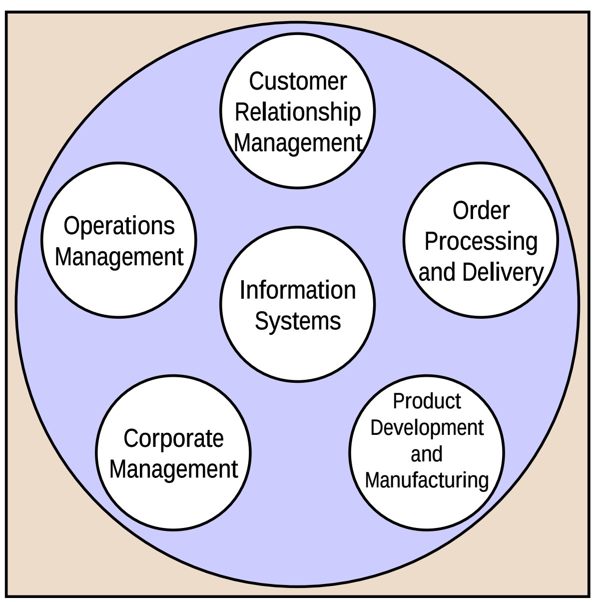

Figure 14-2 The organization and

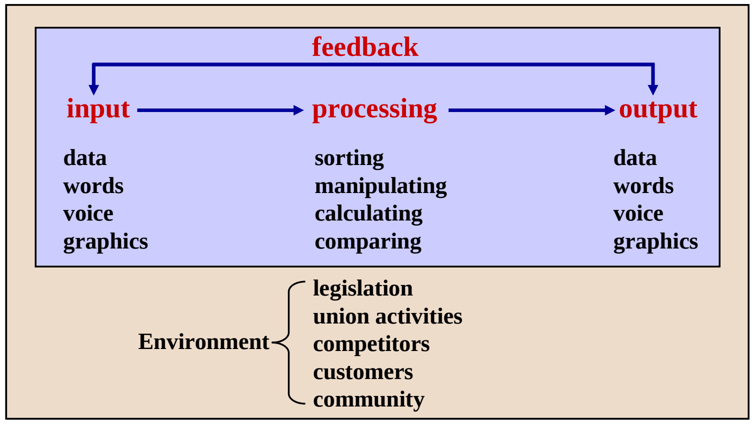

Figure 14-3 Systems in operation

and services. Other entities in its environment also may impact an organization's operations. Legislation and competition are often catalysts for organizational change. When an organization's competition introduces a new product, for example, the organization likely will respond.
As Figure 14-4 shows, a salesperson using an order entry system (see chapter 5) may send orders for products via purchasing orders, telephone calls, or online direct entry. Input data are put into the system via an OCR system, voice, keyboard, or other method. Processing is the manipulation of input (numbers or words). Manipulation of these data occurs, and orders are processed and invoiced. Outputs, the results of this processing, may be in the form of shipping orders, as well as data that are then used as input for other systems, such as credit checking, billing, or further correspondence.

14.4.1.4 Systems Analysis and Design

Open and closed systems do not always operate (process or throughput) as in-tended (entropy). The source of the problem may be within the system's boundary, environment, or interface. *Feedback*, sometimes referred to as *control*, is the means for identifying that something is amiss. Systems analysis is the process of determining whether intended output differs from what was expected, then identifying the cause of any problems and attempting to fix them. Systems analysis is not conducted

