CHAPTER 9

IT Planning and Business Process Redesign

LEARNING OBJECTIVES
After studying this chapter, you will be able to:

1. Discuss the importance, evaluation, and approaches to IT planning.
2. Explain the four-stage model of information systems planning, and discuss the importance of aligning information systems plans with business plans.
3. Describe several different methodologies for conducting strategic information systems planning.
4. Describe information requirement analysis, project payoff and portfolios, resource allocation, and project planning.
5. Identify the different types of information technology architectures and outline the processes necessary to establish an information architecture.
6. Discuss the major issues addressed by information systems planning.
7. Distinguish the major Web-related IT planning issues and understand application portfolio selection.
8. Describe the need for business process redesign and the methodologies for doing it.
9. Explain the IT support for processes redesign and BPR, and describe redesign efforts, successes, and failures.
10. Describe organizational transformation and change management related to business processes redesign.
HOW TRUSERV PLANNED ITS INFORMATION TECHNOLOGY

THE PROBLEM

TruServ Corp. (truserv.com) was created in 1997 by the merger of Cotter & Co. and Servistar Corp. TruServ, one of the largest hardware suppliers in the United States, has annual wholesale sales of about $5 billion, which supports sales of some $15 billion retail. A major challenge was to merge the information systems of the two companies. The two systems were completely different, so their integration was a major problem for TruServ.

THE SOLUTION

To do the integration, Paul Lemerise, CIO of TruServ, relied on a strategic IT plan. Lemerise turned first to Ernst & Young, a major CPA/IT consultant with which he had worked before on external auditing. He created a planning team that included the consultants and executives from the two merging companies. Lemerise did not include IT executives because he wanted strong input from the business side. He felt that he and the consultants knew enough about IT to represent the interest of the IT managers.

The team decided to include both a short-term tactical plan and a long-term strategic plan. The short-term plan was aimed at supporting the immediate needs of TruServ. It ensured that projects such as the corporate intranet would be on track. It also established a help desk. The long-term plan examined such issues as e-procurement and other e-commerce applications.

The team examined the merger plans and the business plan of the new corporation. It conducted interviews with 30 top executives regarding business goals and technology wish lists. Of special importance were long meetings with the CEO, who got very excited about the possibilities the new system could offer, in particular, e-business.

Once the interviews were completed, Lemerise met with all the executives together, in an attempt to reach a consensus about the priorities of IT projects and the entire strategic plan. The formal IT strategic plan was completed in July 1997. It included all major initiatives for three years, such as the move to one common retail system, and delineated how the company would use the intranet and e-commerce. The topics ranged from the use of wireless technologies in the warehouses to collaboration with business partners.

THE RESULTS

The plan has remained fluid. It has been reevaluated and updated with new business goals every six months since its inception. This flexibility has enabled TruServ to introduce new initiatives as needed. For example, in 2000 and 2001 the company embarked on several Web-based projects, including a Web-centric collaborative technology to streamline its supply chain and transportation networks. An e-commerce linkage with midmarket suppliers was announced in December 2000. TruServ decided not to plan for more than three years in the future (“anything beyond planning for three years often doesn’t happen”), but
every year the planning horizon is extended one year. The plan includes a return on investment (ROI) section, which takes into account such intangible items as improving communication with customers.

Sources: Condensed from Blodgett (1998) and from truserv.com (2001).

LESSONS LEARNED FROM THIS CASE

The case of TruServ demonstrates the benefits of a formal IT plan, especially for large corporations. It also demonstrates that there are different types of plans (e.g., tactical and strategic), and that end users as well as the CEO must be involved in the planning.

One of the major concerns of organizations today is how to transform yesterday’s organization to a successful one in the digital economy. Many times, before e-commerce is undertaken, processes such as procurement must be redesigned or reengineered. Therefore IT planning frequently involves planning to redesign business processes as well (see El Sawy, 2001).

This chapter first describes the evolution and issues of IT systems planning. Then it presents a four-stage model of information systems planning: strategic planning, requirements analysis, resource allocation, and project planning. Next, it discusses methodologies for operationalizing the model, with primary emphasis on the stages of strategic planning and requirements analysis. (Planning for developing individual applications is discussed in Chapter 14.) Moving to business process redesign and to organizational transformation, the chapter describes the value and method of redesign and BPR and how IT supports them. Finally, the chapter deals with transforming organizations to e-business and managing change.

9.1 IT PLANNING—A CRITICAL ISSUE FOR ORGANIZATIONS

IT planning is the organized planning of IT infrastructure and applications portfolios done at various levels of the organization. The topic of IT planning is very important for both planners and end users: End-users often do IT planning for their own units, and they also frequently participate in the corporate IT planning. Therefore end-users must understand the planning process. Corporate IT planning determines how the IT infrastructure will look. This in turn determines what applications end users can deploy. Thus the future of every unit in the organization could be impacted by the IT infrastructure.

A survey of more than 500 IT executives, conducted in 2003, by cio.com, revealed that strategic thinking and planning was the number-one concern for CIOs (cio.com, 2003). It was also among the top issues in 2000 and 2001. Why does strategic planning continuously rank high as an issue of concern among IT executives? Simply put, because IT has to work closely with an organization’s business side to make sure the company stays competitive. Aligning the goals of the organization and the ability of IT to contribute to those goals can deliver great gains in productivity to the organization. According to Blodgett (1998), as the demands of an increasingly competitive workplace call for closer integration of IT goals and the business mission, strategic plans for the whole enterprise become more important. In addition, with advances in Web-based supply chain collaborations
and integration of e-marketplaces with buyers, sellers, and service providers, a good business strategy involves an IT strategy that keeps in mind the internal customers as well as the external customers and vendors. Aligning IT with the business is a process rather than an event, and IT strategy should be based on adding value to the organization’s activities.

**The Evolution of IT Planning**

During the early years of information technology, in the late 1950s and 1960s, developing new applications and then revising existing systems were the focal points for the first planning and control systems. Organizations adopted methodologies for developing systems, and they installed project management systems to assist with implementing new applications. These initial mechanisms addressed *operational* planning. As organizations became more sophisticated in their use of information systems, emphasis shifted to *managerial* planning, or resource-allocation control. In the 1990s, the role of IT evolved to helping organizations to reach their business goals and to create competitive advantage. Currently the particular focus of IT strategy is on how IT creates business value.

Typically, annual planning cycles are established to identify potentially beneficial IT services, to perform cost-benefit analyses, and to subject the list of potential projects to resource-allocation analysis. Often the entire process is conducted by an IT *steering committee* (see Chapter 15). The steering committee reviews the list of potential projects, approves the ones considered to be beneficial, and assigns them relative priorities. The approved projects are then mapped onto a development schedule, usually encompassing a one- to three-year time frame. This schedule becomes the basis for determining IT resources requirements such as long-range hardware, software, personnel, facilities, and financial requirements.

Some organizations extend this planning process by developing additional plans for longer time horizons. They have a *long-range IT plan*, sometimes referred to as the *strategic IT plan* (see Ward and Peppard, 2002, and Boar, 2000). This plan typically does not refer to specific projects; instead it sets the overall directions in terms of infrastructure and resource requirements for IT activities for five to ten years in the future.

The next level down is a *medium-term IT plan.* It identifies the applications *portfolio*, a list of major, approved IS projects that are consistent with the long-range plan. Since some of these projects will take more than a year to complete, and others will not start in the current year, this plan extends over several years.

The third level is a *tactical plan*, which has budgets and schedules for current-year projects and activities. In reality, because of the rapid pace of change in technology and the environment, short-term plans may include major items not anticipated in the other plans.

The planning process just described is currently practiced by many organizations. Specifics of the IT planning process, of course, vary among organizations. For example, not all organizations have a high-level IT steering committee. Project priorities may be determined by the IT director, by his or her superior, by company politics, or even on a first-come, first-served basis.

**Executing IT Planning**

IT planning is a lengthy and complex process, and it can be done by several alternative approaches.
IT PLANNING APPROACHES. In the IT planning process, organizations need to first determine whether the use of IT is to achieve a competitive advantage or to support an operational role. Earl (1989) identified five types of planning approaches in response to the changing focus and increasing maturity of the IT strategy process. The five different approaches, which are still valid, are:

- **Business-led approach.** The IT investment plan is defined on the basis of the current business strategy. This approach emphasizes that business strategy should lead IT strategy.
- **Method-driven approach.** The IS needs are identified with the use of techniques and tools (often used or prescribed by consultants).
- **Technological approach.** Analytical modeling (e.g., computer-aided software engineering, CASE) and other tools are used to execute the IT plans.
- **Administrative approach.** The IT plan is established by the steering committee or management to implement an approved IS initiative.
- **Organizational approach.** The IT investment plan is derived from a business-consensus view of all stakeholders in the organization (management and end users) of how IT/IS fits the organization’s overall business objectives.

Organizations may use one or more of these approaches, or some combination or variant of them. They may also use some formal model of planning.

A FOUR-STAGE MODEL OF IT PLANNING. Several models have been developed to facilitate IT planning (e.g., see Ward and Peppard, 2002; Cassidy, 1998; and Papp, 2001). Of special interest is Wetherbe’s (1993) four-stage model of planning. The model (depicted in Figure 9.1) consists of four major activities—strategic planning, requirements analysis, resource allocation, and project planning—and it is valid today. The stages involve the following activities:

- **Strategic IT planning:** establishes the relationship between the overall organizational plan and the IT plan
- **Information requirements analysis:** identifies broad, organizational information requirements to establish a strategic information architecture that can be used to direct specific application development
- **Resource allocation:** allocates both IT application development resources and operational resources
- **Project planning:** develops a plan that outlines schedules and resource requirements for specific information systems projects

Most organizations engage in all four stages, but their involvement in the specific stages tends to be sporadic and prompted by problems as they occur, instead of reflecting a systematic, stage-by-stage process. The four-stage model can be expanded to include major activities and outputs of the four stages. The model moves from a high level of abstraction to a more concrete formulation.
9.2 STAGE 1: STRATEGIC INFORMATION TECHNOLOGY PLANNING

The first stage of the IT planning model is strategic information technology planning (SITP). It includes several somewhat different types of activities. On the one hand, it refers to identifying the applications portfolio through

**APPLICATIONS PORTFOLIO.** An applications portfolio is the mix of computer applications that the information system department has installed or is the process of developing on behalf of the company. Building upon the “McFarlan grid” (see Online File W3.2), the applications portfolio categorizes existing, planned, and potential information systems based on their business contributions. This 2 × 2 matrix is a powerful IT planning tool (as shown in Figure 9.2), which is very easy to grasp and understand.

Let’s now begin at Stage 1 in the four-stage model of IT planning.

![Figure 9.2 Applications portfolio matrix. (Sources: Ward and Peppard 2002, Figure 1.7, p. 42.)](image)
which an organization will conduct its business. These applications make it possible for an organization to implement its business strategies in a competitive environment.

On the other hand, SITP can also refer to a process of searching for strategic information systems (SIS) applications that enable an organization to develop a competitive advantage, as discussed in Chapter 3, rather than just maintaining its position. To accomplish this goal, the organization must do some creative thinking: This involves assessing the current business environment and the organization's objectives and strategies, understanding the capabilities of existing systems, and looking ahead to how new IT systems could produce future advantages for the organization.

The output from the SITP process should include the following: a new or revised IT charter and assessment of the state of the information systems department; an accurate evaluation of the strategic goals and directions of the organization; and a statement of the objectives, strategies, and policies for the IT effort.

Ward and Peppard (2002) provided a more in-depth analysis on the strategic planning and proposed a framework for IT strategy formulation and planning. Details are found in Online File W9.1.

Improving the planning process for information systems has long been one of the top concerns of information systems department management. The Society for Information Management (SIM) (simnet.org, 2002) found this to be the number-one issue in surveys of senior IT executives in 1997/1998. A survey of 420 organizations, conducted by NCC in 2003 (ncc.co.uk, 2003), found that keeping IT strategy aligned with business strategy was their number-one strategic concern.

Strategic information technology planning (SITP) must be aligned with overall organizational planning, whenever relevant, so that the IT unit and other organizational personnel are working toward the same goals, using their respective competencies (Chan, 2002; Pickering, 2000; Ward and Peppard, 2002). The primary task of IT planning is therefore to identify information systems applications that fit the objectives and priorities established by the organization. Figure 9.3 graphically illustrates the alignment of IS strategy, business strategy, and IT strategy and deployment. IT At Work 9.1 demonstrates how alignment was done at Hewlett-Packard. For another example of alignment of business strategy and IT strategy, see Cale and Kanter (1998).

