Chapter 12

Business Process and Job (Re)Design

Learning Objectives

Upon completing this chapter, you should be able to:

- Recognize how end-user computing introduces change at the organizational, work group, and individual levels throughout the organization.
- Explain why business process redesign is a critical competence for contemporary organizations.
- Describe the four basic phases of business process redesign methodology.
- Explain the difference between command-and-control management and empowerment.
- Describe how to establish boundaries to create empowerment while maintaining appropriate managerial control.
- Discuss the need for job (re)design.
- Differentiate between task analysis and job analysis.
- Identify various approaches to business process and job redesign.
- Explain the major characteristics of jobs that motivate workers.
- Identify core job dimensions to be considered when designing jobs.
- Choose appropriate techniques for redesigning jobs.
- Evaluate the way organizations are using technology to redesign jobs.

1 2.1 INTRODUCTION

As indicated in the previous chapter, implementing end-user information systems (EUIS) is as much about new ways of working as it is about information technology. The unprecedented pressure for change in organizations is being driven by more than technology. Many of the basic principles and assumptions underlying how enterprises organize and operate are changing as well. These changes have a powerful influence on the interrelationship of all four variables of the Systems Change Model: structure, people, process, and technology. Some of the most significant of these shifts are highlighted briefly.

1. ***Structure.*** One of the most far-reaching changes is a shift from a segmented, functional orientation in thinking about organizational structure to a process-driven, integrated orientation. This shift puts greater focus on satisfying customer needs and requirements, and meeting them at all points in the process of delivering products and services. It challenges industrial era rules regarding organization hierarchy and command-and-control management.
2. ***People—both workers and customers.*** Individual performance based on stable, defined responsibilities is shifting to a team performance model with greater flexibility to meet the

requirements of the organization. Instead of being based on loyalty and obedience in exchange for long-term security, the psychological work contract has shifted to performance-based results in exchange for long-term employability and opportunity. Compensation models have shifted from security and predictability to risk-based models based on individual, team, and organizational performance. Workers in empowered environments have greater responsibility and control within defined boundaries.

The increasing sophistication of customers, along with other competitive marketplace forces, have simultaneously raised the performance bar not just for today's products and services but in the realization that when a company is standing still, it risks being overtaken and left in the dust. The driving force of the organization shifts from an internal growth and profit-centered focus to an external customer satisfaction focus.

3. ***Process.*** The orientation for organizing work in the information economy has shifted from an internal focus on tasks and functions to an external focus on core business processes that deliver value for customers. The process view transcends traditional functions and departments and shifts the focus to the work that is actually done and the manner in which this work is performed. It profoundly alters the thinking about how to organize work and how to manage the workforce.
4. ***Technology.*** Advances in information technology have fundamentally altered established management models. With digital networks that provide instant access to information and knowledge at all levels of the enterprise, some of the traditional middle management roles of gathering, disseminating, and controlling information are no longer needed. The implication of data converted to information, to knowledge, and then to wisdom is just beginning to be realized.

Throughout this text, we emphasize that using information technology effectively involves more than implementing hardware and software. Job design and business process restructuring are key components of EUIS project management. Opportunities for business process md job redesign are assessed in the initial stages of EUIS projects. Depending upon the size, scope, and strategic importance of a project, EUIS analysts may need to address the issue of job and work group design, either alone or in conjunction with broader business process restructuring efforts. Redesigning business processes and jobs is extremely challenging. Major endeavors are not for the fainthearted. The endeavor must be approached in a systematic, structured way. it is important to understand the fundamental principles of business process and job design, as well as the technology.

This chapter considers the impact of technology on the design of business processes and knowledge work. It focuses on new opportunities to create work environments that meet organizational and individual needs in line with changing work values. The chapter begins with a discussion of the larger picture of business process redesign (i.e., reengineering). The discussion then turns to work groups and individual jobs. Several approaches to job and work group design are presented. The chapter concludes with a discussion of methods that take advantage of technology to design motivating and productive work environments.

12.2 BUSINESS PROCESSES. WORK GROUPS. AND JOBS

Technology is both an enabler and a constraint on business process, work group, and job design. System limitations can restrict greatly an enterprise's flexibility to innovate and change business processes. Indeed, many new approaches to managing business process and work tasks depend on the availability of advanced information networks. A long

legacy of industrial era thinking about how to design jobs and organize work also acts as a constraint in efforts to change business processes. Work rules, especially when stipulated by union contracts, reward systems, corporate cultures, and other factors, can pose significant challenges.

Information technology affects business processes, work groups, and jobs. It's a long way from simply understanding the value of IT to realizing it on the bottom line. As important as IT is, its value in improving performance depends on aligning all four of the change variables. "My view is that technology is only a support— an enabler—for changing practices," says James Yost, Ford Motor Company's CIO and Head of Process Leadership. "You must integrate IT into the texture of the business."[1] Thus, Ford Motor Company has married IT and process leadership. Their IT group is divided into three service areas: process and technology (process documentation and change leadership plus translation of process into IT requirements), solutions delivery (application development and deployment), and technical services (IT infrastructure).

Technology always forces changes in job responsibilities, task content, and human interactions. It often brings change in organizational structure and culture, as well. Studies in the United States and Europe have shown that when organizations ignore people issues, new systems result in poorer job designs. Poor job design threatens the well-being and performance of knowledge workers. Thoughtful design, on the other hand, can enhance both productivity and quality of work life. Thus, to achieve the full benefits of technology, ana1ysts must address the issues of job design, as well as systems design and business process design.

When analysts and decision makers design systems and select equipment, they need to consider how their choices will alter the tasks people perform. Decision makers mistakenly assume that selecting the right technology is the most important part of improving productivity. Considerable evidence to the contrary suggests that technology often affects productivity less than good job design does.

Although job design is an important issue in systems design, traditional analysts often consider job design outside their responsibility, or they assume that employees will apply technology intuitively. When job design is not part of the project scope,~ analysts frequently design jobs unknowingly. Consequently, changes may be haphazard and ignore worker motivation and job satisfaction. Even when attention is given to human factors, analysts often concentrate on such technical aspects as ease of use, lighting, and furniture, and ignore the role of workers. Implementers also need to look carefully at the characteristics of the jobs being changed or created when technology is introduced. They should know the elements of job and systems designs that meet personal, social, and technical objectives.

Many of the problems with the use of technology lie in the way systems analysts typically design and cost justify new technology. Using the cost savings approach described in chapter 9, analysts often justify equipment costs by projecting reduced operating costs. In the past, reducing operating costs usually meant cutting salary expenses by designing systems that minimize the need for skills. In the process, analysts often ignored worker motivation and job satisfaction. Resultant jobs usually were narrowly defined, and production goals and controls were set by supervisors with little or no participation by employees.

This narrow approach to job design limits opportunities for users to benefit from the full capabilities of new systems. For example, in one case, although analysts acknowledged

the importance of worker satisfaction and motivation and expected workers to be capable and skilled, the system they developed was appropriate for only low-level, repetitive jobs. Not only did the narrow approach miss the point, it also created a climate that led to low morale and increased turnover. Thus, it is important when redesigning business processes or implementing information technologies to consider job design, as well.

Neglecting to address behavioral issues such as job design is at the root of many information system and reengineering failures. Assumptions about work performance, productivity, and worker behavior often implicitly affect decisions about systems design. This has led to misguided attempts to improve performance through downsizing rather than sound principles of business process and job design.

12.3 BUSINESS PROCESS REDESIGN (BPR)

Much has been written in recent years about *business process redesign* **(BPR),** or *reengineering.* Reengineering guru Michael Hammer defines reengineering as the "fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical, contemporary measures of performance, such as cost, quality, service, and speed."[2] The primary distinctions between reengineering and other work improvement methods are the emphasis on fundamental rethinking of work design rather than incremental improvement, and the focus on business processes father than functions and work tasks.

Although often viewed somewhat negatively because of its association with widespread downsizing, reengineering has become a widely accepted methodology for business change. The need for BPR is greater than ever. Thousands of enterprises around the world are faced with the daunting task of shifting from stable, command-and-control hierarchical structures to more fleet, flexible, flatter organizational structures that fully utilize the capabilities of a diverse workforce in order to compete in the fast-paced, global marketplace of the twenty-first century. Harold S. Resnick, a Boston management consultant, characterizes the challenge in this way: "Steering the ship of our organizations has shifted from dealing with periods of turbulence amid relatively calm seas to continuous, relentless whitewater rafting."[3]

BPR can be approached at different levels. At the enterprise level, BPR generally focuses on reengineering an entire organization or a department or division within that organization. Changes of this magnitude may take several years to design and implement fully. At the business process level, reengineering efforts are generally smaller in scope, requiring a set of solutions that are less broad and can be addressed much more quickly. Business process redesign can be simple or complex, encompassing an entire core business process or limited to specific subprocesses. BPR may occur at the divisional, unit, work-group, and job levels. Because improvement opportunities usually arc driven or enabled by information technologies, EUIS analysts and project managers may be called upon to lead or contribute to such efforts.

BPR challenges the core purposes or assumptions underlying a business process. It requires a willingness to undergo critical self-analysis and to be open to change of the

broadest and deepest kind. To succeed at BPR, enterprises must be prepared to sustain the discipline required of a rigorous process.

Before undertaking BPR efforts, enterprises must have defined their core business processes. This step is key because it helps focus management attention on the important areas where work gets done and how that work relates to creating value for the customer. Once identified, core business processes can be further broken down, if desired, into smaller components that can be more suitable for redesign.

A *core business process* can be defined as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer."[4] One approach to identifying core business processes is to identify their beginning and their end. For example, the sales process could be called the "prospect to order process," the manufacturing process might be called the "order to delivery process," and the customer service process might be called the "customer delivery to repurchase process." Most companies have between 5 and 10 core business processes that essentially define the business. Some enterprises find it difficult to identify core business processes because they tend to think in terms of departments and functions instead of in terms of what work must be done and the manner in which is it performed. Various techniques, such as mapping and tree diagramming, can help enterprises identify and define their core business processes.

Various reengineering methodologies have emerged, many of them proprietary to specific consulting firms. In general, BPR follows a highly structured methodology based on four basic phases involving diagnosis, (re)design, implementation, and institutionalization. Some methodologies also include a strategic planning phase—where core business processes are defined as described in the preceding paragraph—at [4~]e beginning as part of the reengineering methodology. The four basic phases are described briefly in the sections that follow.