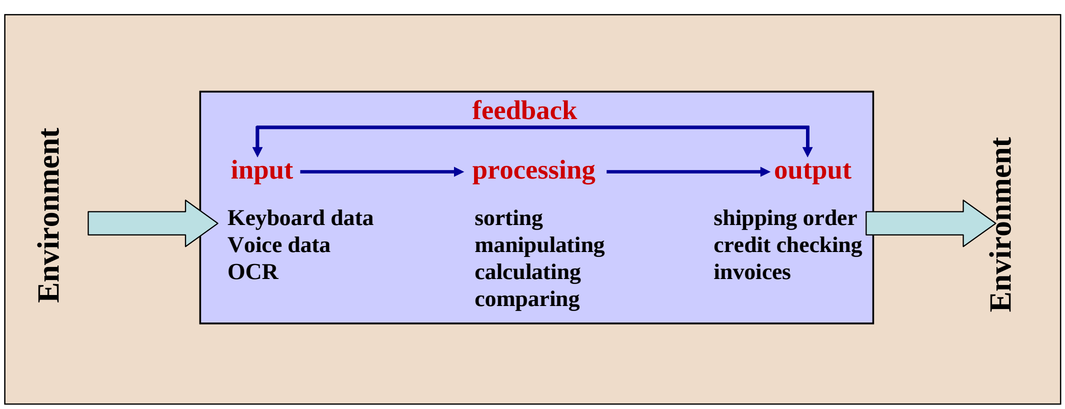

Figure **14-4** An order entry system in operation by taking apart the entire system. Rather, systems are analyzed by examining discrepancies between expected outputs and actual outputs. More than one way to solve a problem exists (equifinality).

Metaphors related to the biological sciences also can offer aid in understanding the systems analysis and design process. For example, if one considers the human body as a system, the process by which a doctor diagnoses an illness (entropy) can be considered systems analysis. If one goes to the doctor with a headache, the doctor considers that headache as output. Rather than operate immediately (go into the system), the doctor asks questions about inputs and outputs (When did the headache begin? Does it occur frequently? What seems to trigger it?). Diagnosis may result in a prescription. If the prescription does not work, the individual returns to the doctor for more advice and another remedy is suggested; and so the process, which is a form of systems analysis, continues. Hopefully, the system (body) itself will not require an operation.

14.4.2 Coordination Theory

A useful theory to understanding how systems work together to perform their identified purpose is *coordination theory*. Thomas Malone and Kevin Crowston of the Massachusetts Institute of Technology have defined coordination theory as a body of principles about how actors (people or technology) perform independent activities that achieve goals; coordination is the act of working together.[2] Team sports such as basketball are examples of coordination. If one is trying to determine who does what, when, and under what circumstances, discussing work flow as a need to improve coordination can be useful. Moreover, as in basketball, there is always more than one best way to solve a problem. The team selects from a "catalog" of alternative ways (plays) to coordinate its strategies.[3]

Coordination theory's key tenet is that many of the most important uses of computers today and in the future do not involve just computing things (as in transaction and reporting systems), but rather involve coordinating players' (workers) activities. Therefore, understanding the costs, benefits, and other characteristics of different kinds of coordination is critical for understanding how information technology can help people organize their activities and work flow in new ways.

Coordination theory is a difficult concept to describe, but you know it when you see it. Coordination theory is perhaps best applied to examining the impact that information technologies have on organizational structures, to designing cooperative work tools, and to designing distributed and parallel processing computer systems. The emphasis is on coordinating activities rather than coordinating data. Evidence suggests that information technology leads to smaller firms, more delegation, and more widely shared ownership. Designers of cooperative work tools and parallel processing computer systems are using coordination theory as a basis for the design of systems; in such systems, sequencing and timing are important considerations.

14.4.3 Action Research

Action research (see Figure 14-5) is a practical approach for problem solving applicable to diverse needs. Basically, the approach involves all stakeholders, who have a lot to win or lose from introducing new technology, in solving the problem. Action research emphasizes the importance of feedback at all stages to refine constantly the problem-solving process itself.

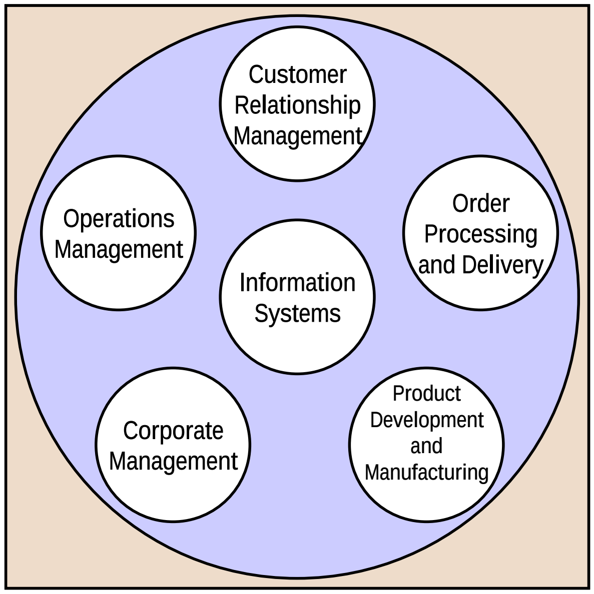

Figure 14-5 The action research model

Action research provides a practical framework for EUIS analysis and is made up of four stages:

Stage 1: Assessment—The investigation of the current state of the problem.