**CHALLENGES FOR IT ALIGNMENT.** Despite the theoretical importance of IT alignment, organizations continue to demonstrate limited actual alignment. People 3 Inc. (2003) reported that about 65 percent of companies have either a negative or neutral view of the ability of IT and business managers to work together in supporting corporate goals and objectives. Alignment is a complex management activity (Hackney et al., 2000), and its complexity increases in accordance with the increasing complexity of organizations (For the IS complexity framework, see Hackney et al., 1999, and Hackney et al., 2000). A study conducted by Chan (2002) also found that informal organizational structure results in better IT alignment and performance. (For a listing of the fundamentals assumptions upon which the SITP process is grounded, and the challenges to those assumptions, see Online File W9.2 and Hackney et al., 2000.)
HEWLETT-PACKARD ALIGNS BUSINESS AND IT STRATEGIES

Hewlett-Packard (hp.com) developed a planning methodology in which business processes strategies and technologies are defined and aligned concurrently. This methodology was designed to allow the company to make process changes regardless of the limitations of the existing technology, and it gives visibility to the impacts that new technologies and processes have on each other.

In the past, Hewlett-Packard had used a sequential process. First, it defined the business strategy and the operations and supporting strategies, including technologies. Then, all these functions were aligned and replanned, taking into consideration the technologies available. In the new methodology, the planning is performed for all areas concurrently. Furthermore, the entire approach is complemented by a strong focus on teamwork, specialized and objective-driven functional areas and business units, and a commitment to quality and customer satisfaction. The approach links strategy and action. The business alignment framework takes into account the necessary process changes resulting from changes in the business environment, as well as potential technological developments. But, because major changes may result in a change in value systems as well as culture and team structures of the organization, H-P includes these factors within the planning methodology.

Target processes, technologies, and standards drive the selection of potential solutions. The participative management approach ensures effective implementation. According to the framework, business processes and information requirements are defined in parallel with technology enablers and models, which are then linked throughout the alignment process. Adjustments and refinements are made continuously.

Sources: Compiled from Feurer et al. (2000) and from hp.com (2001).

For Further Exploration: Why is concurrent planning superior? What communication and collaboration support is needed?
Several tools and methodologies exist to facilitate IT planning. These methods are used to help organizations to align their business IT/IS strategies with the organizational strategies, to identify opportunities to utilize IT for competitive advantage, and to analyze internal processes. Most of these methodologies start with some investigation of strategy that checks the industry, competition, and competitiveness, and relates them to technology (alignment). Others help create and justify new uses of IT (impact). Ward and Peppard (2002) further categorized these methods with respect to their nature (see Online File W9.3). In the next section, we look briefly at some of these methodologies.

THE BUSINESS SYSTEMS PLANNING (BSP) MODEL. The business systems planning (BSP) model was developed by IBM, and it has influenced other planning efforts such as Andersen Consulting’s (now Accenture’s) method1 and Martin and Finkelstein’s information engineering (Martin and Finkelstein, 1981). BSP is a top-down approach that starts with business strategies. It deals with two main building blocks—business processes and data classes—which become the basis of an information architecture. From this architecture, planners can define organizational databases and identify applications that support business strategies, as illustrated in Figure 9.4. BSP relies heavily on the use of metrics in the analysis of processes and data, with the ultimate goal of developing the information architecture. (For details see Business Systems Planning, 1981, and Online File W9.4.)

THE STAGES OF IT GROWTH MODEL. Nolan (1979) indicated that organizations go through six stages of IT growth (called “IS growth” at that time). A Closer Look 9.1 describes these six stages. In each stage, four processes are active to varying degrees. These are the applications portfolio, users’ role and awareness, IT resources, and management planning and control techniques. The y axis in the figure in A Closer Look 9.1 (p. •••) refers to IT expenditures. Note that the growth rate of IT expenses is low during data administration, medium during initiation and maturity, and high during expansion (contagion) and integration. In addition to serving as a guide for expenditure, the model helps in determining the seriousness of problems. (For more on Nolan’s stages of IT growth, see Online File W9.5.)
Critical success factors (CSFs) are those few things that must go right in order to ensure the organization's survival and success. The CSF approach to IT planning was developed to help identify the information needs of managers. The fundamental assumption is that in every organization there are three to six key factors that, if done well, will result in...
the organization’s success. Therefore organizations should continuously measure performance in these areas, taking corrective action whenever necessary. CSFs also exist in business units, departments, and other organizational units.

Critical success factors vary by broad industry categories—manufacturing, service, or government—and by specific industries within these categories. For organizations in the same industry, CSFs will vary depending on whether the firms are market leaders or weaker competitors, where they are located, and what competitive strategies they follow. Environmental issues, such as the degree of regulation or amount of technology used, influence CSFs. In addition, CSFs change over time based on temporary conditions, such as high interest rates or long-term trends.

IT planners identify CSFs by interviewing managers in an initial session, and then refine these CSFs in one or two additional sessions. Sample questions asked in the CSF approach are:

- What objectives are central to your organization?
- What are the critical factors that are essential to meeting these objectives?
- What decisions or actions are key to these critical factors?
- What variables underlie these decisions, and how are they measured?
- What information systems can supply these measures?

The first step following the interviews is to determine the organizational objectives for which the manager is responsible, and then the factors that are critical to attaining these objectives. The second step is to select a small number of CSFs. Then, one needs to determine the information requirements for those CSFs and measure to see whether the CSFs are met. If they are not met it is necessary to build appropriate applications (see Figure 9.5).

The critical success factors approach encourages managers to identify what is most important to their performance and then develop good indicators of
performance in these areas. Conducting interviews with all key people makes it less likely that key items will be overlooked. On the other hand, the emphasis on critical factors avoids the problem of collecting too much data, or including some data just because they are easy to collect.

**SCENARIO PLANNING.** **Scenario planning** is a methodology in which planners first create several scenarios, then a team compiles as many as possible future events that may influence the outcome of each scenario. This approach is used in planning situations that involve much uncertainty, like that of IT in general and e-commerce in particular. With the rapid changes of technologies and business environment, Stauffer (2002) emphasized the need for scenario planning. Five reasons to do scenario planning are: (1) to ensure that you are not focusing on catastrophe to the exclusion of opportunity, (2) to help you allocate resources more prudently, (3) to preserve your options, (4) to ensure that you are not still “fighting the last war,” and (5) to give you the opportunity to rehearse testing and training of people to go through the process. Scenario planning follows a rigorous process; the essential steps are summarized in Table 9.1.

Scenario planning has been widely used by major corporations to facilitate IT planning (e.g., neci.com and gbn.com). It also has been particularly important to e-commerce planning. For instance, creating customer scenarios helps the company better fit the products and services into the real lives of the customers, resulting in sales expansion and customer loyalty. Seybold (2001) described three cases (National Semiconductor, Tesco, Buzzsaw.com) that used customer scenarios to strengthen customer relationships, to guide business strategy, and to deliver business value.

Although EC proliferation would certainly allow any combination or variation of business scenarios, each company has to select the most appropriate model for its needs. The use of this model can help EC planners to determine the EC initiatives that best fit their organization. (See Minicase 2 for an example of implementation.)

---

**TABLE 9.1 Essential Steps of Scenario Planning**

- Determine the scope and time frame of the scenario you are fleshing out.
- Identify the current assumptions and mental models of individuals who influence these decisions.
- Create a manageable number of divergent, yet plausible, scenarios. Spell out the underlying assumptions of how each of these imagined futures might evolve.
- Test the impact of key variables in each scenario.
- Develop action plans based on either (a) the solutions that play most robustly across scenarios, or (b) The most desirable outcome toward which a company can direct its efforts.
- Monitor events as they unfold to test the corporate direction, be prepared to modify it as required.

The educational experience that results from this process includes:

- Stretching your mind beyond the groupthink that can slowly and imperceptibly produce a sameness of minds among top team members in any organization.
- Learning the ways in which seemingly remote potential developments may have repercussions that hit close to home.
- Learning how you and your colleagues might respond under both adverse and favorable circumstances.

(Source: Compiled from Stauffer (2002).)
The next three stages of the four-stage planning model are inter-related; they start with information requirements.

The second stage of the model is the information requirements analysis, which is an analysis of the information needs of users and how that information relates to their work. The goal of this second stage is to ensure that the various information systems, databases, and networks can be integrated to support the requirements identified in stage 1 to enable decision making.

In the first step of information requirements analysis, IT planners assess what information is needed to support current and projected decision making and operations in the organization. This is different from the detailed information requirements analysis associated with developing individual application systems (i.e., identifying required outputs and the inputs necessary to generate them, which we describe in Chapter 14). Rather, the stage 2 information requirements analysis is at a more comprehensive level of analysis. It encompasses infrastructures such as the data needed in a large number of applications (e.g., in a data warehouse or a data center) for the whole organization. Similarly, requirements for the intranet, extranet, and corporate part are established.

There are several alternative approaches for conducting the requirements analysis. One of them is presented as a five-step model in Table 9.2. Also, some of the methods described in Chapter 14, such as JAD, can be used here.

The results of the requirements analysis exercise are threefold. It identifies high-payoff information categories, it provides a basis for the architecture of IT, and it guides in resource allocation.

**IDENTIFYING HIGH PAYOFFS.** To determine which IT projects will produce the highest organizational payoff, the organization can identify categories with high

---

**TABLE 9.2 The Five-Step Requirements-Analysis Model**

| Step 1: Define underlying organizational subsystems. | The first step is to identify the underlying organizational processes, such as order fulfillment or product analysis. |
| Step 2: Develop subsystem matrix. | The next phase is to relate specific managers to organizational processes. This relationship can be represented by a matrix. The matrix is developed by reviewing the major decision responsibilities of each middle-to-top manager and relating them to specific processes. |
| Step 3: Define and evaluate information requirements for organizational subsystems. | In this phase, managers with major decision-making responsibility for each process are interviewed in groups by information analysts in order to obtain the information requirements of each organizational process. |
| Step 4: Define major information categories and map interview results into them. | The process of defining information categories is similar to the process of defining data items for individual application into entities and attributes. |
| Step 5: Develop information/subsystem matrix. | Mapping information categories against organizational subsystems creates an information-categories-by-organizational-process matrix. Information categories can be accounts receivable, customers’ demographics, or products’ warranties. In each cell of the matrix an important information category value is inserted. |
importance-value scores, and should consider them first for feasibility. In order to identify high payoff, planners use a matrix that relates information—categories to organizational processes to identify high payoff. But this matrix does not indicate whether it is technically, economically, or operationally feasible to develop systems for each information category. The matrix merely indicates the relative importance of information. Feasibility studies and other project-related tasks must still be performed, as described in Chapter 14. This step requires substantial creativity (e.g., see Ruohonen and Higgins, 1998). In Section 9.6, we demonstrate how this is done for Web-based systems. An example of identifying high-payoff projects is provided at IT At Work 9.2.

PROVIDING AN ARCHITECTURE. Clearly defining the intersection of information and processes helps an organization avoid separate, redundant information systems for different organizational processes. When an organization decides to improve information for one process, other processes that need such information can be taken into consideration. By completing the conceptual work first, an organization can identify information systems projects that offer the most benefit and lead to cohesive, integrated systems. The resulting systems are far better than the fragmented, piecemeal systems that are continually being reworked or abandoned because they do not mesh with the organization’s general requirements. To develop such integrated systems requires systematic planning from the top down, rather than randomly from the bottom up, and this is done in the architecture phase. In Chapter 13, we describe how this has been done in the State of Iowa (see the opening case there).

GUIDANCE IN RESOURCE ALLOCATION. Once high-payoff areas of IT have been identified it is reasonable to give those areas high priority when the organization allocates resources. Such an allocation is described next.

Resource Allocation, the third stage of the IT planning model, consists of developing the hardware, software, data communications and networks, facilities, personnel, and financial plans needed to execute the master development plan as defined in the requirements analysis. This stage provides the framework for technology and labor procurement, and it identifies the financial resources needed to provide appropriate service levels to users. The financial aspect will be discussed briefly here (with a more in-depth discussion in Chapter 13).

Resource allocation is a contentious process in most organizations because opportunities and requests for spending far exceed the available funds. (See the opening case in Chapter 13.) This can lead to intense, highly political competition between organizational units, which makes it difficult to objectively identify the most desirable investments.

Requests for funding approval from the steering committee fall into two categories. Some projects and infrastructure are necessary in order for the organization to stay in business. For example, it may be imperative to purchase or upgrade hardware if the network, or disk drives, or the processor on the main computer are approaching capacity limits. Obtaining approval for this type of spending is largely a matter of communicating the gravity of the problems to decision makers.

On the other hand, the IT planning process identifies an information architecture that usually requires additional funding for less critical items: new projects,
Step 1: Pre-study preparation: Determine scope and participants and collect project idea stimuli. The analyst invited 25 IS users (6 senior managers, 11 middle managers, 5 journeyman employees, and 3 WFF customers) to participate in an in-depth interview. At the same time, she collected project ideas to serve as stimuli. For example, she asked each participant to describe the functionality of a system that would benefit WFF.

Step 2: Participant interviews: Elicit personal constructs from organization members. The analyst then conducted 25–50 minute interviews with each participant, showing the participant three system descriptions and asking them to rank the system attributes and explain their importance to the organization. A line of questions was asked until the participants suggested a concrete feature or attribute that would become part of the project idea. This line of questions was designed to produce specific features of the system idea, expected performance, and related organizational values or objectives. In this study, the analyst collected about 8 chains of suggestions per participant.