12.3.1 Diagnosis

The diagnosis phase involves a series of structured steps intended to create a shared vision for the business process redesign, compare this desired state to current operations, and determine how to move the organization from the current state to the desired state. The following steps are involved in the diagnosis phase.

1. Once the core business process or subprocess to be redesigned is identified, the first step is to craft a shared vision for the reengineered process. The vision establishes clear goals for the new process in line with the business strategy and serves to focus the efforts of all stakeholders. At the heart of the vision must be a true understanding of customer needs. To move the enterprise forward, the redesign vision must radically challenge thinking about how the work is done, alter the assumptions underlying the current process, and set realistic but challenging performance targets. A meaningful vision defines specific characteristics and measurable objectives for the redesigned process. Creating a BPR vision is a balance among inspiration, innovation, and measurable targets. The clearer and more specific the vision is, the more likely the enterprise is to achieve the radical redesign required for organizational repositioning.
2. The vision is then tested against high-level, external benchmarks of the process. Unless the results of current industry leaders are examined, it will be difficult to

determine whether the goals are realistic or might be set too low or too high. For example, if the BPR vision is to reduce the average time required to fulfill a customer order from 10 days to 3 days, is that a good goal? If the industry leader currently takes 6 days, perhaps it is unrealistic. On the other hand, if the industry leader does it in 2 days, the ~al may not be good enough. Benchmarking should not be limited to current industry leaders, however. It should be extended to any environment in which a similar process is deployed. The best innovations often originate from applying successful practices in one industry or discipline to an entirely different field.

3. The next step is to define critical success factors (CSFs) that must be accomplished in order for the newly designed process to be successful for the enterprise. The CSFs may address technical performance, customer satisfaction, cycle time, technical quality, marketplace forces, or other such factors. Measures generally are defined in terms of customer value, costs, return on investment, time, quality, or quantity.
4. The next step is gaining agreement on the scope of the business process. It is important to define the boundaries within which the business process redesign must achieve its results. Boundary conditions may be established for products or services to be included, markets, customers, costs, physical space, technology, personnel, or other internal or external requirements.
5. Describing the current process. This step is intended to ensure that the reengineering team fully understands the current process before redesigning it. Usually the process will be diagrammed on a flowchart and then verified by users. The analysis should identify inputs, outputs, and measures of all major steps of the current process. All stakeholders must be clearly identified, including owners, users, and customers of the process.
6. Then, the current process is subjected to detailed internal and external benchmarking. Internal benchmarking involves a careful analysis to establish baseline performance measures. External benchmarking involves a detailed and thorough investigation of other enterprises to identify best practices. It is important to look not only at what results are achieved but also how they are achieved. Suppliers and customers are good sources of information regarding possible benchmarks.
7. Compare current performance with desired performance (vision). Gap analysis involves comparing performance on current benchmarks with the target benchmarks and assessing envisioned performance for the new process to identify strengths and weaknesses. Attention must be paid not just to what is done but specifically how it is done. If the envisioned process were implemented, what would it look like in terms of how work is performed, as well as outputs? This analysis identifies the key areas that must be addressed in the new process design phase.
8. The final diagnosis step is root cause analysis to determine why the current process fails to meet the desired vision and strategic goals. During root cause analysis, constraints and enablers are identified. This analysis provides a starting point for the redesign effort, which should seek to remove constraints and strengthen or maintain the enablers.

12.3.2 (Re) Design

The second phase of BPR is designing the new process, which includes flowcharting the new process and addressing the people, structure, and technology requirements. The

design phase is completed in steps and tested to evaluate how well the newly designed process will achieve the vision and benchmarks. Steps in (re)design are initial process redesign, process walkthrough, prototype, pilot test, and final process design.

1. ***Initial process redesign***. Process redesign addresses all four organizational variables: technology, process, people, and structure. This step seeks to create a true breakthrough design concept. technology plays an especially critical role in this step as an enabler for process innovation. This is the phase in which the true distinction between reengineering and other incremental improvement approaches is realized. The objective is to invent a new approach based on new ways of thinking about the desired vision and outputs rather than merely refining the old process. Reengineering guru Michael Hammer calls it the breakthrough design concept. This step produces a new flowchart of how the process should work to meet its critical success factors, achieve desired benchmarks, and fulfill the process vision.
2. ***Process walkthrough***. After the new process has been created (i.e., reengineered), it must be reviewed in detail with all key stakeholders and analyzed to determine whether it truly is capable of working as intended. Will the process fulfill the needs of all key stakeholders including users, interim customers, and suppliers? Is the enterprise capable of implementing and sustaining the required changes? If not, can it secure the required resources and at what cost?
3. ***Prototype.*** Based on feedback from the process walkthroughs, adjustments are made to the original design. Then, a prototype is developed and tested under simulated conditions to determine whether it meets performance expectations. Additional refinements are made as necessary until the process achieves performance expectations based on established benchmarks.
4. ***Pilot testing***. The process now is ready to be tested in a live, controlled environment. Generally, it is desirable to select as favorable a setting as possible. Strong commitment of participants to the success of the endeavor is important because glitches and many questions still remain, which may require some perseverance and ingenuity to resolve. The pilot test identifies problems and additional changes, assesses the robustness of the new process under use, and provides initial measures of results against established benchmarks.
5. ***Final process design***. The results of the prototype testing are analyzed and evaluated to modify the process and create the final integration of the new process. Formal approvals are then sought from process owners, a steering committee, user groups, suppliers, customers, and any other stakeholders. Once approved, the reengineering effort is ready to move ahead with full implementation.

12.3.3 Implementation

Implementation also is conducted in stages. The first step is to convert the pilot developed during design into steady state use. Implementation then continues in stages until all remaining parts of the newly designed business process are fully operational and the results have been measured against established benchmarks.

1. ***Implementation plan.*** The implementation plan defines the who, what, when, where, and how of implementation. The plan must address issues such as budget, timing, required resources, training of personnel, structural adjustments, and communication

of changes to all stakeholders. Documentation, reference materials, training programs, and other tools may need to be developed. How will the implementation be phased, and most importantly, how will operations be transitioned from existing practice to the new process with minimal disruption? The plan must be approved by the process owner and steering committee.

2. ***Initial field implementation***. Implementation generally is completed in phases to minimize disruption. Core business processes, by definition, are central components of the business. Making major changes can be somewhat like trying to change the tire on a car while it's speeding down the highway at 60 mph. Generally, the initial field implementation will require considerable resources and attention. The scope and length of the initial implementation depends on circumstances. Often, the timing for successive implementations may not be finalized until the initial implementation is fully operational and the new process consistently is meeting the vision, critical success factors, and defined measures.

   If problems occur or the process fails to perform as anticipated, further implementation may be delayed while the new process undergoes further redesign, based on the initial experience. It is especially important during this initial implementation to validate the benefits of the newly designed process. This is the point where it is important to remember that different is not necessarily better, and it is critical to demonstrate that the reengineered approach does in fact produce significantly better results. Any supporting infrastructure required to support full implementation of the reengineered process also must be implemented at this point.
3. ***Phased rollout.*** Once the initial implementation is stabilized and operating as envisioned, the next phases of implementation proceed. Implementation may be phased by region, by customer groups, by product groups, by plant, or using other approaches that make sense for the particular enterprise. As the implementation proceeds, the implementation team usually strives to refine the implementation process itself, as well as the reengineered design. The implementation team learns to anticipate potential problems and to avoid or minimize them. Each new phase generally benefits from the lessons learned in the prior implementations. As the success of early implementations is established and results are verified, concerns and resistance among user groups in the later installations often begin to dissipate.

12.3.4 Institutionalization

Once the reengineered business process is implemented and fully operational, the final stage is alignment with other business processes. This stage must be monitored regularly as an ongoing part of normal business operations based on the established benchmarks. This final step would include a transition to the enterprise's ongoing, continuous improvement process.

In addition to the *focus* on redesigning the business process, successful reengineering efforts also must address issues of job and work group design. This is a requirement not only for reengineering but for almost any technology implementation. The impact on jobs must be assessed with an eye to using technology as an enabler for improving work, encouraging innovation, and supporting high performance levels.

12.4 THE NATURE OF JOBS AND NEED FOR JOB DESIGN

The term *job design* means "the formal and informal specification of tasks that are performed by employees, including expected interpersonal relationships and task interdependence. Ideally, the needs and goals of both employees and the organization are taken into account in job design or redesign."[5] The term *job design* suggests a systematic process for determining the content of a job. It implies that the content, interdependencies, and personal relationships of a' job are thought out carefully to accomplish organizational goals. In fact, not all jobs are the result of job design. Jobs often evolve haphazardly. All too frequently, work is divided based upon the skills and preferences of available staff rather than logical design principles. Every time a manager assigns work or gives instructions, job design occurs. Likewise, when analysts design information systems, jobs are affected. Consciously or unconsciously, many factors influence the design of jobs.

A job generally is defined organizationally. A formal description legitimizes the position and defines the tasks, responsibility, authority, accountability role in the organization, and pay scale for the person in each job. Past practice has been to define jobs in terms of a set of specific tasks: preparing budgets, typing correspondence, writing computer programs, conducting meetings, writing reports, supervising employees, appraising performance, hiring staff, analyzing financial trends, evaluating market data, teaching job skills, or forecasting sales. The tasks that make up a job may change over time, and the group of tasks that constitute a job may be designed purposefully or may have evolved through trial and error. In the Information Age, the trend is to define jobs, especially for knowledge workers, in terms of results and the parameters within which those results are to be achieved. This approach provides greater empowerment and flexibility in how results are achieved.

Associated with a job are certain responsibilities, authority, accountability, and roles. ***Responsibility*** defines the obligation to carry out assigned tasks or to achieve agreed-upon results. Whereas the tasks define the what of a job, responsibility spells out the where, when, and how. *Authority* refers to the rights or power granted to the jobholder to carry out assigned tasks and responsibilities. Authority may range from a clerk's right to requisition office supplies to a supervisor's right to hire, train, evaluate, and dismiss staff to an executive's right to approve multi-million-dollar budgets and projects. ***Accountability*** refers to a personal liability to perform a job according to predetermined standards or requirements. Jobholders are accountable to their immediate superiors, as well as to others who are affected by their behavior. For example, corporate attorneys are accountable not only for performing the tasks assigned by their supervisors, but for performing all work according to professional legal standards.