Stage 2: *Design—The* creation of an intervention targeted at modifying the existing state of the problem.

Stage 3: Implementation—The installation of the intervention designed in the second stage.

Stage 4: Evaluation—The assessment of whether or not the intervention has a positive impact on the problem.

Action research has twin goals—to solve the problem and to learn how to solve future ones. People who are involved with the identified problem or opportunity— people who work or live in the context in which the problem exists—are key to the problem-solving process. In other words, end users are more likely to modify their behavior (use/implement a new system) when they have participated in the problem analysis and solution development stages. During the fourth stage, EUIS analysts evaluate the problem-solving process in addition to the implemented solution so that the process of change within the organization can thereby be refined, as well. Users work together with the analyst to rethink their own work. While implementing a solution to one problem, the EUIS specialists help users learn to solve future problems for themselves; these are the dual goals of a successful EUIS project.

14.4.4 Third Wave Management

A recent model of interest to EUIS specialists is *th~ird wave management.* A brief history of third wave management was offered in chapter 12. To recap, noted management consultant Marvin Weisbord extended open systems thinking and added teamwork to effectiveness. Teamwork, Weisbord suggested, is essential to system success. Weisbord's analysis is that problems are best solved when stakeholders examine the *whole* system, and not simply their own role or needs. Applied to EUIS, information systems problems and opportunities are not identified and addressed solely by experts in technical groups or by work groups solving their own localized problems. EUIS projects are best addressed by the participation of stakeholders whb can see the big picture, as well as their individual roles in the work process.

Weisbord identified three powerful levers that can be used to turn workplace anxiety into energy: purposes, relationships, and structures. Purpose (mission) is the business that we are in—the future on which everyone's work security and meaning are attached. Relationships are connections with coworkers that let us feel whole. Relationships require cooperation across lines of hierarchy, function, class, race, and gender. Structure is who gets to do what. Structure affects self-esteem, dignity, and learning.[4] Third wave managing and consulting levers are those practices that support the business purpose, allow for relationship building, identify roles, and assure individual accountability.

14.4.5 A Systems Change Model for EUIS Projects

As suggested by the conceptual models just described, many valid perspectives exist from which planners might view business problems and assess opportunities. When planners attempt to use technology as the basis for redesigning business processes, it is often necessary to approach problems from many perspectives simultaneously. Moreover, EUIS development must take into account not only technical solutions, but also environmental design (hardware, software, and workplace design), business process design, job performance needs, and structure (open and whole systems). Managing this complex process effectively is one of the greatest challenges of EUIS. Because EUIS, by definition, mandate that *change* occurs in workers' behavior, the systems change model is used here to frame the interaction of the technical and social subsystems.

Figure 14-6 is a conceptual view of the variables that impact successful systems projects. Note that four key variables are found at the points of the systems model of change (sometimes known as the Leavitt diamond). The systems model of change, described in chapter 11, has as its premise that when an organization experiences a change in any of the four key variables—technology, tasks (business process), people (job performance), and structure (business goals/management)—there is a resultant change in each of the others. Visualize the diamond made of four plastic straws.