Step 3: Analysis: Aggregate personal constructs into CSC models. The analyst first clustered the interview statements into constructs and mapped the constructs into a matrix. She then clustered the chains using the Ward and Peppard strategic planning framework (found in Online File W9.1). Mapping each cluster into a CSC map, she represented the constructs as nodes and the links in the chains as lines connecting the nodes. The figure below depicts an organization-specific CSC model consisting of, from left to right, descriptions of desired system attributes, resulting expected performance outcomes (CSF), and associated organizational goals.

Step 4: Idea workshops: Elicit feasible strategic IS from technical and business experts and customers. The CSC maps were used by both IS professionals from within WFF and non-IS customers as a starting point for IT planning.

ING Fat Foods (WFF) is a wholesaler, delivering perishable and nonperishable foodstuffs, as well as hardware, kitchenware, and household goods, to restaurants, groceries, and similar businesses along the Atlantic Coast of the United States. WFF is famous for its quality and service, which is accomplished with a relatively low level of IS investment. WFF hopes that its additional IT investment will help it to sustain its edge over competitors.

In response to the need of identifying potential new IT projects, Peffers and Gengler (2003) proposed to WFF a new method, the critical success chain (CSC) method, for IT planning. The CSC method includes four steps:

After setting aside funds for the first category, the organization can use the remainder of the IT budget for projects related mainly to the improved information architecture. The organization can prioritize spending among items in the architecture developed by using information requirements analysis. In addition to formally allocating resources through budgeting decisions, an organization can use chargeback mechanisms to fund corporate-level projects. In a chargeback system, some or all of a system’s cost is charged to users. In addition, management may encourage individual units to make their own decisions about IT expenses. Chapter 13 discusses chargeback, cost-benefit analysis, and other, more sophisticated analyses that can also be used to assess investments in individual IT projects as well as infrastructure.

Another major factor in resource allocation is the outsourcing strategy (Chapter 13). The more that is outsourced, the less capital investment and internal resources are needed.
point for developing a portfolio of IS proposals. Providing the technical and business experts at WFF with the CSC maps, the workshop finally yielded 14 project ideas, including a decision support system for scheduling, routing, and loading trucks for delivery, as well as the support activities for existing systems, including training and updated equipment and maintenance support.

Sources: Compiled from Peffers and Gengler, (2003).

For Further Exploration: Why is the method called the CS chain? Why is such a lengthy process, with so many participants, needed?

Critical success chain network map. (Source: Peffers and Gengler (2003).)

Project Planning: Stage 4 of the 4-Stage Model

The fourth and final stage of the model for IT planning is project planning. It provides an overall framework within which specific applications can be planned, scheduled, and controlled. Since this stage is associated with systems development, it will be covered in Chapter 14. Also, this stage depends on the outsourcing strategy. The more an organization outsources, the more vendor management and control will need to be included in project planning.

9.4 Planning Information Technology Architectures

The term information technology architecture refers to the overall (high-level) structure of all information systems in an organization. This structure consists of applications for various managerial levels (operational control, management planning and control, and strategic planning) and applications oriented to various functional-operational activities (such as marketing, R&D, production, and distribution). The information architecture also includes infrastructure (e.g., the databases, supporting software, and networks needed to connect applications together). In the simplest view, an IT architecture consists of a description of the combination of hardware, software, data, personnel, and
telecommunications elements within an organization, along with procedures to employ them. An information architecture for an organization should guide the long-range development as well as allow for responsiveness to diverse, short-range information systems demands. (The configuration of these architectures is discussed in Technology Guide 4.)

An information architecture is a high-level, logical plan of the information requirements and the structures or integration of information resources needed to meet those requirements. An information technology architecture specifies the technological and organizational infrastructure that physically implements an information architecture.

Three types of technology architectures are described in Technology Guide 4: centralized, noncentralized, and client/server. In this section we discuss the general considerations relating to IT infrastructure and provide some guidelines for choosing among architecture options. We conclude the section with a look at the issue of reengineering legacy systems (holdover systems from earlier architectures).

Different organizations have different IT infrastructure requirements. Broadbent et al. (1996) looked at how the characteristics and environments of organizations influenced their IT infrastructure. They identified several core infrastructure services provided in all of the firms, plus others provided by some of the firms. They also found the following four infrastructure relationships in a sample of 26 large firms:

1. **Industry.** Manufacturing firms use fewer IT infrastructure services than retail or financial firms.

2. **Market volatility.** Firms that need to change products quickly use more IT infrastructure services.

3. **Business unit synergy.** Firms that emphasize synergies (e.g., cross-selling) use more IT infrastructure services.

4. **Strategy and planning.** Firms that integrate IT and organizational planning, and track or monitor the achievement of strategic goals, use more IT infrastructure services.

Based on analysis of their data, Broadbent et al. developed a model of the relationship between firm context and IT infrastructure (shown in Online File W9.6). This model indicates that two general factors influence infrastructure levels: The first factor is information intensity, the extent to which products or processes incorporate information. The second factor is strategic focus, the level of emphasis on strategy and planning. Firms with higher levels of these two factors use more IT infrastructure services, and they have greater reach and range in their use of these services.

A poorly organized IT architecture can disrupt a business by hindering or misdirecting information flows. Each organization—even within the same industry—has its own particular needs and preferences for information. Therefore each organization requires an IT architecture specifically designed and deployed for its use.

In today’s computing environment, IT architectures are becoming increasingly complex, yet they still must be responsive to changing business needs. Actually, today’s IT architecture is designed around business processes rather than
around the traditional application hierarchy of the functional departments. These requirements call for tough decisions about a number of architectural issues. The choices among centralized computing, distributed computing, and blended computing architectures are discussed below.

**IN FAVOR OF CENTRALIZED COMPUTING.** Centralized computing has been the foundation of corporate computing for over 30 years. Centralized computing puts all processing and control authority within one computer to which all other computing devices respond.

There are a number of benefits of centralized computing: Centralized computing can exploit the economies of scale that arise whenever there are a large number of IT applications and users in an organization. It may be more cost-effective to have one large-scale computing resource that is used by many than it is to have many small-scale computing resources. The cost of a centralized facility can be divided among many users, usually reducing duplication of effort and more efficiently managing an operation (housing the computer, providing support services, etc.). Centralized approaches can also offer easier control from an enterprise perspective. If important corporate data are stored on a centralized computing platform, a company is able to impose strict physical access controls to protect the data. When data are spread throughout an organization, securing and preserving data becomes much more difficult (See Chapter 15).

However, with increasing use of client/server systems, the role of the mainframe computer has shifted toward a more collaborative relationship with other computing resources within an organization. A few proponents of PCs go so far as to claim that the mainframe is dead. Many experts, though, agree that the mainframe is likely to exist for many years, particularly as a repository for data that can be centrally maintained for enterprisewide use (the data center, see Technology Guide 3). Providing access to and analyzing very large quantities of data are uses for which mainframes are still very appropriate. This is especially important in banking, insurance, airlines, and large retailing. The Internet and intranets can be extremely useful in distributing information stored on mainframe (and smaller) computers.

**IN FAVOR OF DISTRIBUTED COMPUTING.** Distributed computing gives users direct control over their own computing. This approach argues that choices for computing are best handled at the point of the computing need—that individual needs are best met with individualized computing. The rise in popularity of PCs, with their decreasing costs and increasing performance, has led many organizations to embrace distributed computing. Applications data can be entered, verified, and maintained closer to its source.

Distributed computing can also offer a high degree of flexibility and desirable system redundancy. When an organization expands, it may be much easier and less expensive to add another local, distributed processor than to replace a centralized mainframe with an even larger mainframe. Also, a computer in a decentralized environment may be noticeably faster than a centralized computer very far away from a user.

Moreover, a malfunctioning distributed computer ordinarily does not prevent other distributed computers from working, especially if data are partially or fully duplicated around the system, such as in the case of Lotus Notes/Domino or some intranets. (In contrast, a centralized approach has a single point of failure—the
central computer. When it goes down, no one computes.) Consider an organization that sells online; if its order processing system goes down for a day in the holiday season, it could lose hundreds of thousands of dollars in sales.

**IN FAVOR OF BLENDING CENTRALIZED AND DISTRIBUTED COMPUTING.** As noted earlier, computing does not have to be entirely centralized or entirely distributed—it can be a blending of the two models. Many distributed systems are based on client/server architecture. In some circumstances, the mainframe (centralized resource) is viewed as a kind of peripheral device for other (distributed) computing resources. The mainframe can be a large file server that offers the economies of scale and data control that are desirable in most organizations, and yet still allows processing and handling of local needs via distributed computing resources. What to distribute where (and what not to distribute) then become key issues.

**INFORMATION ARCHITECTURES AND END-USER COMPUTING.** Like an automobile, a personal computer gives its user great flexibility, power, and freedom. But just as the user of an automobile needs access to an infrastructure of highways, the user of a personal computer needs access to an infrastructure of databases and communication networks, including the Internet corporate portal and intranets. Creating such an architecture for end-users invariably involves PC linkage issues.

There are five basic configurations of PCs for end users:

1. Centralized computing with the PC functioning as a “dumb terminal” (or sometimes “not-so-dumb,” yet not smart)—the thin PCs.
2. A single-user PC that is not connected to any other device.
3. A single-user PC that is connected to other PCs or systems, using ad hoc telecommunications (such as dial-up telephone connections).
4. Workgroup PCs connected to each other in a small peer-to-peer network (see Technology Guide 4).
5. Distributed computing with many PCs fully connected by LANs via wireline or Wi-Fi.

End-user computing with interconnected desktop PCs or network computers appears inevitable. Given this inevitability, it is important that organizations maximize corporate business benefits and, at the same time, minimize risks and undue constraints on user initiative, business knowledge, and organizational unity. (For more on the development of end-user computing, see Chapter 14.)

**THE IMPACT OF OUTSOURCING AND UTILITY COMPUTING.** As the amount of IT that is outsourced increases, and with the development of utility computing (the purchase of computing services, much as one today purchases electricity and water services; see Chapters 2 and 14), the amount of infrastructure needed by organizations will decline. Theoretically, there will be no need even for a data center. The architecture then will be comprised of LANs and PCs, intranets, corporate portals, and extranets. While outsourcing is spreading rapidly, it is mostly selected outsourcing (Chapter 13), namely, only some of the IT operations are outsourced. However, within about 5 to 10 years the impact of both outsourcing and utility computing are expected to be significant.
Holdovers of earlier architectures that are still in use after an organization migrates to a new architecture are described as legacy systems. These systems may continue in use even after an organization switches to an architecture that is different from, and possibly incompatible with, the architectures on which they are based. They may still be capable of meeting business needs, and so might not require any immediate changes. Or they may be in need of reengineering to meet some current business needs, requiring significant changes.

Each legacy system has to be examined on its own merits, and a judgment made regarding the current and future value of the system to the organization. This type of decision—to keep, improve, or replace—can present management with agonizing alternatives. On one hand, keeping a legacy system active offers stability and return on previous investments (“If it ain’t broke, don’t fix it”). On the other hand, increasing processing demands and high operational costs make replacement attractive if not imperative. Newer systems, however, may be more risky and less robust.

Reverse engineering is the process of examining systems to determine their present status, and to identify what changes are necessary to allow the system to meet current and future business needs. The results of this process can then guide the redesign and redevelopment of the system. Some reverse engineering tools, when applied to legacy systems, automatically generate up-to-date documentation. Other tools in this category help programmers convert code in older programs into a more efficient form.

Legacy systems are not just mainframe systems. A legacy system might consist of PC programs that need to be reengineered and “ported” to a mainframe, a process that is called upsizing the system. Or a legacy system might be a mainframe application that needs to be reengineered and “rehosted” onto PCs, an example of downsizing a system. In each instance, a business is trying to effectively “rightsize” a legacy system to meet evolving business requirements. An important area is in the integration of legacy systems with enterprise systems (such as ERP, CRM, and KM) and with e-commerce systems.

Finally, organizations should reengineer legacy systems in concert with business process redesign (refer to the “retooling” discussion in Section 9.8). Changes to the computerized or automated side of a business should synchronize with changes in other business processes. While reengineering legacy systems might be justified solely on a cost or efficiency basis, significant business gains can also be made when this effort is a coordinated part of restructuring business processes to improve efficiency and effectiveness.

Reengineering Legacy Systems

Planning for Interorganizational Systems

9.5 SOME ISSUES IN IT PLANNING

IT planning is a complex process. Of the many special topics in this category, we have elected to focus on IT planning in interorganizational and international systems. Information technology planning may get more complicated when several organizations are involved, as well as when we deal with multinational corporations. In this section, we also address the problems and challenges for IT planning.

Internal information systems of business partners must “talk” with each other effectively and do it efficiently. In Chapters 4 and 5, we introduced IT technologies such as EDI, e-mail, and extranets that facilitate communication and
collaboration between companies. IT planning that involves several organizations may be complex. The problem is that some information systems may involve hundreds or even thousands of business partners. IT planners in such a case could use focus groups of customers, suppliers, and other business partners, especially during the strategic information planning as well as during the information requirements analysis.