A job's role within the organization refers to how or where a job fits into the work flow, the interdependencies among tasks and jobs, relationships with others, and the perceived status or prestige that a job has in comparison to other jobs inside or outside the organization. For most individuals, a job provides more than a livelihood; people identify with their jobs and derive gratification from them. The job defines a role within the business process and the social structure; it is the point of articulation between the individual, the technology, and the organization. Thus, it is not sufficient to talk about

how information technologies affect business process. Technology affects jobs as well: the set of tasks, the responsibility, the authority, the role in the organization, and the self-perception of the employees.
To capitalize fully on information technology, people must be motivated to do high-quality work. Motivation is an internal psychological state, which is affected directly by the design of the job itself. The full benefits of technology cannot be realized without the support of the people who use the systems. A new computer system, even if it has the capacity to double output, may yield only a slight increase in productivity if people do not understand it, fear its impact, or see no benefit for themselves. Thus, it is important when redesigning business processes or implementing information technology to consider job design, as well.

12.5 APPROACHES TO JOB DESIGN

Prevailing practice in many enterprises still is based on the simplification and standardization of scientifically engineered jobs. Approaches to job design that attempt to break out of this mold include job enlargement, job rotation, job enrichment, job characteristics approaches, sociotechnical approaches, quality of work life programs, and, most recently, empowerment of individuals and self-managed work groups. Each of these is discussed in this section.

12.5.1 Job Enlargement and Job Rotation

A job enlargement approach to job design expands jobs to include a variety of similar tasks. On a production line, this might mean that a worker performs several assembly steps instead of just one. In an office, a typist might sort mail, order supplies, and file documents rather than type all day.
A job rotation approach, on the other hand, moves workers from one job to an-other rather than changing the tasks that make up the jobs. Job rotation often is used to train workers so that they are exposed to a variety of jobs. This results in greater scheduling flexibility and back-up coverage for absent employees. Job rotation also upgrades the skills and promotability of workers.
Job enlargement and rotation approaches expand jobs horizontally, not vertically. That is, these techniques do not necessarily provide workers with more control over their environment. The approaches assume that workers want more diversification in their jobs and will welcome the opportunity to do more or different kinds of tasks.
Although the techniques of job enlargement and rotation can be useful, results are mixed. Some workers appreciate the increased variety, but others perceive changes as just more boring tasks. New tasks may interfere with the daydreaming or chitchat in which workers engage to cope with boring jobs. Sometimes management views job enlargement or rotation as a way of getting more work out of fewer workers, and workers may understand and resent this.

12.5.2 Job Enrichment

As an approach to job design, job enlargement and job enrichment are based on the theory that employees are motivated by factors that meet psychological needs for achievement, self-fulfillment, recognition, responsibility, advancement, or challenge. Whereas job enlargement approaches expand jobs horizontally, *job enrichment* refers to vertical expansion, including a planning or control task (or both) in a job that previously included only operating tasks. The objective is to give workers control over their jobs from beginning to end, or at least over a segment, so that they experience their tasks as a more meaningful whole. Job enrichment frequently encompasses both horizontal and vertical expansion.

Job enrichment approaches are associated closely with Herzberg's *two-factor theory of motivation.* Herzberg argued that job content contributes significantly to worker motivation and job satisfaction. He identified workers' motivation and satisfaction by asking accountants and engineers to cite times when they felt exceptionally good or exceptionally bad about their jobs. Factors that were the source of good feelings he called satisfiers or *motivators,* and factors that were the source of bad feelings he called *dissatisfiers.* The motivators that produced the most long-lasting, positive attitudes included the following:

- The work itself
- Responsibility in the job
- Opportunities for achievement in the job
- Advancement (for a job well done)
- The major dissatisfiers included the following:
- Company policy and administration
- Supervision
- Salary
- Interpersonal relations
- Working conditions

Herzberg said that only motivators are related to the design of the job and can influence a worker's motivation and satisfaction directly. Dissatisfiers played only a hygiene role. This means that organizational efforts to improve supervision, salaries, or working conditions can keep employees from being unhappy but could not make employees feel positive about their work and hence make them want to work harder. When management and unions address only hygiene factors, they are not addressing motivation or job satisfaction. One set of factors can reinforce another but cannot be addressed at the exclusion or expense of the other.[6]

12.5.3 Job Characteristics Approach

In the mid 1960s, Turner and Lawrence made a significant contribution to job design methodology These researchers identified six task dimensions: variety autonomy, required social interaction, opportunities for social interaction, required knowledge and skill, and responsibility. The dimensions are known collecti~e1y as requisite task attributes.[7]

Other studies followed. The view that has had the most impact on job-design research was suggested in 1975 by Hackman and Oldham, whose theory and measuring instrument, the Job Descriptive Index, is derived from earlier research, as well as from their own studies. Hackman and Oldham identified five core job dimensions that influence motivation and satisfaction: skill variety, task identity, task significance, autonomy, and feedback.[8]

1. ***Skill variety*** is the degree to which a job includes different activities that require a number of different skills and talents.
2. ***Task identity*** is the degree to which a job requires completion of a whole and identifiable piece of work; that is, doing it from beginning to end with a visible outcome. For example, it is more meaningful to an office employee to handle all orders, billings, and inquiries from a designated group of customers than to type invoices all day long.
3. ***Task significance*** is the degree to which the job has substantial impact on other people within the organization or in the world at large. Employees who type labels for medicines and drugs are likely to perceive their jobs as more significant than workers who type labels for file folders, even though the skill levels may be comparable.
4. ***Autonomy*** is the degree to which the job provides freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures. In highly autonomous jobs, the quality and quantity of work depend on an individual's initiative and efforts instead of on regulations, quotas, and supervision. By building more autonomy into jobs, large organizations can address one of their greatest weaknesses: lack of accountability. A common example in clerical operations is the requirement that the manager sign every document that goes out of the department. Why not allow the individual who does the major part of the work to sign the documents, thereby assuming responsibility for their accuracy?
5. ***Job feedback*** is the degree to which required activities provide workers with direct, clear information about the effectiveness of their performance. It is much more effective if workers obtain direct feedback than if their supervisor evaluates results for them. As an example, clerical operations are especially inclined to use too many checkers (such as proofreaders) rather than having employees verify the accuracy of their own work.

Job characteristic theory is a major underpinning for the work redesign methods and work effectiveness model presented later in this chapter. Job characteristics theory, however, focuses primarily on jobs that are done independently by individuals working more or less alone. Sociotechnical systems, discussed next, are an alternative conceptual approach that deals specifically with properties of work systems that emphasize the use of groups in performing work.

12.5.4 Sociotechnical (Systems) Approach

Eric Trist used the term *sociotechnical system* to describe his observation that people (a social system) interacted with tools and techniques (a technical system) by choice, not chance. These choices, he said, are dictated by economic, technical, and human values.

According to Trist, "information technologies, especially those concerned with PCs and digital networks, give immense scope for solving many current problems—if the right value choices can be made."[9]

A sociotechnical approach (also referred to as sociotechnical systems approach or just systems approach) to job design balances the social needs of workers with technological requirements. Technical systems influence the characteristics of the social (or people) system through the allocation of work roles and the relationships among tasks that are dictated by the techno1ogy. The performance of the organization is believed to be a function of the interface of the social and technical systems.

Sociotechnical approaches advocate changing the focus of work design from adapting people to technology to adapting technology to people. The objective is to design jobs that optimize relationships among technology~ people, and the needs of the organization. Unlike the previous approaches, which emphasized designing jobs for individuals, sociotechnical approaches focus on designing tasks for work groups. By participating in the group's decisions, workers attain a sense of personal worth and achievement from the group and the relationships within it. The motivational value of these relationships is important because social needs outweigh achievement needs for 60 percent of the workforce. One of the major contributions of the sociotechnical approach to the theory and practice of work design is the idea of the autonomous work group. Autonomous, or self-managing, work groups have recently become an increasingly popular organizational innovation. They are discussed further in the section on empowerment.

Frederick Emery expanded on the ideas of sociotechnical systems, introducing the concept of open systems thinking. Emery said that it is not enough to know how the technology works. Nor is it enough to know how people work. In an open system, the current situation must be understood. In other words, everything counts. "The most useful way to understand technology *and* people within a system is to understand their relationship to the larger whole they serve."[10] Equifinality, a systems concept also described in chapter 14, says that there is more than one best way to solve a problem. This is a simple concept but one that markedly changes how management thinks about problem solving.[11]

12.5.5 Quality of Work Life (QWL) Programs

Quality of work life may be defined as the degree to which workers can satisfy their personal needs through their work. Quality of work life affects the health, wellbeing, job satisfaction, and productivity of employees. QWL programs emerged in the 1970s as a means of involving workers in problem-solving groups to make jobs more satisfying and productive. These programs are an effective way to implement workplace innovations and measure outcomes.

The QWL movement, which is based on the sociotechnical concept of work design, grew out of European experiments with semiautonomous work teams in manufacturing plants. In the manufacturing sector, QWL programs were spurred by declining productivity in the United States and increased global competition.

QWL programs are not necessarily related to technology although the framework and methods are appropriate for implementing technology-related work changes. The characteristics of QWL programs are summarized in Figure 12-1.

A systems approach to the relationship between information technology and quality of work life reveals a number of patterns. Figure 12-2 shows the framework used by the U.S. Office of Technology Assessment to analyze these relationships. The core relationships are among the organization, technology, and individual. The arrows indicate patterns of association, not necessarily causal relationships.

- Achieving sustained commitment from management to an open, nondefensive style of operation that sincerely encourages employees to speak up regarding problems or opportunities. (A related element is providing practical means for members of the workforce to participate in refining and implementing promising suggestions.)
- Establishing a work environment that encourages continuous learning, training, and active interest regarding both the job and the product or service to which the job contributes. (Such an environment enables an employee to use and develop personal skills and knowledge, which in turn affects involvement, self-esteem, and the challenge obtained from the work itself.)
- Making the job itself more challenging by structuring it so that an individual (or work team) can self-manage and feel responsible for a significant, identifiable output if that kind of responsibility is desired.
- Providing opportunities for continued growth; that is, opportunities to advance in organizational or career terms.
- Training supervisors to function effectively in a less directive, more collaborative style.
- Breaking down the traditional status barriers between management and production or support personnel. Achieving an atmosphere of open communication and trust between management and the workforce.
- Providing not only feedback about results achieved and recognition for good results but also financial incentives, such as shared cost savings, where feasible.
- Selecting personnel who can be motivated, under appropriate conditions, to genuinely care about striving for excellence in task performance.
- Evaluating and analyzing results, including failures, leading to revised efforts toward improvement.