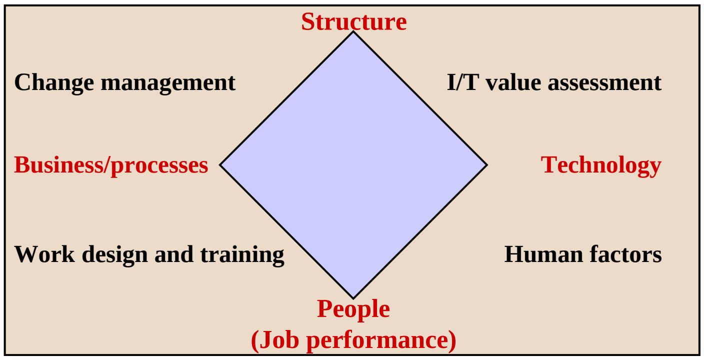

Figure 14-6 A systems model identifying variables EUIS projects

When any of the straws is pushed, the shape of the diamond changes. Figure 14-6 also lists other intervening variables that affect the interrelationship among the four key variables. These intervening variables maybe the cost/value of technology, (chapter 9), human factors (chapter 10), change management (chapter 11), job redesign (chapter 12), and training and support (chapters 6 and 7).

Although Figure 14-6 offers a conceptual view of the variables related to successful EUIS projects, translating these concerns into action requires a specific approach. EUIS project management extends the traditional project management model to address the dimensions of job performance, business process redesign, and structure. This approach provides a framework for directly linking systems design to business restructuring.

The next section presents a framework for EUIS Project Management. The method adapts the steps of traditional Systems Development Life Cycles (SDLC) by incorporating the other dimensions that EUIS projects must address simultaneously. Thus, it incorporates design principles in line with action research and third wave problem solving. However, differences in the scope, requirements, design, and implementation mandate that the steps be adapted to the scope and needs of the project at hand.

14.5 EUIS PROJECT MANAGEMENT (EPM)

EUIS Project Management (EPM) begins with defining the project scope and its objectives. The project is NOT considered truiy complete until achievement of those objectives has been demonstrated. During the final step, the technology is incorporated into the way organizations operate. Using Lewin's term, the organization is *refrozen;* using the Coates Model of Technology Infusion, the organization is transformed. (See chapters 11 and 13 for a discussion of these models.)

EUIS project management method presented here uses Lewin's unfreeze— move— refreeze approach as an overall framework for its eight action steps. The scope of who solves the problem is expanded here to incorporate Weisbord's third wave management concept that all stakeholders should be part of the process. Specific steps include action addressing each of the four points of the Leavitt diamond—technology, task (work processes), people (job performance), and structure (organization/management).

The value of the EPM is its basis for project management. Each action step has specific tasks and *deliverables,* or outcomes, that represent important milestones and checkpoints. Deliverables document the work of each step in a format that can be handed off to others as input for subsequent steps. Following the steps helps keep the project on track and within budget. The project manager is accountable for planning and staffing the project, getting approvals from project sponsors, ensuring that all deliverables are completed on time, and following through to the completion of the project.

The method described in this text is the basis for translating the theoretical into the practical. Not all EUIS projects follow all the steps. *The usefulness of the EPM depends upon the scope of the project, as well as previous experiences in managing projects.* Even EUIS projects that are handled on an ad hoc or quick-fix basis benefit from following an abbreviated form of the method on an informal basis. When a project is larger, more people are involved, the project is more complex, the need for coordination is greater, and the structured EPM becomes more important to managing the project. Also, the more that is learned from previous use of specific tactics, the more one can adapt the steps to specific situations and organizations. Therefore, larger projects benefit more from the entire approach. In addition, the more EPM is used, the more it can be adapted to a given organizational environment.

14.5.1 EPM Action Steps

Following the process step by step helps keep the project focused (within its boundary) and on track. As anyone who has attempted to build a house knows, such project management is needed to keep various subcontractors on schedule. Each of the specific action steps, with its associated tasks and deliverables, is discussed in detail in the next two chapters of this text. Following is a brief overview of the steps.

1. **Define Project Scope** As discussed in previous chapters, systems typically are built to satisfy a business objective. What is the system's goal? What is the scope (boundary) of the project? Who will pay for the project? Who are the major stake-holders? What are the expected results? When is the project to be completed? What is the budget? Answers to these questions identify the *scope* of the project. EUIS projects range from selecting the best notebook computer for an individual to designing an executive support system for the CEO of the organization or networking international offices. Obviously, the scope of the project determines the detail to which the other project steps are carried out.