Planning for project management of interorganization systems (IOSs) can be fairly complex. IT planners may create virtual planning teams that will work together on projects such as extranets or EDI. Such collaboration is especially important in strategic planning that involves infrastructure. Questions such as who is going to pay for what can become critical factors in cost/benefit analysis and justification of information systems applications.

A comprehensive study of global IT strategic planning was conducted by Curry and Ferguson (2000). In order to increase the success of such planning, they suggest that organizations reduce the planning horizon to two to three years (from three to five years) and that they increase the collaboration between the IT planners and end users.

Examples of joint planning for interorganizational systems can include using an extended supply chain approach and adopting the same enterprise software. If company A will use software from SAP and company B will use Oracle software, there could be additional expenses for connecting these softwares to each other. Web services (Chapters 2 and 15) may provide the solution for such an integration.

Multinational corporations face a complex legal, political, and social environment, which complicates corporate IT planning. Therefore, many multinational companies prefer to decentralize their IT planning and operations, empowering their local IT managers. An illustrative example is shown in IT At Work 9.3. However, such a policy may be self-defeating since communication, coordination, and collaboration among decentralized business units may require large expenses. ExxonMobil Corporation, for example, was forced to centralize its IT operations because of such high expenditures (see Online File W9.7).

IT planning can be an expensive and time-consuming process. A study of five large-scale planning projects found that such projects may involve ten or more employees, on a half-time or full-time basis, for periods lasting from ten weeks to a year. The estimated costs of these projects ranged from $450,000 to $1.9 million. In addition, a survey reported by King (2000) disclosed that more than 50 percent of the companies surveyed were conducting IS planning using obsolete methodologies.

Teo and Ang (2001) emphasized the importance of understanding IT planning problems. They argued that these problems may result in wasted resources, lost opportunities, duplicated efforts, and incompatible systems. They studied 138 companies and identified IT planning problems at the three phases of IS planning: the launching phase, the plan development phase, and the implementation phase. In all three phases, failing to get top management support for the IS planning was the most serious problem. Other major IS planning problems included: not having free communication flow and not being able to obtain sufficiently qualified personnel in the planning phase; ignoring business goals and failing to translate goals and strategies into action plans in the plan development phase;
Strategic planning for Web-based systems can be viewed as a subset of IT strategic planning. However, in many cases it is done independently of IT planning. Here, we will refer to this specialized process as e-planning and will examine some of its features.

**E-Planning**

IT planning in this chapter refers mostly to corporate planning of IT infrastructure rather than to applications planning. In contrast, e-planning is electronically supported IT planning that touches on EC infrastructure and mostly deals with uncovering business opportunities and deciding on an applications portfolio that will exploit those opportunities (see IT At Work 9.2).

Some of the infrastructure needed for e-commerce and Web-based systems may already be in place, as part of the organization’s overall IT infrastructure.
Nevertheless, e-planning may be conducted as a separate planning exercise. In such a case, ISD people will participate in the steering committee together with end users. Of course, alignment between the two processes is needed. One reason for such separation is that technology is an enabler of e-commerce, but the major objective of e-commerce is to rejuvenate organizations. If the process is controlled by IT people, the success of e-commerce may be constrained. Another reason for the separation is that e-planning is usually less formal, and it must be done quickly. Furthermore, due to rapid changes the e-planning must be more flexible.

Planning for Web-based individual applications is very similar to the planning of any IT application. However, at the macro level of planning, the emphasis is different. The areas where more attention is given in e-planning are the applications portfolio, risk analysis, and strategic planning issues such as the use of metrics. Let’s elaborate.

**APPLICATIONS PORTFOLIO FOR E-COMMERCE.** The importance of the applications portfolio in regular IT planning may be declining. Most organizations have their mission-critical systems already in place, and IT activities are fairly distributed. In e-commerce, however, most organizations are starting from scratch. The cost of building systems is high, and so is the risk. Therefore, it is advisable to conduct centralized EC planning and to select appropriate applications and prioritize them, as was shown in IT At Work 9.2. Another methodology for planning an applications portfolio was proposed by Tjan (2001).

**Tjan’s Portfolio Strategy.** Tjan (2001) adopted a business project portfolio applications approach to create an Internet portfolio planning matrix. (Also see Boar, 2000.) However, instead of trading off industry growth and market position, here the strategy is based on company fit, which can be either low or high, and the project’s viability, which can also be low or high. Together these create an Internet portfolio map (matrix).

A project’s viability can be assessed by four criteria: market-value potential, time to positive cash flow, personnel requirements, and funding requirements. EC initiatives such as a B2B procurement site, a B2C store, or a portal for kids, for example, can be evaluated on a scale of 1 to 100, for each of the four metrics. Then, an average score (simple average) for each metric is computed. For fit, the following criteria are used: alignment with core capabilities, alignment with other company initiatives, fit with organizational structure, fit with company’s culture and values, and ease of technical implementation. Again, each EC initiative is assessed on a scale of 1 to 100 (or on a qualitative scale of high, medium, low), and an average is computed.

The various applications initiatives are then mapped on the Internet portfolio matrix, based on the average scores for viability and fit. The Internet matrix is divided into four cells, as shown in Figure 9.6. If both viability and fit are low, the project is killed. If both are high, then the project is adopted. If fit is high, but viability is low, the project is sent to redesign. Finally, if the fit is low but the viability is high, the project may be sold or spun off. The figure shows how several applications were rated for an e-marketplace company for a toy company in Hong Kong.

Tjan’s portfolio strategy introduces a systematic approach to EC project selection. The assessment of the points per criterion can be done by several experts to ensure quality. Cases where there is more agreement can be considered with more confidence. Organizations can add their own criteria to the methodology.
RISK ANALYSIS. The degree of risk of some Web-based systems is very high, and such risk often leads to failure. For example, Disney Inc. aborted two major EC initiatives in 2000: First, Disney closed its e-toy company (smartkid.com), and second, it closed its company (go.com) that was managing all of Disney’s EC initiatives. The loss was many millions of dollars. Failures of IT applications do not usually cost so much money, especially if they are not enterprisewide in nature. Conducting an appropriate risk analysis could reduce the chance of failures. However, this was difficult to do at that time due to lack of historical data.

STRATEGIC PLANNING ISSUES. Several strategic planning issues are unique to the Web environment. Each of these may involve IT infrastructure, but the market and organizational implications may be more important. Here are some examples:

- **Who and where?** Should the EC initiatives be conducted in a completely independent division or even a separate company?
- **Use of metrics.** EC planning is difficult because the field is evolving, the history is brief, and few planners have experience. Therefore it is desirable to use industry standards, also known as metrics, for executing various steps of the planning process (see Plant, 2000). (Metrics are discussed in Chapters 5 and 13.)
Learn from failures. During 2000/2001 there were many EC failures, both major initiatives and whole companies. Planners should study such failures, to learn what went wrong in the hope of avoiding such problems in the future. (For lessons for planners, see Useem, 2000; Agrawal et al., 2001; and Chapter 5 of this book.)

Use a different planning process. The Web environment requires a different planning process, as illustrated by Turban et al. (2004).

Integration. Information systems strategic planning must integrate, in many cases, e-business and knowledge management (see Galliers, 1999, for details).

The Web environment is very turbulent. Some people question the validity of formal planning in such an environment. Others insist that the turbulence makes formal planning a necessity. Samela et al. (2000) investigated the issue of planning in a turbulent environment in two organizations and concluded that a formal comprehensive approach may be more beneficial than not having a formal plan. Of course, generalizing from only two organizations may not tell the whole story. Samela and Spil (2002) recently suggested a continuous e-business planning process, with four basic planning cycles: (1) agreeing on planning objectives, (2) aligning business objectives and information objectives, (3) analyzing IS resources and IT infrastructure, and (4) authorizing actions. The four cycles are repeated each period in order to ensure continuous review and improvement of the strategies. (Details are shown in Online File W9.9).

Whether an organization uses formal planning for the Web environment or not, the planning of Web systems frequently requires redesign of business processes, our next topic.

9.7 Business Process Redesign

Of the major environmental pressures described in Chapter 1, three are considered most important by Hammer and Champy (1993)—customers, competition, and change, known as the three C’s. Customers today know what they want, what they are willing to pay, and how to get products and services on their own terms. Their considerable influence puts pressure on organizations to meet their terms, or lose their business. In addition, competition is generally increasing with respect to price, quality, selection, service, and promptness of delivery. The introduction of e-commerce has caused competition to intensify through removal of trade barriers, increased international cooperation, and the creation of technological innovations. Finally, change continues to occur. Markets, products, services, technology, the business environment, and people keep changing, frequently in an unpredictable and significant manner.

These pressures can be very strong in certain industries or countries, and they tend to be even stronger as time passes. Some of the conventional methods of organizational responses do not always work in this environment. Therefore, a more comprehensive response—called business process redesign—is sometimes called for. Of the organizational responses to environmental pressures, business process redesign and its variants have received lots of management attention (e.g., see Evangelista and Burke, 2003, and Rajaram and Corbett, 2002). (One variant, and predecessor, of business process redesign is business process reengineering, or BPR.) These approaches encompass several of the responses described in Chapter 1. In this section we will explore the topic of business process redesign. Let’s begin by looking at some of the drivers of redesign and BPR.
A business process is a collection of activities that take one or more kinds of inputs and create an output. As indicated earlier, business processes may need to be redesigned in response to business pressures and/or to enable transformation to e-businesses. Here are some representative drivers behind the need to business process redesign:

- **Fitting commercial software.** It is frequently more economic to buy or lease software than to develop custom software. However, to reap the best benefit of buying or leasing software, it is best to use the software as it is. (Remember the Nike disaster discussed in Chapter 1.) But what if the software does not fit your business processes, and it is not possible or advisable to change the software? The best solution sometimes is to redesign the affected business processes. Typical software in this category is the functional information systems, ERP, business intelligence (Chapter 11), and profitability software.

- **Streamlining the supply chain.** As seen in Chapter 8, it is frequently necessary to change segments in the supply chain to streamline its operations and to better collaborate with business partners. Redesign is frequently done on small segments of the chain, but sometimes the entire chain is redesigned (e.g., the Orbis case of Chapter 1, where a linear chain was changed to a hub).

- **Participating in private or public e-marketplaces.** With the increased trend to use e-marketplaces (Chapter 5) comes the need to get connected to them, as well as to the organization’s back-end processes. To enable such integration it is frequently necessary to redesign internal as well as external processes. The same is true with participating in auction sites. Not changing the processes results in manual operations (e.g., data entry) which may be expensive, slow, and error-prone.

- **Improving customer service.** To properly introduce CRM, it is often necessary to change business processes. As will be seen later in this chapter, centralizing 800 numbers and empowering frontline employees involve process restructuring.

- **Conducting e-procurement.** Introduction of e-procurement methods (Chapter 5) frequently requires complete redesign of the purchasing process (requisition, approval, control, and payment for purchases).

- **Enabling direct online marketing.** Many manufactures as well as wholesalers are using direct marketing to consumers, mostly via the Internet. Moving to such a business model requires design or redesign of order taking and order fulfillment.

- **Reducing cost and improving productivity.** For generations companies have sought to reduce costs and increase productivity. An example is industrial engineering methods. Many of these are part of continuous small improvements, while others require radical changes in business processes (e.g., see Barua et al., 2001, and Selladurai, 2002).

- **Automating old processes.** Many organizations believe that the solution to their problem is to automate business processes. While in some cases it make sense to do it, in many other it does not. Automating ineffective processes can result in only small savings, whereas restructuring can result in a much larger savings.

Several other drivers may contribute to the need for redesign. In the following sections we will describe some of them: reducing cycle time, need for customization, and empowering employees. Another of these drivers, the problem of the stovepipe, is described in *A Closer Look 9.2.*
All organizations have both horizontal and vertical dimensions. The organization’s layers—usually top, middle, and low (supervisory) management—define the horizontal dimensions; the organization’s functional departments define the vertical dimensions.

The vertical dimension of the organization, primarily focused on functional specialization, has caused many problems in organizations as they have tried to move into the information-based economy. One recurring problem is sometimes referred to as “stovepipes,” in recognition of its vertical nature. Because of the vertical structure of organizations, there is a lack of effective collaboration between quality, control, and customer service are processes that can transcend the functional boundaries of several departments such as distribution, purchasing, research and development, manufacturing, and sales.

Here is an example of a stovepipe problem: A customer places an order with Sales. After a few days, she calls Sales to find out the status of the order. Sales calls various departments. Frequently, it is difficult to trace the order. People push the order from place to place and feel only a small sense of responsibility and accountability, so Sales may not be able to give the customer an answer in time, or may even give an incorrect answer. The problem of the stovepipe can intensify if the supporting information systems are improperly structured.

Focusing on vertical functions and their corresponding information systems to support the business has resulted in fragmented, piecemeal information systems that operate in a way in which the “left hand doesn’t know what the right hand is doing.” Integration of information is required for good decision making (see Chapter 7). Achieving it is one of the goals of business process redesign.
As indicated earlier, business process redesign was preceded by business process reengineering (BPR), a methodology in which an organization fundamentally and radically redesigns its business processes to achieve dramatic improvement. Initially, attention in BPR was given to complete restructuring of organizations (Hammer and Champy, 1993). Later on, the concept was changed to include only one of a few processes (rather than an entire organization) due to numerous failures of BPR projects (e.g., Sarker and Lee, 1999) and the emergence of Web-based applications that solved many of the problems that BPR was supposed to solve.