Figure 12-1 Characteristics of QWL programs
Source: US. Congress, Office of Technology Assessment, *The Automation of America's Offices* (Washington, D.C.: Government Printing Office, 1985), p.[12].

12.5.6 Empowerment

The concept of *empowerment* emerged during the 1980s. The objective of empowerment is to push responsibility down the organizational hierarchy to the level where the work is done. The basic philosophy is that within their scope of authority,

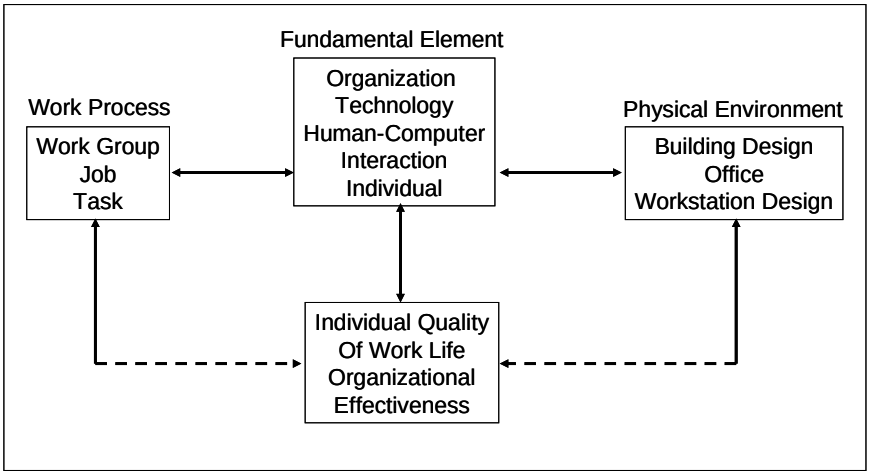

Figure 12-2 Office characteristics that contribute to an individual's quality of work life
Source: U.S. Congress, Office of Technology Assessment, *The Automat ion of America's Offices* (Washington, D.C.: Government Printing Office, 1985), p. 126.

workers should be empowered to make the decisions necessary to accomplish their assigned tasks effectively. In practice, it puts the responsibility on the employee to identify impediments to getting tasks done and to take action to work with others to resolve those issues. It also allows employees to seek and implement ideas for improving the way work is done.

Unfortunately, the concept of empowerment is used and misunderstood with great frequency. Many enterprises have failed to implement it effectively because it flies in the face of a deeply entrenched command-and-control management approach. Much of the misunderstanding derives from differences in interpretation of its root word: *power.* Power in the classical sense has to do with the ability to impose a position on others or on the circumstances. Position power carries with it the authority (as described earlier) to commit resources, hire and fire workers, and make other decisions. When individuals or teams are told that they are empowered, they often respond from this classical interpretation of power. They want to know: How much budget do we have? What is our signature authority? Can we require or direct others about what to do? This interpretation is not what is meant by empowerment; it is delegation of formal authority in the classical sense.

Empowerment relates to a broader concept of power as the ability to influence others and cause them, or persuade them, to make decisions, select courses of action, or change behaviors. It has to do with credibility and fact-based decision making. Empowerment defined in this context creates a high degree of freedom of action, latitude to take risks, and opportunities to be innovative within the agreed-upon performance objectives, project results, or mission. Empowerment applies to the design of individual jobs and to self-managing work groups.

Self-managing work groups may be defined as "intact (if small) social systems whose members have the authority to handle internal processes as they see fit in order to generate a specific group product, service, or decision."[12] These groups also may be referred to as autonomous or self-regulating work groups. Self-managing work groups include temporary task forces setup to solve specific problems; permanent and cross-functional teams, such as decision-making committees and many kinds of management teams; and permanent production teams.

Self-managing work groups can be differentiated from more common types of coacting groups by three main characteristics. People in coacting groups may report to the same supervisor and work closely with one another, but they have individually defined tasks. Even when coacting groups have to coordinate their work closely, individuals are considered the basic performing unit of the organization. The three characteristics that distinguish self-managing groups are:'[3]

- They are real groups. The group, even if small or temporary~ must constitute an identifiable social system that is recognized as a group by members and nonmembers. At a minimum, its members must have differentiated roles with interdependent relationships.
- They are work groups. The group must have a significant piece of work to do that results in a product, service, or decision that is measurable or tangible. If a group does not generate productive output, it is not considered a work group.
- They are self-managing groups. Group members must have the authority to manage the work and interpersonal processes required to carry out their tasks. If management

retains control over who does what and when it gets done, then a group is self-managed only in name.

The conditions required for high team effectiveness are different from those needed for optimal individual work effectiveness. For individuals, the emphasis is on the person-job relationship, whereas for groups, analysts must consider person-job, person-group, and group-job relationships, as well as interrelationships among these components.'[4] Thus, designing work for groups never should be viewed as merely creating a team version of a good individual job design. One of the most important choices to be made in structuring a work system is the choice between individual and group designs.

In his book about BPR, Harold S. Resnick talks about the concept of shared re-sponsibility'[5] In a traditional context, responsibilities are largely an individual matter. When individuals are assigned a responsibility, they are personally accountable for generating the results expected for the defined area. Typically, responsibilities are defined, measurable, tied to accountability~ and form the basis for recognition and reward systems.

From a business process perspective, however, few tasks are accomplished individually. Business processes generally span multiple individuals and groups. The traditional view of individual responsibility tends to work reasonably well when work is going well. The tendency, however, is for individuals to optimize their own performance and to protect their personal areas of responsibility, assigning the blame or fault to others when problems arise. No one seems to own the entire scope of the work.

As enterprises transition to a process orientation and recognize the interdependence of work and the necessity for teams .to work together, individual responsibility paradoxically becomes a limitation, as well as an asset. The concept of shared responsibility is intended to build full team interdependence and collective effort. Individuals have a shared responsibility for the success of the entire enterprise, process, team, or work product of which they are a part. This means that the failure of any individual member of the team represents the failure of the entire team. Resnick indicates that shared responsibility often creates initial anxiety and concerns. Each individual now realizes that the performance of others directly affects personal performance. When fully developed in a team environment, he hastens to add, shared responsibility is not only comfortable for all the team members, it is essential to the creation of high performance teams. Resnick cautions, however, that in order to implement the concept, the reward and recognition systems of the organization must be brought into alignment. Shared responsibilities require team-based reward and recognition systems in addition to individual-based performance systems. (See the Bailey and Bailey Spotlight in chapter 4.) It also leads to the demand for some risk-based compensation systems.

12.5.7 Perspectives on Job Design Approaches

Declining U.S. productivity in the lale 1970s focused attention on the success of Japanese participative management. In his best-selling book *Theory* Z, William Ouchi challenged the traditional American premise that specialization increases productivity. Ouchi compared the productivity of U.S. firms practicing American-style scientific management to the productivity of U.S. firms practicing Japanese-style participative management. His findings demonstrated that Japanese-style management, with a low

degree of specialization, achieved higher productivity than American-style management with a high degree of specialization. Moreover, Japanese management led to higher-quality output. According to Ouchi, American managers believe that quality is achieved through testing and control. Japanese managers, on the other hand, believe that quality comes from inviting workers to refine product design and manufacturing processes continually. Ouchi concluded that Japanese-style management was more effective than American-style management.

Futurist Alvin Toffler terms the current environment the Information Age or the third wave, with agricultural and industrial waves preceding it. In *Productive Workplaces,* Marvin Weisbord marries open sociotechnical (systems) thinking to team effectiveness and labels the result *third wave managing/consulting.* He maintains that in the Information Age, teamwork is essential to system success. In his view, this means that everyone rLeeds to be involved with improving the whole system. Weisbord (Figure 12-3) shows the evolution of scientific management (Taylorism), to participative management (group problem solving), to systems thinking, to third wave managing/consulting.

Weisbord suggests three powerful levers that can be used to turn workplace anxiety into energy: purposes, relationships, and structures. Purposes (missions) are the business that the company is in—the future on which everyone's work security and meaning are attached. Relationships are connections with coworkers that contribute to feeling whole. Relationships require cooperation across lines of hierarchy, function, class, race, and gender. Structure refers to who gets to do what. Structure affects self-esteem, dignity, and learning.'[6] Third wave managing and consulting levers are those practices that support the business purpose, allow for relationship building, identify roles, and assure individual accountability

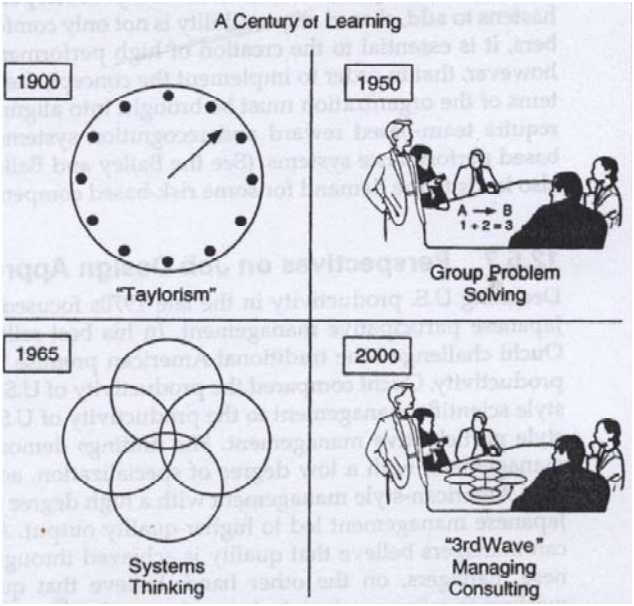

Figure 12-3 A brief history of management practices
Source: Weisbord, Marvin. *Productive Workplaces.* (San Francisco, Jossey-Bass/John Wiley& Sons, 1988), 254.

Despite decades of experience with alternative techniques, *command-and-control management* still prevails in most American enterprises. It is a major premise of this text, however, that enterprises that cling to these industrial era management practices will be at a distinct competitive disadvantage in the Information Age. Enterprises cannot achieve significant benefit from EUIS technologies unless they are prepared to change the way work is done. Effective EUIS implementation requires that workers are involved in setting goals and standards, solving problems, and making decisions related to their work. In other words, EUIS technologies are driving job redesign efforts.

The concepts described in this section underlie much of the practice of job design and organizational change. Job characteristics and sociotechnical theories are the basis for intervention strategies used by enterprises to move from authoritarian forms of management to participative, or empowerment, styles. The following section offers more specifics on the impact of information technology on business process and job design.