   Deliverables: Deliverables for step 1 include (1) a statement of project scope that identifies expected results, objectives, major stakeholders, and time frames; and (2) formal agreement of the project sponsor.
2. **Plan the Project** The objective of the second step is to establish the project organization, assemble a project team, and develop a detailed work plan. An initial assessment is made during this phase as a basis for planning and estimating. Project planning is an iterative process. The project and plan depend upon the amount and accuracy of available information. As new information comes to light or as available information becomes more accurate, necessary changes in one step may cause the redesign and reworking of other phases of the project. Thus, the deliverables are evolving constantly until final project completion.

   Deliverables: Important deliverables for step 2 include (1) a decision on a project method; (2) project team assignments; (3) definition of roles and responsibilities; (4) detailed work plan for the next step; and (5) a high-level work plan identifying major tasks and target dates for the entire project.
3. **Assess Requirements** Sometimes the analyst can determine feasibility based on the statement from step 1. Often, however, a much more detailed analysis is needed to determine requirements and evaluate alternatives. Assume, for example, that the notebook computer mentioned in step 1 is for the entire sales force, not a single individual. Who would be impacted by this decision? How feasible would such a purchase be? How would the notebook improve performance? What software would

be provided? Do the benefits outweigh the costs? Does the network fit in with the overall systems architecture of the organization?

Deliverables: The main deliverables for step 3 include (1) a series of models describing current jobs, business processes, organization structure, and existing systems; (2) a vision statement linking business goals and technology plans; (3) a statement of system requirements and possibly a design prototype; (4) a more refined comparison of expected benefits to expected costs; and (5) a detailed project proposal for sponsor approval.

4. **Describe the Proposed Solution in Detail** Once the requirements study is approved by the project sponsors, the next step is to determine *exactly* how business processes can be streamlined and what the system is expected to do. Working with end users and managers, the project team develops detailed specifications for work process redesign and systems requirements.

   Deliverables: Major deliverables for step 4 include (1) specifications for redesigning business processes, procedures, and jobs; and (2) systems specifications or a request for a proposal (RFP) that identifies systems requirements and other details, such as the needed implementation date.

5. **Select or Develop Solution** If the system is bought off the shelf, a comparison among those systems that meet the systems requirements described in step 4 is made. If the solution is to be developed externally (e.g., by a consulting firm or vendor), a decision is made as to which option would result in the delivery of the right system at the right time for the right price. Internally developed solutions require that the programmers and analysts agree on specifications.

   Deliverables: Important deliverables for step 5 include: (1) contracts with vendors or an agreement with a developer that details systems specifications; (2) developed or customized software and applications; (3) fully configured and tested hardware, software, or communications system ready for installation in the user environment; and (4) a detailed conversion and implementation plan that takes into account any physical changes (e.g., data conversion, wiring), as well as issues related to effective use (e.g., job design and training).

6. **Implement the Solution** Implementation involves installing or putting into use all the previously planned components of the solution. Implementation may be done in phases if the project is large. For example, if the system replaces an existing system, files will need to be converted to the new system. In the case of document management systems, paper or electronic files must be set up on a server. Databases may need to be developed and populated, form letters automated using macro languages, mail merge procedures set up, and printers and software configured with appropriate fonts and drivers. Many other such requirements also must be implemented. Sometimes a trial or pilot test is scheduled. Implementation also includes job design, training, and work flow modifications. Ideally, however, these considerations were addressed continually within the previous five steps. At this stage, the focus should be on putting into use all previously planned systems, applications, procedures, and work flow.

   Deliverables: The main deliverable for step 6 is an accepted working version of the new system, including redesigned jobs, business processes, and work flow, as needed.

7. **Evaluate Results Evaluation is ideally an ongoing process**. The project team receives continual feedback (evaluation) from all those involved with the system assessment, design, and implementation process. This feedback should be monitored and, when necessary, the system corrected. In practice, however, projects have an end date and operations return to business as usual. Therefore, it is important in EUIS projects to allow sufficient time to evaluate results against planned business and system objectives and to identify additional actions needed to achieve them.

   Deliverables: Important deliverables for step *7* include (1) progress reports or post-implementation benefit analyses that measure actual results against initial goals; and (2) specifications for remedial training; advanced training; additional applications; modifications or enhancements to systems; or further changes in business processes, procedures, and jobs.
8. **Institutionalize New Business Processes** In EUJS projects, performance goals and objectives seldom are reached simply by implementing new systems. In a dynamic business environment, it takes time and continual reinforcement to effect the alterations in work habits and patterns, business processes, management practices, and other variables needed to sustain significant changes that can be carried to the bottom line.