Today, the concept of BPR has been modified to business process redesign, which can focus on anything from the redesign of an individual process, to redesign of a group of processes (e.g., all the processes involved in e-procurement), to redesign of the entire enterprise (see El Sawy, 2001). The redesign of several processes became a necessity for many companies aspiring to transform themselves to e-businesses. For principles of redesign, see Online File W9.10. For a table showing how BPR has changed with time and with technology development, see Online File W9.11. And finally, for a tutorial on the first wave of BPR (many of whose features exist in the second wave), see Online File W9.12.

Business process management (BPM) is a new method for restructuring that combines workflow systems (Chapter 4) and redesign methods. This emerging methodology covers three process categories—people-to-people, systems-to-systems, and systems-to-people interactions—all from a process-centered perspective. In other words, BPM is a blending of workflow, process management, and applications integration. Le Blond (2003) describes the use of BPM in McDonald’s Singapore operations. One area of redesign there was the scheduling of crews at McDonald’s restaurants; several other successful applications related to performance improvements. (Staffware Inc., a BPM software vendor and consultant, provides a free online demo as well as case studies at staffware.com. For comprehensive coverage see also Smith and Fingar, 2002).

The conduct of a comprehensive business process redesign, or even of the redesign of only one process, is almost always enabled by IT, which we address in the next section.

9.8 The Role of IT in Business Process Redesign

IT has been used for several decades to improve productivity and quality by automating existing processes. However, when it comes to restructuring or redesign, the traditional process of looking at problems first and then seeking technology solutions for them may need to be reversed. A new approach is first to recognize powerful redesign solutions that restructuring and BPR make possible, and then to seek the processes that can be helped by such solutions. This approach requires inductive rather than deductive thinking. It also requires innovation, since a company may be looking for problems it does not even know exist.

IT can break old rules that limit the manner in which work is performed. Some typical rules are given in Table 9.3. IT-supported redesign and BPR examples can be found in any industry, private or public (e.g., MacIntosh, 2003 and...
The role of IT in redesigning business processes can be very critical and is increasing due to the Internet and intranets. For example, Geoffrey (1996) provides several examples of how intranets have rescued BPR projects (Salladurai, 2002).

One objective of redesign is to overcome problems such as that of the stovepipe, by integrating the fragmented information systems. (Some integration solutions were described in Chapters 4, 7, and 8.) Besides creating inefficient redundancies, information systems developed along departmental or functional boundaries cause difficulties in generating the information that is required for effective decision making. For instance, consider a case where the management of a bank wants to offer more mortgage loans to better utilize large savings deposits. Management decides to send letters encouraging specific customers to consider buying homes, using

<table>
<thead>
<tr>
<th>Old Rule</th>
<th>Intervening Technology</th>
<th>New Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information appears in only one place at one time.</td>
<td>Shared databases, client/server architecture, Internet, intranets</td>
<td>Information appears simultaneously wherever needed.</td>
</tr>
<tr>
<td>Only an expert can perform complex work.</td>
<td>Expert systems, neural computing</td>
<td>Novices can perform complex work.</td>
</tr>
<tr>
<td>Business must be either centralized or distributed.</td>
<td>Telecommunications and networks: client/server, intranet</td>
<td>Business can be both centralized and distributed.</td>
</tr>
<tr>
<td>Only managers make decisions.</td>
<td>Decision support systems, enterprise support systems, expert systems</td>
<td>Decision making is part of everyone’s job.</td>
</tr>
<tr>
<td>Field personnel need offices to receive, send, store, and process information.</td>
<td>Wireless communication and portable computers, the Web, electronic mail</td>
<td>Field personnel can manage information from any location.</td>
</tr>
<tr>
<td>The best contact with potential buyers is a personal contact.</td>
<td>Interactive videodisk, desktop conferencing, electronic mail</td>
<td>The best contact is the one that is most cost-effective.</td>
</tr>
<tr>
<td>You have to locate items manually.</td>
<td>Tracking technology, groupware, workflow software, search engines</td>
<td>Items are located automatically.</td>
</tr>
<tr>
<td>Plans get revised periodically.</td>
<td>High-performance computing systems, intelligent agents</td>
<td>Plans get revised instantaneously whenever needed.</td>
</tr>
<tr>
<td>People must come to one place to work together.</td>
<td>Groupware and group support systems, telecommunications, electronic mail, client/server</td>
<td>People can work together while at different locations.</td>
</tr>
<tr>
<td>Customized products and services are expensive and take a long time to develop.</td>
<td>CAD/CAM, CASE tools, online systems for JIT decision making, expert systems</td>
<td>Customized products can be made quickly and inexpensively (mass customization).</td>
</tr>
<tr>
<td>A long period of time is spanned between the inception of an idea and its implementation (time-to-market).</td>
<td>CAD/CAM, electronic data interchange, groupware, imaging (document) processing</td>
<td>Time-to-market can be reduced by 90 percent.</td>
</tr>
<tr>
<td>Organizations and processes are information-based.</td>
<td>Artificial intelligence, expert systems</td>
<td>Organizations and processes are knowledge-based.</td>
</tr>
<tr>
<td>Move labor to countries where labor is inexpensive (off-shore production).</td>
<td>Robots, imaging technologies, object-oriented programming, expert systems, geographical information systems (GIS)</td>
<td>Work can be done in countries with high wages and salaries.</td>
</tr>
</tbody>
</table>

convenient financing available through the bank. Management also decides that the best customers to whom to send such letters are: customers who do not currently have mortgage loans or who have loans for a very small percentage of the value of their homes; customers who have good checking account records (e.g., few or no overdrafts); customers with sufficient funds in their savings accounts to make a down payment on a home; and customers with good payment records on installment loans with the bank.

Because the data necessary to identify such customers may be available in different files of different information systems, there may be no convenient or economical way to integrate them. Using innovations such as data warehouses and special integrated software can be helpful, but expensive. Therefore, extensive programming and clerical work are required to satisfy such an information request. The scenario of the bank can be translated into other organizational settings.

Integration should cross not only departmental boundaries but also organizational ones, reaching suppliers and customers. Namely, it should work along the extended supply chain. This is especially important in company-centric B2B e-marketplaces and in B2B exchanges (see Chapter 5). An example of an internal integration followed by integration with dealers is provided in IT At Work 9.4.

The integration of an organization’s information systems enables redesign innovations such as the introduction of a single point of contact for customers,
called a case manager or a deal structurer. We can see how this single point of contact works by looking at a credit-approval process at IBM. The old process took seven days and eight steps. It involved creation of a paper folder that was routed, sequentially, through four departments (sales, credit check, business practices, finance, and back to sales). In the redesigned process, one person, the deal structurer, conducts all the necessary tasks. This one generalist replaced four specialists. To enable one person to execute the above steps, an intelligent DSS (Chapter 12) provides the deal structurer with the guidance needed. The program guides the generalist in finding information in the databases, plugging numbers into an evaluation model, and pulling standardized clauses—“boilerplates”—from a file. For difficult situations, the generalist can get help from a specialist. As a result, the turnaround time has been slashed from seven days to four hours.

Redesign of business processes often means a need to change some or all of the organizational information systems. The reason for this is that information systems designed along hierarchical lines may be ineffective in supporting the redesigned organization. Therefore, it is often necessary to redesign the information systems. This process is referred to as retooling.

Retooling focuses on making sure the information systems are responsive to the processes-redesign effort and to the use of e-business. Many organizations found that once they realized they had a business problem and wanted to do something about it, their information systems function could not accommodate the desired changes. For example, a government agency in Singapore decided to defer a badly needed BPR project when it discovered that it would cost over $15 million just to rewrite the applicable computer programs.

To retool for redesign, a key issue is getting a good understanding of the current installed base of IT applications and databases. It is also important to understand the existing infrastructure in terms of computing devices, networks, and the like, and their relationships to the current available software, procedures, and data. Another key issue is an assessment of what the ideal IT architecture would be for the organization in terms of hardware and software, as well as an appropriate information architecture.

In planning a retooling, it is very important to benchmark the technology being used in the organization against what the best competitors are using. It is also imperative to find out what the latest technologies are and to determine in what direction the organization needs to go. For an example of a massive IT retooling in a public agency, in which the technology enabled the company to restructure all its major business processes, see Tung and Turban (1996).

IT INFRASTRUCTURE AND DEVELOPMENT SOFTWARE FOR BUSINESS PROCESS REDesign. Information technology can either enable or constrain successful redesign and BPR. The links between enterprise IT infrastructure and business-process change were explored by Broadbent et al. (1999). Exploratory case analysis of four firms was used to understand the ways IT infrastructure contributes to success in implementing redesign and BPR. The researchers found that all firms needed a basic level of IT infrastructure capability in order to implement process redesign and especially BPR. The firms that had developed a higher level of IT infrastructure capabilities, before or concurrent with undertaking business process redesign, were able to implement extensive changes to their business processes over relatively short time frames.
IT TOOLS FOR BUSINESS PROCESS REDESIGN AND BPR. A large variety of IT tools can be used to support redesign and BPR. Some of these tools are generic and can be used for other purposes, while others are specifically designed for redesign and BPR. Let’s elaborate.

**Special BPR and process redesign software.** According to El Sawy (2001), special BPR software enables the capture of the key elements of a business process in a visual representation made up of interconnected objects on a timeline. The elements of this visual representation usually include activities, sequencing, resources, times, and rules. BPR software is much more than drawing or flowcharting software in that the objects on the screen are intelligent and have process and organizational data and rules associated with them. The software is also interactive, in real time. BPR software may incorporate some aspects of project management in terms of allocating resources and costs to work activities and their time sequencing. BPR software also has “what-if” capabilities in that it enables process simulation and performance comparison of alternative process designs. The better BPR software packages are quite intuitive and relatively easy to learn. The 10 major reasons why special BPR software is of value for business process redesign are summarized in Online File W9.13.

The most comprehensive special BPR suite, which includes many functionalities, was BPR Workflow from Holosofx (now a part of IBM’s WebSphere). For a detailed description of this package and usable software, see El Sawy, 2001. In addition to BPR Workflow one can find integrated BPR toolkits in some ERP software (e.g., see Oracle 9i and SAP R/3).

Some people believe that BPR can be done with CASE tools (Chapter 14). This is not the case, since CASE tools can be used to execute only a few BPR activities, and they are difficult to use. Other believe that workflow tools can be used. Again, this is true only for some redesign activities. Furthermore, the workflow capabilities in custom-designed BPR software are usually superior to those of generic tools. However, for many projects there is no need for a comprehensive suite; in those situations, generic tools or special tools designed to be used for only one or two BPR activities are both efficient and effective. For a listing of some generic and single-activity tools that may be of use in business process redesign, see Online File W9.14.

### 9.9 RESTRUCTURING PROCESSES AND ORGANIZATIONS

Redesign, restructuring, and reengineering efforts involve many activities, four of which are described in this section: redesign of processes, mass customization, cycle time reduction, and restructuring the entire organization. In this section we also look at some BPR failures.

#### Redesign of One or a Few Processes

Redesign efforts frequently involve only one or a few processes. One of the most publicized examples of business process redesign is the accounts payable process at Ford Motor Company described in IT At Work 9.5. The Ford example demonstrates changes in a simple process. Khan (2000) describes the restructure of an air cargo process that was much more complicated and involved several IT tools.

#### Mass Customization

One of the most successful models of e-commerce is build-to-order, which is implemented via mass customization. (See Appendix 3.1.) The concept of mass
A s part of its productivity improvement efforts, the management of Ford Motor Company (ford.com) put its North American Accounts Payable Department under the microscope in search of ways to cut costs. Management thought that by streamlining processes and installing new computer systems, it could reduce the head count by some 20 percent, to 400 people.

But after visiting Mazda’s account payables department (Ford is part owner of Mazda), Ford managers increased their goal: perform accounts payable with only 100 clerks. Analysis of Ford’s old system revealed that when the purchasing department wrote a purchase order, it sent a copy to accounts payable. Later, when material control received the goods, it sent a copy of the receiving document to accounts payable. Meanwhile, the vendor also sent an invoice to accounts payable. If the purchase order, receiving document, and invoice all matched, then accounts payable issued a payment. Unfortunately, the department spent most of its time on many mismatches. To prevent them, Ford instituted “invoiceless processing.” Now, when the purchasing department initiates an order, it enters the system. (If there is no database entry for the received goods, or if there is a mismatch, the clerk returns the goods.)

Under the old procedures, the accounting department had to match 14 data items among the receipt record, the purchase order, and the invoice before it could issue payment to the vendor. The new approach requires matching only four items—part number, amount, unit of measure, and supplier code—between the purchase order and the receipt record. The matching is done automatically, and the computer prepares the check, which accounts payable sends to the vendor (or an electronic transfer is made). There are no invoices to worry about since Ford has asked its vendors not to send them. The restructured system as compared to the old one is shown in the figure below.