12.6 THE RELATIONSHIP BETWEEN TECHNOLOGY. BUSINESS PROCESS. AND JOB DESIGN

The impact of technology on business processes ~nd jobs goes beyond changes in tasks. IT changes jobs in several ways. The key point is that the best results with IT are achieved when these factors are considered as part of the project rather than being addressed at the end as an afterthought.

1. Procedures for completing tasks may change. When tasks are taken over by an automated system, jobs (or portions of jobs) may be eliminated. Workers must be retrained to do the new jobs, reassigned, or let go.
2. When jobs are modified due to the addition or deletion of tasks, boundaries between jobs may change as tasks are transferred from one job to another. Sometimes, but not always, these changes are accompanied by changes in job titles, descriptions, or compensation.
3. Automation creates new tasks that are required to support the system or that are related to new products or services. Existing jobs may be redesigned to incorporate these new tasks, or new jobs may be created. For example, a position of administrator may be created to operate a newly installed local area network, assign passwords, perform daily backup, troubleshoot problems, and so forth.
4. Technology may lead to the creation of new tasks not previously possible, practical, or cost effective. New capabilities may create opportunities for new products or services—a positive impact of technology.

To understand the effects of technology on jobs, business process, and organizational structure, consider the following four results related to the introduction of PCs with word processing and spreadsheet software in the office of a manager and secretary
First, the way some tasks are accomplished may change; new skills will be needed and old ones eliminated. If the manager decides to use the PC to author documents, creating them will require different skills than writing them in longhand did. Previously

important skills, such as the manager's dictation and the secretary's shorthand and transcription skills, may be used only rarely.

Second, the process that governs the interactions of author, secretary, and other people to produce documents may change. The secretary now may do only the final formatting and printing of documents. Documents that are filed electronically are no longer sent to records management or physically filed in one department. If these PCs are connected to a network, the potential for change is extended significantly. For example, if the manager uses e-mail for intercompany correspondence, the secretary and mail services may be left out of the process entirely. Moreover, e-mail gives many people in the enterprise direct access they never had before. The manager also has more direct information about what is going on in the enterprise. The power structure, in essence, is being changed—and therein is often the source of resistance.

At some points, technology allows for choice rather than mandating change. For example, a PC may be given just to the secretary. The manager still might continue to dictate documents that the secretary will transcribe and edit using word processing software. In this case, the computer becomes a substitute for the typewriter. The relationship between manager and secretary, and the flow of work, might change minimally with only the secretary needing new skills. Another alternative is to sever the relationship completely; the secretary might be reclassified as an administrative assistant. All managers schedule their own meetings and compose correspondence with the aid of word processing, electronic mail, and calendaring software. One administrative assistant can support an entire department.

Third, new technology may introduce new steps and new tasks. For example, use of a PC introduces the need to make backup copies, to design and use an electronic filing system, and to manage disk space or diskette storage. New technology also introduces the need for training. Decisions about these tasks—whether they will be handled by all users, by secretaries, by a systems administrator, or by some combination—will affect the work process.

Fourth, the availability of the technology will enable the manager and secretary to do new tasks that were not practical before. For example, if the secretary converts the old card file of clients to a PC database, it becomes practical to send personalized letters to hundreds of clients using the merge printing feature of word processing. The manager, using a spreadsheet, forecasts sales under different economic scenarios and tracks them against actual results.

Thus, with even this simple example one can see how changes at the level of the task, job, business process, and organizational structure could take place as a result of new technology.[17]

12.6.1 Computer-Mediated Work

Two characteristics of computer work are that the machine makes work more abstract and that the machine alters the worker's relationship to the task. The new relationship sometimes is referred to as *computer mediated,* which means that a person accomplishes a task through the information system rather than through direct contact with objects.[18]

Workers experience tasks as more concrete when the tasks involve manipulation of objects, as in pottery making or carpentry. Manipulation itself is a form of feedback; the object feels right. Machines remove workers as a direct source of energy, but workers

still have contact with the objects of their labor. With computers, however, workers get only indirect feedback through the symbols on the screen. "Very often, from the point of view of the worker, the object of the task seems to have disappeared 'behind the screen' and into the information system."[19]

Thus, computers have made information processing more abstract. From the perspective of the knowledge worker, when information is in physical forms that can be touched and manipulated—such as cards, letters, reports, and invoices—it appears to be more concrete. When information is processed on the computer, however, many of these objects disappear. The knowledge worker is confronted with intangible information, which is manipulated in invisible ways inside the computer.

12.6.1.1 Coping with Computer Logic

The computer easily handles quantitative data, but qualitative judgments are difficult to program. Consequently, when computer systems are designed, qualitative aspects are either quantified or lost. A programmer defines correctness of data in terms of formal computer logic. Frequently, formal correctness can become more important than the relevance of the information. Judgment is replaced by computer logic, and errors become difficult to detect and correct.

Computers have become easier to use, but they still require codes and procedural commands. Although today's graphical user interfaces (GUIs) have made using computers much more intuitive, it is difficult for most people to learn to think in a way that parallels computer logic. It requires thinking and performing steps in the precise order dictated by the logical sequence built into the software.

The difference between how most people go about finding information in a file folder or reference book in contrast to a computer database illustrates the point. When physically searching for information, most people rely on intuitive aids. They recall that it was in a red volume, it was near the back, the page was torn, or it was on the second shelf. If searchers recall terminology inaccurately or misspell a term, they probably will find what they are looking for anyway. These memory aids are not available in computer databases; only names are used, and they are defined precisely by computer logic. Searchers must use the right key words in the right relationship, or the results will be faulty. GUIs have reduced these problems somewhat. New technologies such as intelligent agents (for example, Microsoft's "Mr. Paper Clip" in MSWord), Web bots that assist with self-service, and other artificial language techniques such as natural language interfaces hold additional promise.

One consequence of computer-mediated work is that it becomes more difficult to exercise judgment over it. This is true for both routine clerical jobs and complex knowledge work. The comments of a bank auditor illustrate this point.

The job of auditing is very different now. More imagination is required. I am receiving data online. I don't go to the branches if I don't want to. I
don't see any books. What do I audit in this situation? I always have to be thinking about what is in the system. I may be auditing, but it doesn't feel like it.[20]

The computer also has introduced new complexity in data. The auditor can compare branches according to selected criteria and search out new relationships in the data. To do this, however, the auditor must develop a theory of the auditing process. A conceptual framework is needed to guide the auditor through the mass of available

information. Theoretical insight and imagination are the new keys to effectiveness. By creating a medium where imagination is more important than experience-based judgment, information technology challenges old procedures. In this auditing process, for example, planners are not automating the old, but inventing the new. Consequently, the traditional training of auditors—and others— must shift to provide a stronger theoretical or conceptual foundation.

12.6.1.2 Worker Frustration

Another consequence of computer-mediated work is that it can induce feelings of frustration and loss of control. "Computer mediation of simple jobs can create tasks that are routine and unchallenging, while demanding focused attention and abstract comprehension."[2]' People who are action oriented, rather than abstract thinkers, may find computer-mediated work frustrating and stressful. Those who shift from conventional procedures to computer-mediated work feel this stress most acutely. It is impossible, however, to forecast how people will adapt to the abstraction of work over the long term.

12.6.1.3 Altered Social Structure

Computer-mediated work alters the social structure of an organization. The workstation itself can become the individual's primary focus of interaction. "This focus can lead people to feel isolated in an impersonal situation."~ The importance of communities in the workplace has been widely recognized. Jobs that isolate people at computer workstations can lead to social problems.

12.6.2 De-Skilling Versus Enhancing Jobs

Perceptions differ over whether technology is de-skilling or enhancing office jobs. The term *de-skilling* means "using the computer to direct, control, and pace work so that the required level of skill is reduced and knowledge, judgment, and decision making are minimized." The term *enhancing* means "expanding the scope and level of responsibility by using technology to reduce routine, repetitive tasks and provide access to information and resources."

Many organizations that process large amounts of standardized data have elected to use technology to de-skill tasks, enabling lower-paid employees with minimum skills to process more data in a given amount of time. Sorting rules, decision trees, and analytical processes also can be built into computer processes and software packages as a means to de-skill professional tasks. This approach can create factory-like offices, which often reduce job interest and satisfaction and increase stress. Many of these jobs have been shifted offshore or overseas to third world countries because American workers are no longer willing to work under these conditions.

On the other hand, technology can enhance jobs by relieving people of routine, repetitive tasks. Simple tasks can be integrated into fewer, broader jobs so that the worker has a better sense of the purpose and outcome of the work. Information systems also can give a worker access to knowledge that previously could be obtained only through advanced education. This allows a clerical worker to take over interesting tasks that previously were considered the ~vork of the professional. For example, clerks can use computerized databases to search for information that formerly only a lawyer, doctor, scientist, or

Ph.D. in archaeology would have known about. Some organizations are using information technology deliberately to upgrade and enhance work at all levels. Flatter organizational structures and reduced costs of management may result.

In *The Age of the Smart Machine*, Harvard Business School professor Shoshana Zuboff differentiated between "automating" and "infomating" jobs. Zuboff explained that in jobs that are automated, the human body is replaced with a technology that allows the same processes to be performed with more continuity and control. In jobs that have been infomated, however, technology generates information about the underlying productive and administrative process through which an organization accomplishes its work.[23] Whether the introduction of information technologies results in work that has been automated or infomated rests, in part, upon appropriate job design.

12.6.3 Changes in Organizational Structure and Communications

When the work process changes, the organizational structure, which defines the relationships among jobs, also can change. Changes may result in revisions in the formal organization chart or simply may alter communication patterns or power relationships among groups or departments. Changes in organizational structure may take place immediately as part of the planned system changes, or may evolve over time as the enterprise gains familiarity with the technology and its capabilities.

Many changes in organizational structure and communication patterns can be attributed to technology. For instance, adoption of a centralized computer system created a tendency for enterprises to centralize control. On the other hand, the acquisition of PCs at the departmental level has led to decentralization of decision making. End-user computing has put new power in the hands of local departments because one source of power is information. E-mail has opened new avenues of communication that bypass former information gatekeepers. The Internet has significantly expanded the impact, providing wide .availability of extensive information to which access previously was fairly limited. Senior managers have immediate, direct access to data formerly filtered to them in summary reports. Knowledge workers literally have the Library of Congress at their fingertips. Information can be consolidated in centralized databases and knowledge management systems while access and processing can be decentralized any place in the country or the world.