   Deliverables: The deliverables for step 8 will vary. They may include (1) specific training programs; (2) new work procedures; (3) new applications; or (4) system enhancements.

14.5.2 The EPM Model

In summary, EUIS project management addresses improvement of individual job performance, business process design, and management control, as well as technology design. In other words, EUIS systems design takes a broad view that includes within the project scope people, structure, business processes, and technology and addresses all of these aspects. In Figure 14-7, this perspective is represented in a three-dimensional diagram that shows the eight steps of the EUIS project management method. The diagram depicts specific systems design tasks required to address the dimensions of job performance, business process, and structure at the same time as the technical system is developed. Note that the technology perspective cuts across the other three dimensions because technology is viewed as the catalyst or enabler for changes in the other three dimensions. Strategies for completing each step are categorized as addressing job performance considerations, business process considerations, structure, and technology design. These steps in relationship to key design variables are summarized in Figure 14-7.

14.6 SUMMARY

This chapter provides an overview of theory related to concepts and frameworks for EUIS projects. Because of the expense, importance, and complexity of EUIS, danger exists in planning large-scale systems on an ad hoc basis. Systems implemented on an ad hoc basis may solve a particular problem, but~the solution probably will not have considered the overall information needs of the organization, job performance, or business processes & addressed hardware compatibility issues.

The first part of this chapter outlined conceptual approaches to EUIS analysis and theoretical foundations of systems design. Six perspectives—organizational communication, functional approach, decision support, information resource management, quality of work life, and management of computing resources— were discussed. An analyst or manager needs to understand the variety of perspectives from which an EUIS project is viewed and evaluated by various stakeholders. Everyone involved in an EUIS may be examining a system's usefulness from a different perspective.

Then, general systems theory was examined. A *system* was defined as "a set of separate but interrelated components that process input into desired output." A system may be a subsystem of a larger suprasystem and may itself have subsystems.

Project Steps	People (Job Performance	Business Process	Structure (Organization/ Management)	TEKNOLOGY DESIGN
1. Define Project Scope Establish clear understanding, or problems to be addressed, boundaries (scope) of the project, expected benefits, and resources required. Obtain project sponsorship (funding).	Identify number of workers affected. identify levels and types of jobs affected. Establish individual performance objectives.	identity business departments affected. Identify and describe specific business functions and tasks affected. Identify high level data subjects and Information needs, Develop work process objectives,	Select business Sponsor (s). Define business objectives. Identify expected benefits. Identify critical success factors (CSF). Identify all stakeholders (those who have most to win or lose by maintaining or changing current procedures, functions, organization). Assess project priority based on preliminary cost—benefit analysis. Establish target date.	Define system objectives Define expected result Define system benefit Obtain preliminary Agreement on approach Estimate development/ Implementation time Estimate cost range
2. Plan the Project Establish project organization. Make Initial assessment. Develop a detailed work plan and assemble project team.	Establish approach for work process redesign.	Relate functions to current organizations, Relate functions to data subjects. Relate functions to information needs. Determine dependency among functions.	Establish project review board/steering committee. Define management control measures. Assemble project team. Assign roles and responsibilities. Develop initial project work plan with tasks, target dates, and responsibilities.	Establish project Methodology based on Scope, objectives approach, and time. Train and educate project team and managers in the process and methods
3. Assess Requirements Understand and document the structure and purposes of the current system. Determine requirements for a new system. Evaluate alternative solutions and recommend ~ the preferred solution.	identify knowledge, skiffs, and abilities of users. Collect current job descriptions. Determine current performance criteria/measures, Do a cost—benefit analysis for individual workers. Document what changes are needed and why.	Perform a task analysis. Document current work processes. Document current procedures and work flows, Identity major inputs and outputs for an affected work processes. Document what changes are needed and why. Develop business models.	Define mission of all functions/departments to be Impacted. Assess impact on organization structure. Identify internal and external clients. Obtain organization charts of affected departments. Identify CSF for business. Develop more refined cost—benefit analysis. Develop vision statement linking business goals and 'technology plans. Assess organizational culture. Assess climate for change. Obtain sponsor approval to proceed to next phase.	Analysis current system (manual mechanical, or automated). Determine technology requirement of new system Identify need to interface with with other system Assess available technology environment Estimate capacity requirements Study alternative solutions. Design a prototype Define system tactics and Alternatives for achieving EUIS objectives.