Ford did not settle for the modest increases it first envisioned. Instead it opted for a radical change, and it achieved dramatic improvement: a 75 percent reduction in head count, not the 20 percent it would have achieved with a conventional improvement program. And since there are no discrepancies between the financial record and physical record, material control is simpler, receipts are more likely to be correct, and financial information is more accurate.


For Further Exploration: How did the EDI help attain the reduction? What other support was provided by IT?
 customization involves production of large quantities of customized items, as Dell is doing with personal computers (e.g., see Pine and Davis, 1999, and Gilmore and Pine, 2000). Mass customization enables a company to provide flexible and quick responsiveness to a customer’s needs, as expressed in their self-configured orders, at a low cost and with high quality. A build-to-order strategy is made possible by allowing fast and inexpensive production changes, by reducing the ordering and sales cycle time using e-commerce, and by shortening the production time (e.g., by using prefabricated parts and sub-assemblies). Often, such a mass customization strategy must be preceded and/or supported by a business process redesign.

Cycle Time Reduction

Cycle time refers to the time it takes to complete a process from beginning to end. As discussed earlier, competition today focuses not only on cost and quality, but also on speed. Time is recognized as a major element that provides competitive advantage, and therefore cycle time reduction is a major business objective.

The success of Federal Express, for example, is clearly attributable to its ability to reduce the delivery time of packages. It does this by using complex computer-supported systems that allow flexible planning, organization, and control (see Wetherbe, 1996). The comeback of Chrysler Corporation and its success in the 1990s can be attributed largely to its “technology center,” which brought about a more than 30 percent reduction in its time to market (the time from beginning the design of a new model to the delivery of the car). General Motors achieved even larger reduction of delivery times in recent years (see case in Chapter 8). Boeing Corporation reengineered its design of airplanes by moving to total computerization. In a fundamental change to Boeing’s processes, a physical prototype was never built. In addition to reducing the cycle time, Boeing was able to improve quality and reduce costs. Because of these changes, Boeing was able to compete better with Airbus Industries.

Notice that in Boeing’s, GM’s, and Chrysler’s cases the change was fundamental and dramatic. First, the role of the computer was changed from a tool to a platform for the total design. Second, it was not just a process change, but a cultural change relative to the role of the computer and the design engineers. According to Callon (1996), the engineers are now a part of a computer-based design system. Computing also played a major communications role during the entire design process. As was shown in the Ford case (IT At Work 9.5), IT makes a major contribution in shortening cycle times by allowing the combination or elimination of steps and the expediting of various activities in the process. In Chapter 2 we demonstrated a significant reduction in cycle time achieved by Dell due to introduction of Web Services and redesigning the communication processes between the manufacturing plants and the suppliers.

There is an old saying that “time is money,” so saving time saves money. But cycle time reduction does more than save money. If you beat your competitors with a new product, a product improvement, or a new service, you can gain a substantial market share. Pharmaceutical companies, for example, are desperately trying to reduce the cycle time of new drugs. If successful, they will be the first on the market, they may receive a patent on the innovation, and revenues will begin flowing sooner to repay their huge investments.

Additionally, the Internet, extranets, and intranets provide a means of economically reducing cycle time by cutting communications time through the use
We’ve seen that one problem in many current organizations is vertical structures. How should a contemporary organization be organized? There are several suggestions of how to do it. Let’s look at how it is done with business process redesign.

The fundamental problem with the hierarchical organizational structure is that any time a decision needs to be made, it must climb up and down the hierarchy. If one person says “no” to a pending decision, everything comes to a screeching halt. Also, if information is required from several “functional sources,” getting all the right information coordinated can be a time-consuming and frustrating process for employees and customers alike.

So, how is organizational redesign done? It varies, depending on the organization and the circumstances. For example, providing each customer with a single point of contact can solve the stovepipe problem described earlier. In the traditional bank, for example, each department views the same customer as a separate customer. Figure 9.7 depicts a redesigned bank in which the customer deals with a single point of contact, the account manager. The account manager is responsible for all bank services and provides all services to the customer, who receives a single statement for all of his or her accounts and can access all accounts on the same Web page. Notice that the role of IT is to back up the account manager by providing her with expert advice on specialized topics, such as loans. Also, by having easy access to the different databases, the account manager can answer queries, plan, and organize the work with customers.
An alternative to the single-point contact is a networked structure, usually supported by a call center. In this structure, regardless of where and when a client contacts the company, the networked agents would have access to all customer data, so that any employee can provide excellent customer service. Companies such as USAA, Otis Elevator, and others have all agents located in one city and give customers all over the country the same toll-free number and a centralized Web address. In this model, the company also can install a computer-based call-center technology, which brings up complete customer information (or information about a customer’s elevator in the case of Otis) on the computer screen, whenever a customer calls. This means that anyone who answers the call would know all the information necessary to make a quick, frontline decision (see Chapter 12). There is no need to ask questions of the customer, and any agent can give personalized and customized service. This is especially important in services such as reservation systems for hotels or airlines, as well as for utility companies, financial services, universities and health care services.

Reengineering and restructuring is not limited to a specific type of organization. Studies indicate that 70 percent of all large U.S. corporations are reengineering or considering some major redesign projects. In addition, the public sector, including the U.S. federal government, is continuously implementing restructuring projects. See IT At Work 9.6, which describes one such project by the U.S. federal government.

**IT At Work 9.6**

**INFORMATION TECHNOLOGY IN RESTRUCTURING THE FEDERAL GOVERNMENT**

The U.S. federal government is using IT to streamline its bureaucracy and improve public services. The plan is to create an “electronic government,” moving from the Industrial Age into the Information Age. It is also part of e-government, where processes are being redesigned to enable e-purchasing and other EC activities. For detail of the plan see E-Government Strategy (2003).

Information technology is playing a key role in such restructuring of government operations and services. The document cited above describes the new e-government systems as a “virtual agency” in which information is shared throughout the government. The U.S. Department of Agriculture already distributes food stamps electronically. Medicare payments may be integrated into that system (expected in 2004). Other e-government services being proposed include a national network serving law enforcement and public safety agencies; electronic linkage of tax files at federal, state, and local agencies; an international trade data system; a national environmental data index; government wide electronic mail; and an integrated information infrastructure, including consolidated data centers. Various IT teams are also looking at client/server networks and intranets to eliminate the need for large mainframe data centers. Tens of millions of U.S. citizens receive Social Security and other payments periodically. The distribution of these services is also moving to the Internet for greater savings and shorter cycle times. Smaller countries such as Hong Kong and Singapore already restructured many of their services to go online (e.g., see citizen.gov.sg and cinfo.gov.hk).


**For Further Exploration:** Why are these systems referred to as a virtual agency? Is so much computerization of the government beneficial? Why or why not?
One of the most interesting organizational structures is the virtual organization, also referred to as a virtual corporation (VC). The creation, operation, and management of a virtual organization is heavily dependent on IT and is especially facilitated by the Internet and e-commerce (see Venkatraman and Henderson, 1998).

**DEFINITION AND CHARACTERISTICS.** A virtual organization (virtual corporation, VC) is an organization composed of several business partners sharing costs and resources for the purpose of producing a product or service. In a virtual organization the resources of the business partners remain in their original locations but are integrated. The virtual organization can be temporary, with a onetime mission such as launching a satellite, or it can be permanent. According to Goldman et al. (1995), permanent virtual corporations are designed to: (1) create or assemble productive resources rapidly, (2) create or assemble productive resources frequently and concurrently, and (3) create or assemble a broad range of productive resources. They are considered permanent in that they expect to continue their activities indefinitely.

The virtual organization is usually composed of several business units, each in a different location. Each partner contributes complementary resources that reflect its strengths and determine its role in the virtual enterprise. VCs are not necessarily organized directly along the supply chain. For example, a virtual business partnership may include several partners, each creating a portion of a product or service, in an area in which each has special advantage such as expertise or low cost.

The concept of virtual organizations is not new, but recent developments in IT allow new implementations that exploit its capabilities (see Suhas, 2000). The modern virtual organization can be viewed as a network of creative people, resources, and ideas connected via online services and/or the Internet, who band together to produce products or services. The major attributes of virtual organizations are:

- **Excellence.** Each partner brings its core competency, so an all-star winning team is created. No single company can match what the virtual corporation can achieve.

- **Utilization.** Resources of the business partners are frequently underutilized, or utilized in a merely satisfactory manner. In the virtual corporation, resources can be put to use more profitably, thus providing a competitive advantage.

- **Opportunism.** The partnership is opportunistic. A virtual organization is organized to meet a market opportunity.

- **Lack of borders.** It is difficult to identify the boundaries of a virtual corporation; it redefines traditional boundaries. For example, more cooperation among competitors, suppliers, and customers makes it difficult to determine where one company ends and another begins in the virtual corporation partnership.

- **Trust.** Business partners in a VC must be far more reliant on each other and require more trust than ever before. They share a sense of destiny.

- **Adaptability to change.** The virtual corporation can adapt quickly to the environmental changes discussed in Chapter 1 because its structure is relatively simple or fluid.
Technology. Information technology makes the virtual organization possible. A networked information architecture is a must.

For an analysis of why virtual organizations work, see Markus et al. (2000). For strategies used by virtual organizations, see Venkatraman and Henderson (1998).

**HOW IT SUPPORTS VIRTUAL ORGANIZATIONS.** There are several ways for IT to support virtual organizations. The most obvious are those that allow communication and collaboration among the dispersed business partners. For example, e-mail, desktop videoconferencing, screen sharing, and several other groupware technologies described in Chapter 4 are frequently used to support virtual corporations.

Since the partners in a virtual organization are in different locations, they need information systems for supporting communication and collaboration. Such systems are a special case of interorganizational information systems (IOISs)—information systems that cross organizational lines to one or more business partners (see Chapter 8). Standard transactions in the interorganizational information systems are supported by extranets, Internet/EDI, and EFT (see Chapter 5).

The Internet is the infrastructure for these and other technologies used by VCs. Virtual office systems, for example, can be supported by intelligent agents. Modern database technologies and networking permit business partners to access each other’s databases. Lotus Notes and similar integrated groupware tools permit diversified interorganizational collaboration. Turban et al. (2004) provide numerous examples of collaborative applications. ERP software is extensively used to support standard transactions among business partners. In general, most virtual organizations cannot exist without IT. (For a survey of other tools see Boudreau et al., 1999; for the effect of IT on VCs, see Peng and Chang, 2000.)

**Organization Transformation and Change Management**

The examples in the previous sections demonstrated restructuring and BPR approaches that can be helpful in solving problems and exploiting opportunities created by the changing business environment. Such approaches need to be introduced into an organization and accepted by its members. Major organizational changes such as transformation to e-business (Siemens case, Chapter 1) are referred to as organization transformation; such major transformation usually requires change management. In this section we also address the topics of empowerment and BPR failures and successes.

Introducing a corporate wide e-business or other major business process redesign is likely to result in transforming an old organization to a new one. Generally speaking, **organization transformation** refers to an organization with a “new face,” whose business processes, structure, strategy, and procedures are completely different from the old one. Taking an organization through a radical transformation can be a lengthy, expensive, and complex process, which may involve organizational learning, changes in management and personnel, creation of a new structure, and employee retraining.
A major organization transformation, which many companies have had to face recently, is transformation to an e-business.

**TRANSFORMATION TO AN E-BUSINESS.** Transforming an organization to e-business, especially for a large company, can be very complex endeavor. (Recall the Siemens case, Chapter 1). To do so, the organization needs to transform several major processes, such as procurement, sale, CRM, and manufacturing.

Such a transformation involve several strategic issues. Lasry (2002) raises several of these issues when investigating the rate at which “brick-and-mortar” retail firms adopt the Web as an additional sales channel. He examined organizational strategies such as internal restructuring, forming a joint venture, or outsourcing. He concluded that implementing EC requires a disruptive and potentially hazardous change in core features, and therefore he suggested that companies spin off the EC activities as part of the transformation process.

Ginige et al. (2001) provide a comprehensive description of the transformation to e-business, describing both the internal and external processes supported by IT, as shown in Figure 9.8. They then showed the support of IT to each stage, as shown in Online File W9.15. Finally they describe the necessary change management activities.

Several other studies are dedicated to the transformation to e-business. For example, Chen and Ching (2002) explored the relationship of BPR and e-business and investigated the change process both for individuals and organizations. They proposed a process of redesigning an organization for e-business, providing several research propositions. Bosilj-Vuksic et al. (2002) explored the use of simulation modeling for enabling transformation to e-business. They examined the process of BPR and suggested how to use simulation and process maps to support the process. Lee (2003) described the use of business intelligence (Chapter 11) and
intelligent systems (Chapter 12) to facilitate the transformation of process and data to e-business.

An organization transformation process is facilitated by change management.

**Change Management**

Changing business processes, organizational structure, operating procedures, and so forth are interrelated, as shown by the classic Scott-Morton framework (see Online File W1.4). Major changes in business processes and/or in technology move organizations out of equilibrium, creating changes in structure, strategy, and in people and their roles. When the magnitude of the changes is significant, the changes may be resisted by employees. Change is a learning process that need to be properly managed. Management scholars have developed guidelines for how to introduce change into organizations (e.g., see Mintzberg and Westley, 1992, and Anderson, 2001) and how to diffuse innovations into organizations (e.g., see Rogers, 1983).