Observers have noted interesting changes in the boundaries between clerical and professional and between clerical and managerial positions. Some researchers have referred to this redistribution of labor as the clericalization of professional work and the professionalization of clerical work.[24] The most prominent trend is the shift of keyboarding tasks when professionals and managers acquire PCs. Individuals who would never have typed in the past now use word processing to author documents and send e-mail, and the time that clerical workers used to spend keyboarding original documents subsequently decreases. Sometimes secretaries are bypassed completely, or their involvement may be limited to revising, formatting, and printing. All of these effects of information technology are not inevitable. Changes in functions and shifts in power can be attributed as much to the characteristics of the organization and its management strategy as to the characteristics of the technology.

12.6.4 Technology as an Enabler for Job and Work Group Design

Efforts to improve organizational performance through the application of information technology must not overlook the key role of people in making technology payoff. According to a special report on the response of management to the human factors of automation:

> *American managers are finally learning what the Japanese discovered years ago: The solution to fading competitive ability, sluggish productivity growth, and poor quality cannot be found in the mythical black box of a miraculous technology. To realize the full potential of automation, leading-edge companies are integrating workers and technology in sociotechnical systems that revolutionize the way work is organized and managed.. . . This is an immensely important trend, one that is producing a new model of job design and work relations that will shape the workplace well into the twenty-first century.*[25]

Because analysts seldom addressed job design issues, most early systems were implemented in ways that maintained old, functional lines of organization, often compounding weaknesses. Anticipated productivity improvements never were realized because technology created new bottlenecks in the old work flows. In some of the worst cases, disgruntled workers resisted the technology or failed to use it effectively because of inadequate training. Today, progressive enterprises are applying the concepts of BPR, turning technological changes into opportunities to rethink old forms of work organization in light of current and future objectives. Technology can be a catalyst for restructuring on both individual and work group levels in addition to an enterprise level. Decision makers should determine which level is most appropriate prior to embarking on redesign projects. Even EUIS projects that are small in scope should offer opportunities to rethink the way work is organized.

Instead of attempting to optimize each task and function separately, analysts can use electronic integration to optimize a whole procedure. For example, they might focus on improving customer service or marketing. Electronic integration is possible because the technology allows the integration of information from many sources and the distribution of information to many locations.[26] Electronic integration can be used to design jobs that give workers a variety of tasks and, at the same time, allow them to understand how the job contributes to the department or enterprise. This gives workers greater autonomy and responsibility, and it contributes to job satisfaction and productivity.

For example, an international letter of credit at one bank required 23 steps, performed by 14 workers, and generated forms and copies stored in several locations. When customers called, they had a difficult time finding the worker with the right information to answer their questions. Moreover, if the customer wanted to change something, the process had to start again. The bank revised the process so that one worker, with the aid of a PC and a client database, now performs all the necessary steps in processing letters of credit for a particular set of clients. The database contains all information related to the accounts. The service worker is the single contact between the customer and the bank for corrections or inquiries. Thus, a task that previously took 14 people more than 3 days now is completed by one person in a single day with the aid of powerful information systems.

The capabilities of an integrated client service system at a major insurance company (Figure 12-4) provide another example. With PCs on their desks, client service

representatives have word processing, spreadsheet, and administrative systems at their fingertips. In addition, they have direct access to the company's database of policyholder information. They can answer telephone inquiries, send written replies, check policyholder information (such as loan balances or current cash value of policies), make policy changes (such as address or beneficiary changes), issue special statements, and much more. Most importantly, electronic integration has changed the focus of the job from processing paperwork to serving clients, or, in other words, from efficient paperwork to effective client service.

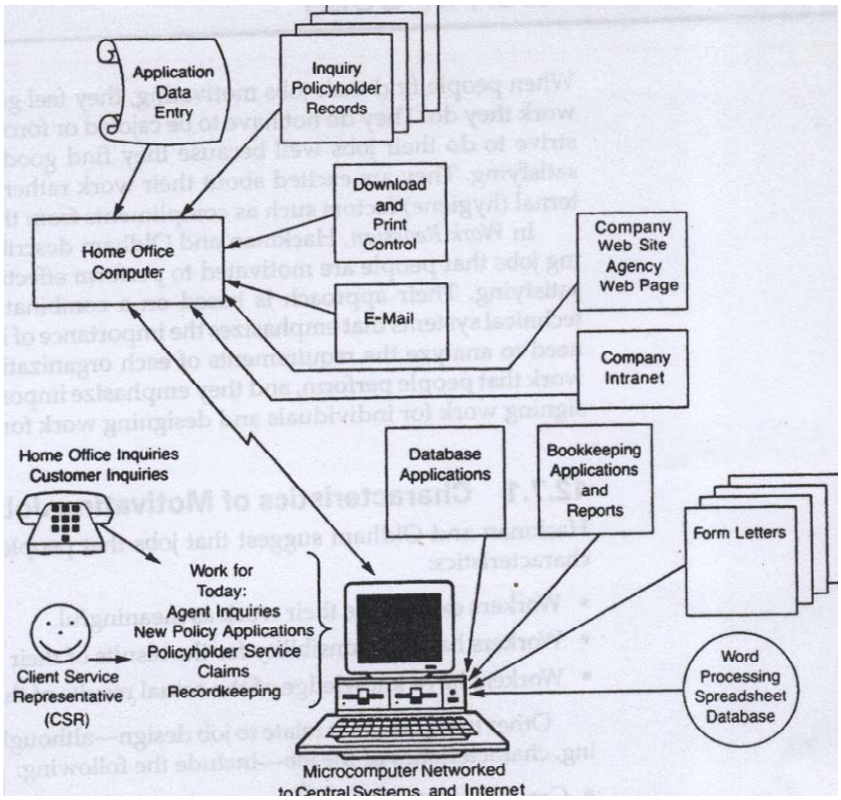

Figure 12-4 An integrated client service system at a major insurance company
Source: Courtesy of Roy W. Walters and Associates, Inc.

Electronic integration also can be used to design work groups. Some insurance companies have restructured work groups that formerly were organized by function into self-managed teams that service a specific market. For example, one company combined the expertise of raters, underwriters, and clerical workers on a single team and assigned them resp6nsibiity for specific product lines. Organizing workers in teams, rather than isolating them in functional groups, allows greater understanding of the production process and empowers workers to remove impediments and make changes required to improve results.

When designing solutions, analysts should remember that job design influences productivity more than technology does. Without a well-thought-out design, chances are that new systems will reinforce functional organization rather than invent integrated ones. In fact, analysts often strive to tailor new technology to the existing organization to

avoid disrupting the work environment. When job design is overlooked, however, important opportunities to make technology pay off may be missed.

When people find their jobs motivating, they feel good about themselves and the work they do. They do not have to be cajoled or forced to perform their work; they strive to do their jobs well because they find good performance rewarding and satisfying. They are excited about their work rather than motivated solely by external (hygiene) factors such as compliments from the boss or a paycheck.

In *Work Redesign,* Hackman and Oldham describe a methodology for designing jobs that people are motivated to perform effectively and find rewarding and satisfying. Their approach is based on a combination of behavioral and sociotechnical systems that emphasizes the importance of individual differences and the need to analyze the requirements of each organization. They focus on the actual work that people perform, and they emphasize important distinctions between designing work for individuals and designing work for groups.

12.7.1 Characteristics of Motivating Jobs

Hackman and Oldham suggest that jobs that people find motivating have three characteristics:

- Workers experience their work as meaningful.
- Workers have responsibility for the results of their work.
- Workers have knowledge of the actual results of their work.[27]

Other measures that relate to job design—although they are not, strictly speaking, characteristics of the job—include the following:

- Growth satisfaction, or the degree to which the employee believes the job provides opportunities for personal growth and development.
- Growth need, or the strength of the employee's desire for growth and personal development.

These characteristics of motivating jobs relate directly to the five core job characteristics described previously under "Job Characteristics Approach." As illustrated in the work effectiveness model in Figure 12-5, the absence or presence of the five core job dimensions directly affect the extent to which workers experience the critical psychological states that are characteristic of motivating jobs. In other words, these characteristics lead to high internal motivation. Skill variety task identity, and task significance contribute to experienced meaningfulness of the work. Autonomy contributes to experienced responsibility and feedback from the job contributes to knowledge of results. Growth satisfaction and growth need (desired personal and work outcomes) indicate how an employee will respond to a job with high motivating potential. The next section discusses implementing concepts, or strategies, for designing jobs that encompass the five core job characteristics.

12.7.2 Designing Jobs for Individuals

When redesigning jobs for individuals, analysts should focus on job dimensions that encourage employees to work hard and perform well because they want to rather~han out of fear or in response to close supervision. Hackman and Oldham recommend the following five strategies for redesigning work. As illustrated in

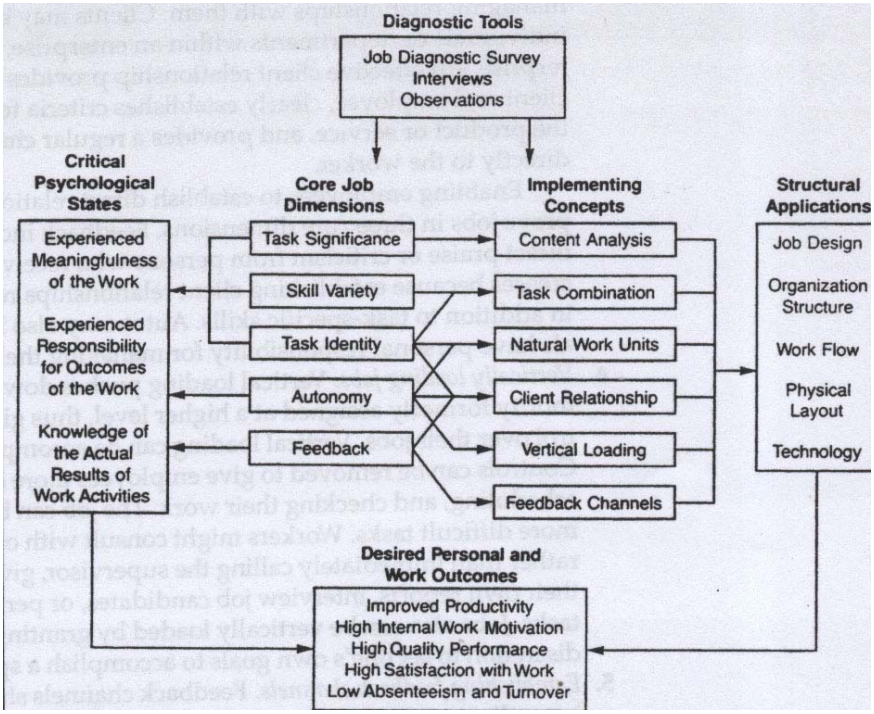

Figure 12-5 The work effectiveness model
Source: Courtesy of Roy W. Walters and Associates, Inc.