Figure 14-7 EUIS project management model: Action steps and activities related to key variables

Project Steps	People (Job Performance	Business Process	Structure (Organization/ Management)	TEKNOLOGY DESIGN
4. Design: Describe the System in Detail Develop detailed specifications for the proposed project solution,	Develop skits inventory. Define instructional strategies. Identify skiffs, knowledge, and information required for different positions. Analyze job design. Develop new job descriptions. Define team/group roles and responsibilities.	Identify tasks that can be streamlined, eliminated, or combined with automation, Document proposed new work processes design. Document proposed new work flows. Define business requirements for all applications to be automated. Define requirements for help systems. Develop performance benchmarks/measures.	Conduct client survey (to determine service/quality factors from client's perspective). Define quality. Define best practices. Develop proposed organization charts. Define requirements! objectives for organizational restructuring. Set up model office, if needed.	Determine system requirement Document existing systems. Define specifications for proposed system or system alternatives Develop request for proposal For system/work to be contracted Evaluate alternative proposals Conduct benchmark testing
5. Select or Develop Solution Bring a working version of the system to a usable stage. Write and test all customized software, applications, procedures, documentation, and training materials.	Develop training program. Develop cross-training plan. Develop documentation. Develop help systems. Develop CBT. Develop job aids.	Develop and document new procedures. Develop conversion plan. Create test cases and procedures. Develop training database, if needed.	Develop change management strategies. Develop new management measures. Define quality control measures and monitoring procedures. Create physical Site plans. Create detailed implementation plan.	Selected application software Select hardware, system software communication network Modify/customize software as planned. Construct software application, menus, interfaces Secure needed contracts. Test all hardware and software
6. Implement Solution Implement all necessary steps to convert from existing operating environment to the new system.	Train in software skills. Train in EUIS application development skills, Train in now job skills or cross train, Maintain business activity as training is conducted. Provide hot line and other support. Establish group procedures.	Install new procedures. Convert all work to new systems/procedures. Eliminate tasks/procedures replaced by new ones.	Implement model office activities. Make adjustments based on model office experience. Prepare facilities. Cut over to new systems or Implement all planned installations. implement new measurements. Implement change strategies. Install backup and security procedures.	Install pilot locations. Make adjustments based on pilot results. Install hardware and software at all locations.. Resolve any technical problems.

Figure 14-7 (continued)

Project Steps	People (Job Performance	Business Process	Structure (Organization/ Management)	TEKNOLOGY DESIGN
7. Evaluate Results Determine If new system meets performance criteria, satisfies defined project objectives, and meets client expectations. Identify additional action (steps) to be taken.	Identify any performance problems. Identify additional training needs, such as problems with tasks, and the use of system features. Identify where users are in the learning curve, Assess level of needed behavior changes.	Identify bottlenecks. Resolve problems with new processes. Respond to new ideas/new insights for additional improvements. Assess user problems. acceptance, applications.	Assess actual results against planned results. Assess client satisfaction with new system.	Assess system Performance.. Troubleshoot problems with hardware or software
8. Institutionalize New Business Processes Provide reinforcement needed to sustain workplace changes. Capitalize on new learning and Insight to Improve results.	Deliver remedial training. Deliver advanced training, Reinforce/reward desired new behaviors,	Modify work processes as needed. Implement additional/more advanced applications, Provide additional business training,	Refine business criteria and success measures. Develop new measures if appropriate. Reinforce organizational changes. Bring benefits to bottom line.	Make any needed system modifications. Develop any needed enhancements. Acquire additional hardware/software,

Figure 14-7 (continued)

System may be either open or close, depending upon the degree they are impacted upon by events outside their boundaries. It is difficult to conceptualize a truly closed system because even the most closed system is affected by what happens in its environment. Systems have a tendency toward disorder; the more closed a system is, the more likely it is that entropy will result. Interface, the region between systems, is responsible for the transference of one system's output as the input for another system. Systems analysis is based on feedback—knowledge that the actual system output is or is not what was expected.