The faster the speed of change, the more difficult and stressful it is to manage it. Moving to e-business is very rapid, and so are many redesign projects. The classic change management approaches, such as use of benchmarking (Clarke and Manton, 1997), were adapted for IT changes. For example, Burn and Ash (2001) developed a model for introducing e-business changes in an ERP environment.

Of the many topics related to organization transformation and change management, we will deal here only with two: changing organizational structures, and empowerment of employees. The related topics are also important but are outside the scope of this textbook.

A major issue in organization transformation, including transformation to e-business, is the change in organizational structure. One common potential change is to a networked organization.

Many experts have advocated the concept of networked organizations (e.g., see Majcharzak and Wang, 1996). The term networked organizations refers to organizational structures that resemble computer networks and are supported by information systems. This structure is promising, but it is difficult to implement. (See Online File W9.16.)

The tendency in recent years has been for organizations to become somewhat “flatter” in terms of management layers, and managerial roles and organizational processes have been changing to follow this trend. Although the basic hierarchical structure is still most common, many organizations use temporary and/or permanent teams that are assigned to specific processes. For the use of teams as they related to business process and work redesign, see Choudrie et al. (2002) and Launonen and Kess (2002). Team-based structure requires empowerment of employees.

**Empowerment** is the vesting of decision-making or approval authority in employees in situations in which such authority was traditionally a managerial prerogative. Empowered employees are allowed to make operational and managerial decisions. Empowerment frequently accompanies redesign efforts. As a philosophy and set of behavioral practices, empowerment means allowing self-managing autonomous teams (e.g., see Hinks, 2002) or individuals to be in
charge of their own career destinies, as they work toward company and personal goals through a shared company vision (see Murrell and Meredith, 2000).

**EMPOWERMENT’S RELATIONSHIP TO INFORMATION TECHNOLOGY.** Empowerment can be enhanced through IT. Perhaps IT’s most important contribution is the provision of the right information, at the right time, at the right quality, and at the right cost. Information is necessary, but it may not be sufficient. To be fully empowered means to be *able to make decisions*, and these require knowledge. Knowledge is scarce in organizations, and specialists usually hold it. To empower employees means to increase the availability of such knowledge. Expert systems and other intelligent systems can play a major role in knowledge sharing, as can the Internet and intranets.

Empowered employees are expected to perform better, and to do so, they may need new tools. Information technology can provide, for example, tools that will enhance the creativity and productivity of employees, as well as the quality of their work. These tools can be special applications for increasing creativity (Chapter 12), spreadsheets for increasing productivity, and hand-held computers to improve communication. Examples are provided in Chapters 4 and 7.

Finally, empowerment may require training. Self-directed teams, for example, may need more skills and higher levels of skills. Once organized, teams will require training, which can be provided by IT. For example, many companies provide online training, use multimedia, and even apply intelligent computer-aided instruction.

**EMPOWERMENT OF CUSTOMERS, SUPPLIERS, AND BUSINESS PARTNERS.** In addition to empowering employees, companies are empowering their customers, suppliers, and other business partners. For example, Levi Strauss & Company allows its textile suppliers to access its database, so they know exactly what Levi Strauss is producing and selling and can ship supplies just in time. The company is using a similar approach with all its suppliers. Federal Express is using the Internet to empower its customers to check prices, prepare shipping labels, find the location of the nearest drop box, and trace the status of packages. Finally, Dell empowers its customers to configure and track orders and troubleshoot problems.

The topics we have considered in this section—organization transformation, change management, and empowerment—can have a significant impact in determining success or failure in business process redesign.

**FAILURES.** The PROSCI organization conducted a survey of several hundred companies to learn the best BPR practices and the reasons for BPR failures, which can be found at the organization’s Web site ([prosci.com](http://prosci.com)). Another summary of research into business process redesign failure is available at [managingchange.com/bpr/bprcult/4bprcult.htm](http://managingchange.com/bpr/bprcult/4bprcult.htm). The summary indicates a failure rate of 50 to 80 percent. According to Grant (2002) at least 70 percent of all BPR projects fail. Some of the reasons cited for failure are high risk, inappropriate change management, failure to plan, internal politics, high cost of retooling, lack of participation and leadership, inflexible software, lack of motivation, and lack of top management
support. A highly detailed case study on BPR failures is provided by Sarker and Lee (1999). For more on BPR failures and suggestions on how to avoid them, see El Sawy (2001).

**BPR SUCCESSES.** Despite the high failure rate of business process redesign, there are many cases of success, especially when less than the entire organization is restructured. While BPR failures tend to get more widespread publicity, success stories are published mostly by vendors and in academic and trade journals. For example, there is evidence of the success of BPR in the public sector (Maclntosh, 2003). Khong and Richardson (2003) report on extensive BPR activities and successes in banking and finance companies in Malaysia, and Mohanty and Deshmukh (2001) found successful BPR initiatives in a large cement manufacturing plant in India. (For details, see Online File W9.17). Organizations should consider restructuring their business processes or sometimes the entire businesses (see opening case, Chapter 1). When successful, redesign has great potential to improve an organization’s competitive position.

**MANAGERIAL ISSUES**

1. **Importance.** Getting IT ready for the future—that is, planning—is one of the most challenging and difficult tasks facing all of management, including IS management. Each of the four steps of the IT strategic planning process—strategic planning, information requirements analysis, resource allocation, and project planning—presents its own unique problems. Yet, without planning, or with poor planning, the organization may be doomed.

2. **Organizing for planning.** Many issues are involved in planning: What should be the role of the ISD? How should IT be organized? Staffed? Funded? How should human resources issues, such as training, benefits, and career paths for IS personnel, be handled? What about the environment? The competition? The economy? Governmental regulations? Emerging technologies? What is the strategic direction of the host organization? What are its key objectives? Are they agreed upon and clearly stated? Finally, with these strategies and objectives and the larger environment, what strategies and objectives should IS pursue? What policies should it establish? What type of information architecture should the organization have: centralized or not centralized? How should investments in IT be justified? The answer to each of these questions must be tailored to the particular circumstances of the ISD and the larger organization of which it is a part.

3. **Fitting the IT architecture to the organization.** Management of an organization may become concerned that its IT architecture is not suited to the needs of the organization. In such a case, there has likely been a failure on the part of the IT technicians to determine properly the requirements of the organization. Perhaps there has also been a failure on the part of management to understand the type and manner of IT architecture that they have allowed to develop or that they need.

4. **IT architecture planning.** IT specialists versed in the technology of IT must meet with business users and jointly determine the present and future needs for the IT architecture. In some cases, IT should lead (e.g., when business
users do not understand the technical implications of a new technology). In other cases, users should lead (e.g., when technology is to be applied to a new business opportunity). Plans should be written and published as part of the organizational strategic plan and as part of the IT strategic plan. Plans should also deal with training, career implications, and other secondary infrastructure issues.

5. **IT policy.** IT architectures should be based on corporate guidelines or principles laid out in policies. These policies should include the roles and responsibilities of IT personnel and users, security issues, cost-benefit analyses for evaluating IT, and IT architectural goals. Policies should be communicated to all personnel who are managing or directly affected by IT.

6. **Ethical and legal issues.** Conducting interviews for finding managers’ needs and requirements must be done with full cooperation. Measures to protect privacy must be taken.

   In designing systems one should consider the people in the system. Reengineering IT means that some employees will have to completely reengineer themselves. Some may feel too old to do so. Conducting a supply chain or business process reorganization may result in the need to lay off, retrain, or transfer employees. Should management notify the employees in advance regarding such possibilities? And what about those older employees who are difficult to retrain?

   Other ethical issues may involve sharing of computing resources (in a client/server environment, for example) or of personal information, which may be part of the new organizational culture. Finally, individuals may have to share computer programs that they designed for their departmental use, and may resist doing so because they consider such programs their intellectual property. Appropriate planning must take these and other issues into consideration.

   Implementing organizational transformation by the use of IT may tempt some to take unethical or even illegal actions. Companies may need to use IT to monitor the activities of their employees and customers, and in so doing may invade the privacy of individuals. When using business intelligence to find out what competitors are doing, companies may be engaged in unethical tactics such as pressuring competitors’ employees to reveal information, or using software that is the intellectual property of other companies (frequently without the knowledge of these other companies).

7. **IT strategy.** In planning IT it is necessary to examine three basic strategies:

   (1) **Be a leader in technology.** Companies such as FedEx, Dell, and Wal-Mart are known for their leading strategy. The advantages of being a leader are the ability to attract customers, to provide unique services and products, and to be a cost leader. However, there is a high development cost of new technologies and high probability of failures. (2) **Be a follower.** This is a risky strategy because you may be left behind. However, you do not risk failures, and so you usually are able to implement new technologies at a fraction of the cost. (3) **Be an experimenter, on a small scale.** This way you minimize your research and development investment and the cost of failure. When new technologies prove to be successful you can move fairly quickly for full implementation.
CHAPTER HIGHLIGHTS

8. Integration: The role of IT in redesign and BPR. Almost all major supply chain management (SCM) and/or BPR projects use IT. However, it is important to remember that in most cases the technology plays a supportive role. The primary role is organizational and managerial in nature. On the other hand, without IT, most SCM and BPR efforts do not succeed.

9. Failures. A word of caution: One of the lessons from the history of IT is that very big projects have a tendency to fail when expectations exceed real capabilities. For example, many of the early material requirements planning (MRP) systems, artificial intelligence, and complex transaction processing systems never worked. BPR and some ERP projects also have failed, for many reasons. One of the reasons for failure is a miscalculation of the required amount of IT. It simply may be too expensive to rebuild and retool the IT infrastructure and adjust applications that are necessary for BPR. The solution may be instead to defer the BPR and use incremental improvements, or to reengineer only the most critical processes.

ON THE WEB SITE... Additional resources, including an interactive running case; quizzes; additional resources such as cases, tables, and figures; updates; additional exercises; links; and demos and activities can be found on the book's Web site.

KEY TERMS

- Applications portfolio
- Business process
- Business process management (BPM)
- Business process reengineering (BPR)
- Business systems planning (BSP)
- Centralized computing
- Change management
- Critical success factors (CSFs)
- Cross-functional activities
- Cycle time reduction
- Distributed computing
- E-planning
- Empowerment
- Flattened organization
- Four-stage model of planning
- Information architecture
- Information requirements analysis
- Information technology architecture
- IT planning
- Legacy systems
- Metrics
- Networked organizations
- Organization transformation
- Project planning
- Resource allocation
- Reverse engineering
- Scenario planning
- Stages of IT growth
- Strategic information technology planning (SITP)
- Virtual organization (virtual corporation, VC)

CHAPTER HIGHLIGHTS (Numbers Refer to Learning Objectives)

1. Information technology planning can help organizations meet the challenges of a rapidly changing business and competitive environment. There are several approaches to IT planning (e.g., method driven, technologological approach).

2. IT planning methods have evolved over time. Today they are centered around e-planning.

3. Aligning IT plans with business plans makes it possible to prioritize IS projects on the basis of contribution to organizational goals and strategies.
The four-stage IT planning model includes strategic planning, requirements analysis, resource allocation, and project planning.

Strategic information systems planning involves methodologies such as business systems planning (BSP), stages of IT growth, and critical success factors (CSFs).

IS planning requires analysis of the information needed by the organization. Several methods exist for doing it. Also, implementing the planning requires planning—including resource allocation, cost-benefit analysis, and project management (using software).

Information technology architecture can be centralized or distributed. When it is distributed, it often follows the client/server architecture model.

Organizations can use enterprise architecture principles to develop an information technology architecture.

The major information systems planning issues are strategic alignment, architecture, resource allocation, and time and budget considerations.

To prioritize an e-commerce applications portfolio, IT planners can use the validity of the application and its fit with the organization, plotting it on a grid that indicates company fit and project viability and suggests one of four strategies.

BPR is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements.

IT helps not only to automate existing processes, but also to introduce innovations which change structure (e.g., create case managers and interdisciplinary teams), reduce the number of processes, combine tasks, enable economical customization, and reduce cycle time.

Mass customization, which is facilitated by IT, enables production of customized goods by methods of mass production at a low cost.

Cycle time reduction is an essential part of many BPR projects and is usually attainable only by IT support.

One of the most innovative BPR strategies is the creation of business alliances and virtual corporations.

Process redesign and/or BPR result in transforming organizations to new structures and operations, such as e-business.

Transforming organizations means change that may be resisted or poorly done. Therefore, change management is needed.

**QUESTIONS FOR REVIEW**

1. Briefly discuss the evolution of IT planning.
2. What are some of the problems associated with IT planning?
3. Define and discuss the four-stage model of IT planning.
4. Identify the methods used for strategic planning and review their characteristics.
5. What is information technology architecture and why is it important? List the major types.
6. What are the advantages and disadvantages of centralized computing architectures?
7. What is a legacy system? Why do companies have legacy systems?
8. Define scenario planning.
9. What is an applications portfolio?
10. Define business process and BPR.
11. List the drivers of process redesign.
12. Describe the stovepipe problem.
13. Define BPM.
14. Describe the enabling role of IT in BPR.
15. What is meant by mass customization? Give examples.
16. Define cycle time reduction.
17. Define a virtual corporation.
18. Describe the major characteristics of empowerment and describe its benefits.
19. Define organization transformation and change management.