Figure 12-5, each of these strategies directly addresses one or more of the five core job dimensions:[28]

1. ***Task combination.*** Task combination puts fragmented job tasks into new job modules, combining all the tasks required for a given piece of work. Information systems can reduce many repetitive tasks, making combination more practical than it was with manual systems. A complete job module increases skill variety and task identity and generates challenge and responsibility for the worker. At times, task combination may be constrained for organizational or technical reasons. For example, enterprises may want to keep internal auditing separate from other processing.
2. ***Forming natural work units.*** Forming natural work units, in conjunction with task combination, provides further opportunities for task identity and significance. A natural work unit refers to grouping tasks in a logical or inherently meaningful way. Natural work units are organized according to groups of customers, types of transactions, geographical distribution, or any other arrangement that makes good sense to those performing the work. For example, a customer service representative might handle all contact with clients in the Chicago area rather than handling work randomly as it comes into the department.
3. ***Establishing client relationships.*** When natural work units are formed around specific groups of clients, it may be possible to put the employee in direct contact with the clients and give them continuing responsibility for managing relationships with them. Clients may be customers of a firm, other individuals or departments within an enterprise, or other publics of the enterprise. An effective client relationship provides direct contact between client and employee, clearly establishes

criteria for evaluating the quality of the product or service, and provides a regular channel for relaying feedback directly to the worker.

Enabling employees to establish direct relationships with clients can improve jobs in three core dimensions. Feedback increases when workers get direct praise or criticism from persons who receive the work. Skill variety increases because establishing client relationships requires interpersonal skills in addition to task-specific skills. Autonomy also increases because individuals have personal responsibility for managing their relationships with clients.

4. ***Vertically loading jobs.*** Vertical loading pushes down responsibility and authority formerly assigned at a higher level, thus giving employees more control over their jobs. Vertical loading can be accomplished in many ways. Controls can be removed to give employees more discretion in planning, scheduling, and checking their work. The job can be broadened by adding more difficult tasks. Workers might consult with others in the organization rather than immediately calling the supervisor, give technical advice, author their own reports, interview job candidates, or perform other appropriate tasks. Jobs also can be vertically loaded by granting new authority~ such as discretion to set one's own goals to accomplish a specific short-term objective.
5. ***Establishing feed back channels.*** Feedback channels should give workers direct, immediate, and regular information about how well they are performing their jobs. It is generally more effective for employees to learn about their performance directly, by doing the job, than to rely on a supervisor as their main source of feedback. Direct job feedback is usually more immediate and private, and it increases the employee's sense of control over the job. In most instances, establishing feedback channels involves removing barriers or blocks that insulate employees from information about their performance. Establishing direct client relationships (discussed previously) is one of the most effective feedback channels. Other examples include returning documents to the same word processing operator for revisions and corrections rather than to random individuals or moving quality control dose to the workers.

Although the implementing concepts are mutually reinforcing, each can be a separate action strategy Other possibilities also exist for redesigning jobs. The five areas outlined by Hackman and Oldham, however, address some of the mostcommon problems associated with job design. They are intended as guidelines for generating ideas about how jobs might be improved rather than as hard and fast rules. In order to work, these principles must be implemented in a supportive organization. Work redesign efforts must have the support of all stakeholders or the intended results will be diminished, if not thwarted.

12.7.3 Designing Self-Managing Work Groups

Although the same principles apply, designing work for work groups is more complex than designing work for individuals. In addition to the five core job characteristics, two additional characteristics must be addressed: task-required interdependence and opportunities for social interaction.

Designing work for work groups requires addressing issues of motivating individuals and group dynamics, as well. The focus is on the overall task of the group rather than on

tasks of members. Up to this point, the discussion has centered on redesigning work for individuals.

SPOTLIGHT ON SOLUTIONS →Technology, People, Structure, Processes

MANAGING CHANGE: HIGH TOUCH ESSENTIAL TO HIGH TECH SUCCESS

Do human resource specialists have a role in information systems (IS) implementation? Recent studies indicate that they should.

Despite remarkable advances in information technology (IT), many computer-based IS still fall short of performance expectations. A growing share of these implementation failures are due to nontechnical factors.

The role of IT in industry and commerce has rapidly risen during the past half century IT now represents about half of all capital investment on a global basis while much of the workforce in the developed world relies on telecommunications and computer-based IS. Unfortunately, IS success can be elusive. An effective IS will improve performance, but IT applications that are poorly planned, developed, or implemented can retard individual and/or group performance. Many organizations have become internally stressed or competitively disadvantaged after deploying a major new IS.

IT is of little benefit by itself. Technology is certainly introduced to foster economic efficiencies, but if it is not also designed to increase human resource effectiveness, it will be a disaster. IT can help people to do a better job, but only if they are willing to use the technology and if they become effective users. Unfortunately, many IT applications are misused underutilized or abandoned Even a good technical system may be sabotaged if it is perceived to interfere with an established social network. Thus, a good understanding of the intended end-users, their tasks, and the interdependencies between the two is a likely prerequisite for IS success

The unique characteristics of each organization must be considered when determining whether, where, and to what extent IT should be applied. After a decision is made to develop a specific IT application, the issue of how to effectively implement the resulting IS must be addressed. The operating performance of an IS will be impaired **if it** does not fit with the needs and expectations of intended users the natural patterns of work and communication, and the goals of relevant business processes Elegant technical solutions are of little value unless they can be effectively implemented where they are needed. This inevitably involves the resolution of social and organizational issues. Thus, clear allocations of responsibility and the inclusion of appropriate expertise are both likely to improve the prospects for IS success. With the recent evolution towards end-user computing and the propensity for downsized and outsourced IS, the dynamics of the partnerships between management and technical specialists have changed. Much of the responsibility for IS has been passed on to line managers and user groups.They are now using IT as a resource in their business activities. This transfer of IT management responsibilities raises both the ability and duty of assorted specialists to contribute during the IS adoption process. As IT usage increases, and the disparities in computing skill levels grow, the need for end-user support will increase.

The rigid linear approach to IS development, whereby implementation follows design, has been supplanted by greater iteration. As a result, early and sustained user participation should be encouraged, but specialist support, from both technical and human factors experts, can also contribute to IS success. Time and resource constraints may preclude an ideal IS outcome. However, it is important that stakeholders with conflicting interests and perspectives as well as differential levels of political power have the opportunity to participate in the IS adoption process. The geographic reach of modern IT applications can make it difficult to involve all end-users and appropriate specialists. Face-to-face participation may be infeasible, but advances in telecommunications do favor the use of electronic meetings to discuss both technical and human factor issues and achieve a consensus on how they will be addressed. Goals can be identified for both the IS and the associated change program. These goals will help to guide the development and implementation effort. The satisfaction of users, the perceived quality of information outputs, and key dimensions of organizational performance, such as productivity, may be used to measure, IS success.

One solution, according to recent studies, is a proactive level of HR involvement during the IS adoption process By acting as agents of change HR specialists can help both end users and if specialists adjust to their new roles User satisfaction can be promoted by creating an IS that supports rather than disrupts effective work and communication patterns, and explaining how the new system is to benefit individual users and the organization.

HR specialists can help to match the technology to the -users, plan for the associated organization change, and deliver programs to smooth the transition process. They have traditionally been slow to introduce or effectively use information technology and their involvement in IS adoption processes across the organization has also remained modest. However, a change in this situation appears to be justified because of the positive link studies have found between HR specialist involvement and IS outcomes. Information systems should not be considered only in terms of money, technology, and business processes, but also in terms of how they affect attitudes and behaviors. The effective management of human resources is critical if the potential benefits from an IT investment are to be realized. Business improvements ultimately depend on people working smarter and more effectively. Those with human factors expertise can enhance both their own stature and improve key dimensions of organizational performance by contributing to the IS adoption process.

Source: Mans G. Martinsons and Patrick K.C. Chong, "The Influence of Human Factors arid Specialist Involvement on Information Systems Success," *Human Relations* 52 (January 1999): 123(3).

12.7.3.1 Criteria for Group Effectiveness

Effectiveness means doing the right things. A group is effective when it does the right things and efficient if it does them right. When designing systems and work to take advantage of new information technology, the analyst and organizational development specialist need to understand what makes a group effective. Systems and job design should support group effectiveness, as well as efficiency. The three criteria of group effectiveness identified by Hackman and Oldham include the following:[29]

1. The work of the group meets or exceeds organizational standards of quantity and quality. If the work of the group is not acceptable to those who receive and use it (e.g., reports are inaccurate or untimely), the group cannot be considered effective.
2. The group experience contributes to meeting the personal needs of members. Sometimes groups develop patterns of interpersonal behavior that are destructive to the well-being of members. If most members find that their experiences in the group frustrate their needs and block them from achieving personal goals, it would be hard to argue that the group is a successful social unit.
3. The social process in carrying out the work maintains or enhances the capability of members to work together on subsequent tasks. Some groups operate in ways that destroy their integrity; that is, the group burns out in the process of performing the task. Even if the product is acceptable, a group cannot be considered successful if it generates so much divisiveness and conflict that members are unwilling or unable to work together on future occasions.

Hackman and Oldham also identified three intermediate criteria of team effectiveness:[30]

1. The level of effort that group members bring to bear on the task.
2. The amount of knowledge and skill that group members apply to the task.
3. The appropriateness of the task performance strategies used by the group in doing its work.

12.7.3.2 Composition of Work Groups

An additional consideration in designing work for groups is the composition of the group. Hackman and Oldham recommended the following characteristics for a work group:[31]

1. The group should include members who have high levels of task-relevant expertise.
2. The group should be large enough to do the work but not much larger.
3. Group members should have at least a moderate level of interpersonal skills in addition to their task-relevant skills.
4. The group membership should strike a balance between homogeneity and heterogeneity

Implementing and managing work groups is far more complex than designing jobs for individuals. The tasks of self-managing work groups generally have a much greater impact than individual jobs do on the organizational structure and management climate. Supporting and sustaining work groups without the commitment of top management is

highly improbable. Some tasks are so large or complex, however, that they can be accomplished only by groups. Nevertheless, if given a choice, the systems analyst should use individual rather than group strategies unless the latter are significantly superior and the management climate is highly supportive.