Coordination theory was overviewed. Researchers at Massachusetts Institute of Technology explained that coordination theory is a body of principles about how actors perform independent activities that achieve goals. Many of the most important uses of computers today are not just for computing things, but for coordinating activities. Understanding this coordination is important to studying the impact that technology has on the organizational structure, the design of cooperative work tools, and the design of distributed and parallel processing computer systems.

Weisbord's third wave consulting extends participative management (Lewin) and systems thinking (Emery and Trist) to incorporate a third aspect, the entire system and all its stakeholders. Weisbord, in an attempt to provide workers with more meaning and community in the workplace, and therefore with information technologies, explains that involvement by workers in all steps of the project is important, and that steps change dependent upon ~specific situations that also are changing constantly.

The EUIS Project Management Model marries these theoretical foundations with standard project management practices. The result is a systematic approach for addressing the development of IT solutions that meet the needs of individuals, work groups, and the organization. The EPM consists of eight separate steps, with each step requiring a deliverable or outcome to be used in the subsequent step. The steps are: (1) define project scope; (2) plan the project; (3) study project feasibility; (4) analyze project in detail; (5) select or develop solution; (6) convert and implement new solution; *(7)* evaluate results and modify; and (8) institutionalize results. The EPM may be viewed as an action research cycle as the outputs of one step become the inputs for the next step, and the evaluation stage of one project may lead to the assessment stage for another.

KEY TERMS

- Boundary
- Closed system
- Coordination theory
- Decision support approach
- Entropy
- Environment
- EUIS project management
- Feedback
- Functional approach
- Information resource management approach
- Interface
- Open system
- Organizational communication approach
- Project
- Quality of work life approach
- System/subsystem/suprasystem
- Systems analysis
- Systems theory
- Third wave management
- Throughput

DISCUSSION QUESTIONS

1. What is a theory? How does theory relate to practice?
2. A conceptual approach *to* EUIS analysis is *simply* a *way* of assessing the perspective from which different people in the organization view a project. Which of the following would be the primary perspective from which the CEO, the CIO, the branch manager, the salesperson, and the claims adjustor would view a, new claims management system?
   a. Organizational communications
   b. Functional
   c. Information resource management
   d. Decision support approach
   e. Quality of work life
   f. Management of computer resources

3. What is a system? Give an example of a system and describe it, using the systems components listed in this text.
4. Define *coordination.* Give examples of coordination that you see every day. How is coordination theory considered useful for systems design and project management?
5. Explain how the systems model of change can be used to show the relationship among technology, business processes, job performance, and structure goals. What other variables help explain successful systems?
6. How does the EUIS Project Management (EMM) compare with the traditional Systems Development Life Cycle (SDLC)?
7. How is the work of Lewin, Leavitt, and Weisbord the conceptual base for the EUIS Project Management Model?
8. List the eight steps of the EUTS Project Management Model. What are the deliverables for each step?

APPLICATION EXERCISES

1. Interview two systems analysts or project managers and ask what their jobs entail and how they go about their work. Which approach or approaches do they follow? Can each approach be labeled? Compare responses from your interviews with classmates' findings.
2. Put yourself in the role of a systems consultant. You've just been called in by a major company to manage an EUIS project. Make a list of the questions you will need for your first meeting.

SUGGESTED READINGS

Tapscott, Don, Alex Lowy, and David Ticoll. *Blueprint to the Digital Economy: Creating Wealth in the Era of E-Business.* (New York McGraw-Hill, 1998).

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ENDNOTES

1. Don Tapscott. *Office Automation: A User-Driven Approach.* (New York: Plenum Press, 1982): 66.
2. Thomas W. Malone and Kevin Crowston, "*Toward an Interdisciplinary Theory of Coordination,*" Technical Report CCS TR# 120 (Cambridge, MA: Massachusetts Institute of Technology, 1991).
3. Ibid
4. Ibid., P.259