**QUESTIONS FOR DISCUSSION**

1. Discuss how strategic planning, as described in this chapter, could help an electric utility plan its future.
2. How might an organization with a good strategic idea be limited in its ability to implement that idea if it has
an inferior or inappropriate information architecture? Provide an example.

3. What type of problems might an organization encounter if it focuses only on resource allocation planning and project planning?

4. Why is it so important to align the IT plan with organizational strategies? What could happen if the plan is not aligned with these strategies?

5. Discuss the advantages of using Tjan’s approach to an applications portfolio.

6. Some organizations feel that IT planning is a waste of time, because the competitive environment and technologies are changing so rapidly. They argue that their plans will be obsolete before they are completed. Discuss.

7. Should there be a correlation between a firm’s architecture structure (and chart) and its IT architecture (e.g., centralized IT for a centralized structure)?

8. Review the opening case. What approach was used to develop an information systems plan?

9. Relate the concepts of supply chain and its management to BPR and IT.

10. Explain why IT is an important BPR enabler.

11. Some people say that BPR is a special case of a strategic information system, whereas others say that the opposite is true. Comment.

12. Relate virtual corporations to networked organizations. Why is a VC considered to be a BPR activity?

13. What are some of the reasons for maintaining a functional structure of an organization?

14. Explain the role intranets can play in lessening the stovepipe problem.

EXERCISES

1. Using the CSF method of strategic planning, identify new strategic initiatives that a university might take using information technology.

2. Examine IT At Work 9.2 and Tjan’s applications portfolio method. Compare the two, showing the advantages and limitations of each.

3. What kind of IT planning is done in your university or place of work to ensure that the Internet demand in the future will be met? Does the university have a CIO? Why or why not?

4. Examine some business processes in your university, city, or company. Identify two processes that need to be redesigned. Employ some of El-Sawy’s 10 principles to plan the redesign. Be innovative.

GROUP ASSIGNMENTS

1. Divide the class into groups of six people or less. Each group will be entrepreneurs attempting to start some kind of nationwide company. Each group should describe the IT architecture it would build, as well as the expected benefits from, and potential problems with, the IT architecture it has chosen.

2. Have teams from the class visit IT project development efforts at local companies. The team members should interview members of the project team to ascertain the following information.

   a. How does the project contribute to the goals and objectives of the company?
   b. Is there an information architecture in place? If so, how does this project fit into that architecture?
   c. How was the project justified?
   d. What planning approach, if any, was used?
   e. How is the project being managed?

3. Assign groups to the following industries: banking, airlines, health care, insurance, and large retailing. Each group will investigate the use of the mainframe in one industry and prepare a report on the future of the mainframe. Also, include information on how client/server architecture is used in the industry.

4. Each group in the class will be assigned to a major ERP/SCM vendor such as SAP, PeopleSoft, Oracle, etc. Members of the groups will investigate topics such as:

   a. Web connections.
   b. Use of business intelligence tools.
   c. Relationship to BPR.
   d. Major capabilities.
   e. Use of ASPs.
   f. Low cost approaches.

   Each group will prepare a presentation for the class.
CHAPTER 9  IT PLANNING AND BUSINESS PROCESS REDESIGN

INTERNET EXERCISES

1. Go to dwinc.com/strat.htm and read the content. Compare and contrast the approach on this page to other approaches to strategic information systems planning.

2. Enter cio.com. Review the latest IT planning surveys and reviews reported. Start with the October 1997 survey conducted by CIO Communications Inc.

3. Find 10 to 15 examples of mass customization not cited in this book. Look for shoes, clothing, industrial products, etc.

4. There is an increased use of the Internet/intranets to enable employees to make their own travel arrangements. Several Internet travel companies provide opportunities for companies to reengineer their travel processes. Surf the Internet to find some vendors that provide such services. Prepare a report that summarizes all the vari-

Minicase 1
Oregon Geographic Information System Plan

Geographic information systems (GISs) are becoming increasingly important to governmental agencies in conducting their business and serving the public. Such systems use spatial data such as digitized maps and can combine these data with other text, graphics, icons, and symbols (see Chapter 11). The state government in Oregon (sscgis.state.or.us) recognized the increasing importance of GISs as a tool to support decisions that are related to data represented by maps. GISs also offer the potential benefit of coordination among agencies, to avoid duplicated efforts and incompatible data.

The state therefore created a Geographic Information Council, consisting of 22 people from agencies at the federal, state, and local levels, to develop a strategic plan to promote the effective use of GISs in Oregon. The planning process commenced in 1995 and produced a comprehensive plan dated March 1996. The plan identified and prioritized goals and strategies, including leadership responsibilities and time frames for each major item. The Council circulated the draft plan to GIS personnel in different organizations, to obtain a peer review before finalizing the document.

The plan starts with a “vision for GIS,” a scenario for potential types and levels of usage. This vision incorporates potential advances in technology such as multimedia, organizational structures including a statewide centralized GIS data administration function, a high-bandwidth telecommunications infrastructure, and adequate funding for GIS activities.

Benchmarks for Success

The plan identified criteria for evaluating its own validity:

- GIS integrated into governmental processes ("as common as word processing")
- Geographic data gathered and managed cooperatively and made available to the public
- Statewide standards for spatial data
- A centralized catalog of statewide GIS data
- GIS as an integral part of curriculum for K-12 and higher education throughout the state

Goals and Strategies

The plan also established specific goals, strategies for achieving them, agencies with lead responsibilities, and target dates. The goals include data requirements such as:
ous activities. Also discuss the potential impact on the travel agency industry.

5. Enter truserv.com and find “news” in the media relations section. Identify all IT-related plans announced by the company in the last six months. Comment on your findings.

6. Surf the Internet to find some recent material on the role IT plays in supporting BPR. Search for products and vendors and download an available demo.

(1) currency and completeness; (2) security; (3) ease of use and accessibility; (4) incorporation of metadata indicating applicability; (5) coordination of collection and maintenance; and (6) standardization.

For technology, the goals include: (1) network access for agencies and public; (2) compatible data exchange formats; (3) real-time update capability; (4) master contracts for hardware/software/training; (5) integration with global positioning system (GPS) technology; and (6) a centralized data repository.

For people and organizations, the goals include: (1) stable funding and resources; (2) recruitment and retention of GIS employees; (3) definition of a model GIS organizational structure; (4) development of an educational program; (5) effective marketing of Oregon’s GIS program.

Follow-Up

The planning group recognized that this plan would lose its value if not maintained, or if there were no follow-up on its recommendations. Therefore the plan included the following ongoing strategies: (1) monthly meetings of the planning group; (2) workgroups to address specific recommendations; (3) development of GIS plans at other state agencies; (4) distribution of supplements and updates four times a year; and (5) measurement against benchmarks and revision of the plan for the next two-year period.

Source: Compiled from ssogis.state.or.us/coord/orisplan.htm. Adapted and reprinted with permission from Oregon Department of Administration and PlanGraphics, Inc.

Questions for Minicase 1

1. Which stage(s) and activities of the four-stage planning model is/are included in the Oregon GIS planning effort?

2. Based on material presented in this chapter and your own personal evaluation, identify things that the planners did well in this project.

3. Can you see any problems or weaknesses with this planning effort?

4. Discuss possible differences in IT planning for governmental agencies, as discussed in this minicase, versus planning in business organizations.

5. Identify businesses and other private organizations that might want to use GIS data created and maintained by public agencies in Oregon. Discuss how (and whether) public agencies should charge private organizations for such data.

6. Enter truserv.com and find “news” in the media relations section. Identify all IT-related plans announced by the company in the last six months. Comment on your findings.

7. Enter gensym.com and find their modeling products. Explain how they support BPR and redesign.

8. Enter xelus.com/index.asp and find how Xelus Corporation software can facilitate planning (e.g., see the Cisco case).
CHAPTER 9  IT PLANNING AND BUSINESS PROCESS REDESIGN

Minicase 2
Scenario Planning at National City Bank Aligns IT with Business Planning

The Problem. The banking industry is very competitive. National City Corp. of Cleveland (national-city.com) was confronting three challenges: (1) it needed new ways to generate earnings; (2) it faced increasing competition for market share; and (3) the bank was losing customers who wanted to do banking using the Internet.

National City saw the customer information system it was developing with IBM as a solution to these problems. The bank hoped to use this system to develop new, high-revenue products, tailor programs for customers, and cross-sell products to appropriate customers. But to design it, the bank had to know what kind of information the system would be aggregating. Would it track information about the products the bank offered or the people who bought them? If it was product-focused, it would have to include detailed descriptions of each financial service, whether credit cards or mortgages. If the system was customer-focused, it would track whether they used ATMs, branch offices, or call centers, and would indicate demographics in order to build customer profiles. Furthermore, the bank would need to set up business rules to determine customer profitability.

Management quickly realized that they simply could not answer these questions because the answers were linked to a larger issue: Management didn’t have a clear sense of the bank’s strategic direction. The required investment in technology was $40 million, so planning to invest it properly was critical.

The Solution. To clarify the business direction, the bank hired a consulting company, ncri.com, to employ scenario planning. The planning process involved six phases used by an implementation team:

Phase I: Alternative Visions (Scenarios)
In this phase, a few possible visions of the future are selected. In the case of National City, the scenarios were:

- **Utilize a CRM-based strategy.** This was a major industry trend in which everything would be geared to individual customer need. This business model is complex and expensive to pursue.
- **Specialize solely in certain financial services.** This is a low-cost option, but may not bring new customers and may even result in losing existing customers.
- **Create a separate online bank.**

Phase II: Events Generation
Next, a list of 150 internal and external events that might influence any of the outcomes was generated by the team. Events included new regulations and technological developments (e.g., wireless). These events were simulated as newspaper headlines (e.g., “Demand for real-time banking information via cell phones is skyrocketing”). These events were used later to create scenarios.

Virtual Company Assignment
IT Planning at The Wireless Café

During your internship at TWC, you’ve uncovered many opportunities for IT to offer more effective management, better information, and improved customer care. You’ve got everybody’s heads spinning with the possibilities, but you realize that it takes careful planning, alignment, and integration to make the best use of information technologies at the diner. While you and Jeremy were recently talking about the potential of wireless waitstaff software, you realized he’s quite excited about it and may just go out and buy the system. You decide you really need to talk with Barbara and Jeremy about the importance of IT planning, so you start to set out your plan to plan.

1. Discuss the long-range planning approach you’d recommend that TWC undertake. Include issues such as the planning approach, who you’d include (and how you’d...
Phase III: The Workshop

A three-day workshop with the 24 top executives was conducted. The participants were divided into three groups. The first task was to rank all 150 events by the chance that they will occur. Once done, all participants met to discuss the rankings and, after appropriate discussion, reach a consensus. This process can be lengthy, but it is essential.

Then, each team was assigned one of the bank’s three scenarios and was asked to analyze the impact of the most-likely-to-occur events on that scenario, within a five-year planning horizon.

Phase IV: Presentation

Each group made an oral presentation, in which their goal was to convince the other groups that their vision was the most feasible. This was a difficult task since some team members, who had to play the role of supporters, actually did not like the scenario they were supposed to “sell.”

Phase V: Deliberation and Attempt to Reach a Consensus

The entire group of participants needed to agree on which alternative was the best for the bank. After long deliberation, the group decided to support alternative #1, the CRM-based strategy.

Phase VI: IT Support

To facilitate the IT planning, an IS plan was devised in which a data warehouse was planned, so that customers’ profiles could be built. Data mining was planned for identifying the bank’s most profitable customers, and a Web-based call center was designed to provide personalized services.

All in all, the scenario planning process was an exercise in contingency thinking that resulted in prosperity. Compiled the bank when the system was eventually deployed.

Sources: Condensed from Levinson, 2000; ncri.com; and nationalcity.com.

Questions for Minicase 2

1. One critique of this approach is that some members who are asked to “sell” a specific scenario may not be enthusiastic to do so. Find information in the scenario planning literature on this issue, or e-mail to a scenario consultant (ncri.com or gbn.com). Write a report on your findings.

2. Can group decision support systems (Chapter 10) be used in this case? Why and what for, or why not?

3. How can the end users learn about technology in scenario planning?

4. What IT tools can be used to facilitate this scenario planning process, which was done manually?

5. How did the scenario planning help the IT people to better understand the business?

6. Why is scenario planning considered a risk-management tool?
REFERENCES

Agrawal, V., et al., “E-Performance: The Path to Rational Exubera


Boudreau, M. C., et al., “Going Global: Using IT to Advance the Competitivevis


sition of the Informal Organizational Structure,” *MIS Quarterly Execu


McAlistor, R., “IT PLANNING AND BUSINESS PROCESS REDESIGN


REFERENCES