12.7.4 Analyzing Opportunities for Work Redesign

Before undertaking any job design or redesign project, the analyst must assess the situation and ask such questions as the following.

- Is there a need or opportunity for job design?
- Is job redesign feasible for the unit?
- Which aspects of the job can benefit from improvement and which are fine as they are?
- How receptive will employees be to change, and how will changes fit with their needs and skills?
- How will changes fit with the rest of the organization?
- What opportunities for innovation are offered by the new technology?
- How should the affected employees be involved in the process?
- Are individual job redesign strategies appropriate, or is the task large or complex enough to require group strategies?

Resources, tools, and methods that analysts can use to answer these questions include consultants, organizational mission statements, work flow analysis, observations and interviews, survey instruments, and physical layout. When jobs are designed in conjunction with technological change, it is also important to keep in mind that innovations that are not initially apparent may emerge as workers gain experience with the technology.

12.7.4.1 Consultants

Consultants and organizational development specialists can be an excellent resource for the EUTS analyst. Consultants can offer objectivity an outside perspective, and methods and assessment tools for diagnosing job redesign opportunities and developing solutions. Job redesign efforts often are tied to broader business process restructuring projects. (More information about working with consultants is provided in later chapters.)

12.7.4.2 Mission Statement of the Work Unit

A mission statement defines the purpose of the organization or work unit. If such a statement does not exist, the analyst should ask the manager of the unit to write one. The objective is to state the single reason why the organization exists. A well-designed organizational structure should establish one main purpose for each unit, and secondary goals should be related directly to this primary purpose. Armed with a clear statement of a work unit's mission, the analyst can then determine the extent to which current

procedures support that mission and whether the organizational structure is consistent with the mission.

12.7.4.3 Work Flow Analysis

Before redesigning a job, the analyst should determine precisely what tasks are being done in the work unit and what purposes they serve. It is helpful to draw work flow diagrams similar to the ones in Figure 12-6. (Details on how to draw a flowchart are provided in later chapters.)

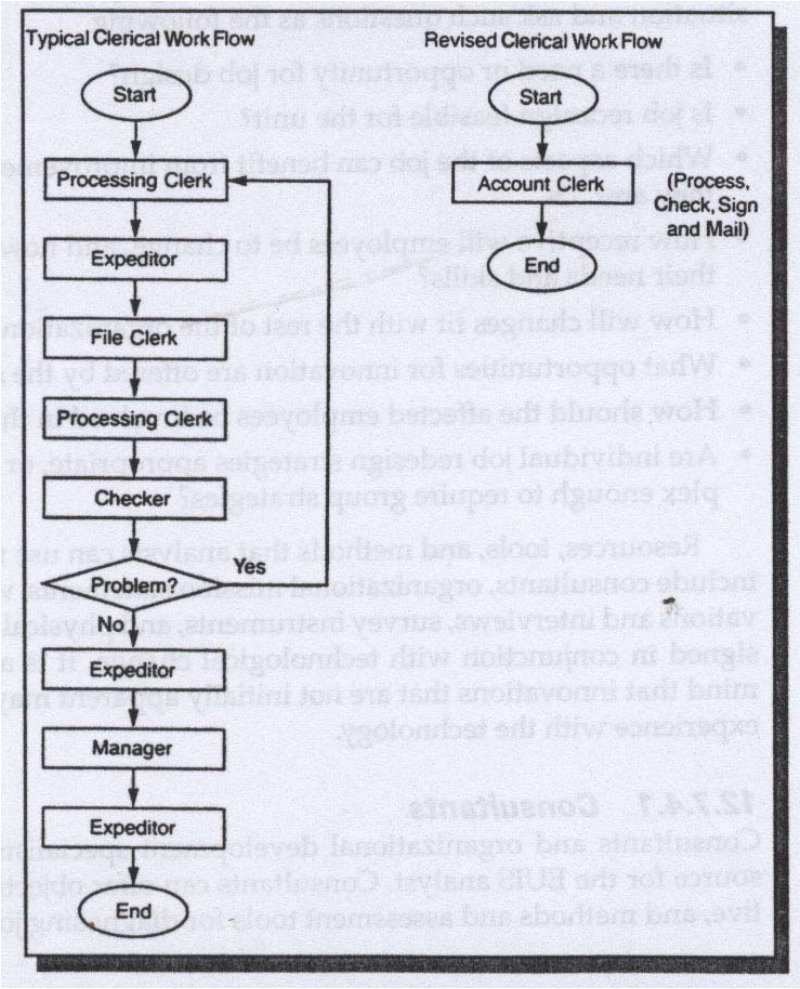

Figure 12-6 Work flow diagrams of a clerical operation
Source: **Courtesy of Roy W.** Walters and Associates, Inc.

Roy W. Walters and Associates, Inc., a consulting firm that specializes in job design, suggests that questions such as those that follow be used in analyzing work flow diagrams. How does each employee get the work, and where does it go next? How do separate tasks relate to one another? Are all current tasks necessary? Can any tasks be eliminated? For example, are reports prepared that are not used? Could reports be

prepared less frequently? Is all the information in the reports needed, or would a more concise report serve just as well—or perhaps better? Should any tasks be added? Should additional information be included or current information be replaced?

12.7.4.4 Observations and Interviews

The analyst's observations of the work unit and knowledge of the new technology to be implemented are key to understanding the opportunities for job redesign. The analyst should also solicit the observations of knowledgeable senior managers about the unit's operation. Individuals familiar with similar operations in other enterprises also can provide valuable insights. Also, the employees serving in the work unit are a key source of information and can provide valuable insights into work procedures, problems, receptivity to change, and ideas for improving the work.

Analysts should not overlook the clients of the work unit as a valuable source of information. Clients may include other departments or individuals within the enterprise who receive output from the unit, as well as consumers of the enterprise's products or services. It is important to determine how the client defines a superior service or product.

To gather information, the analyst can use either formal or informal interview techniques. Keep in mind, however, that interviewers should spend 80 percent of their time listening. (Interview techniques are summarized in a later chapter.) Data from interviews and observations can provide information about the unit's mission, detailed work procedures, efficiencies and inefficiencies of the work flow, who makes decisions about work, who evaluates work, and how the unit relates to other organizational units. The analyst should be sure to assess the perceptions, attitudes, and feelings of employees about their jobs and the organization.

12.7.4.5 Survey Instruments

The analyst can develop or purchase survey instruments to obtain detailed information about the jobs that are candidates for redesign and the skills, needs, and motivations of the employees who staff the positions. One such instrument, the Job Diagnostic Survey (JDS), was developed by Hackman and Oldham to gauge the degree to which each core job dimension exists in a given job.[32] The JDS asks objective questions to measure the core job dimensions and subjective questions to measure employee attitudes related to job satisfaction, motivation, and personal growth. The JDS is used to collect information from job incumbents. A separate instrument, the Job Rating Form (JRF), would be used to collect data describing a job from others in the organization besides the jobholder.

12.7.4.6 Physical Layout

The physical layout should support the work flow. When jobs are redesigned and work flow is changed, the physical layout also may need to be redesigned (see chapter 10).

When work was redesigned in the field offices of a large insurance company, creating the new position of client service representative, the physical layout of the office was redesigned, as well. Each client service representative was assigned a new workstation that was designed ergonomically to provide room for a PC, printer, client files, reference materials, personal items, and work area. The workstation area was designed in a U shape to facilitate the work flow and provide convenient access to necessary materials.

Sound-absorbing panels created privacy, reduced disruptions, and housed electrical cables and wiring.

The end result was a more productive work environment. Having all essential information at their fingertips contributed to client service representatives' achievement of objectives such as being able to respond to 90 percent of client inquiries immediately, eliminating the need for callbacks after information was gathered.

12.8 TECHNOLOGY. BUSINESS PROCESS, AND JOB DESIGN IN PERSPECTIVE

The major goal of BPR and job design programs is to improve performance in meeting customers' needs and carrying out the organizational mission. When BPR and job design principles are coupled with technological innovations, enterprises have new opportunities to rethink the way products and services are produced and delivered.

> Using technology to create routine jobs that can be easily performed with minimum training constrains the capabilities of both technology and people. The greatest potential of information technology in the long run derives from the computer's capacity to enhance human capabilities. Just as humankind has historically used the lever to amplify the physical strength of the body, we can now use the computer to extend the thinking and creative power of the mind.. . . Those organizations that learn to use technology to unleash and capitalize on people's creative potential will have a tremendous competitive advantage.[33]

By this point, a reader may feel overwhelmed by the number of factors that affect the way work is organized and managed. This is precisely why organizations do not undertake these projects more often. Theories can serve only as aids in planning design strategies; no blueprints detail how changes should be implemented. The use of technology as an enabler to redesign processes and jobs is largely uncharted territory. It takes skilled, knowledgeable analysts, working with organizational development specialists and department management, to implement effective job design or business process changes. EUIS analysts must be sensitive to the ways that technology affects organizations, business processes, and people and be prepared to deal with them.

12.9 SUMMARY

Business process and job (re)design play a vital role in making technology pay off. To achieve the full benefits of information technology~ project managers must address organizational issues, as well as technical ones. Implementing end-user solutions is as much about new ways of working as it is about technology. This chapter discusses the effect of technology on the design of business processes and knowledge work.

Technology is both an enabler and a constraint on business process, work group, and job design. BPR and job design can be approached at different levels.

At the enterprise level, BPR generally focuses on reengineering an entire organization or a department or division within the organization. At the business process level, reengineering efforts are smaller in scope and can occur at the unit, work group, and job

levels. Because improvement efforts usually are driven or enabled by information technologies, EUIS project managers and analysts may be called upon to lead or contribute to such efforts.

BPR challenges the core business processes or assumptions underlying a business process. Before undertaking BPR efforts, enterprises must define their core business processes. Various reengineering methods have emerged, many of them proprietary to specific consulting firms. In general, BPR follows a highly structured methodology with four phases involving diagnosis, design, implementation, and institutionalization.

Technology has affected knowledge work in a number of ways. Technology takes over some tasks completely, replacing jobs in whole or in part. Jobs are modified when automation eliminates, adds, or shifts tasks. Technology also creates new jobs when new tasks are required to support systems or are generated by new opportunities. Computers make work more abstract and alter the worker's relationship to tasks. In some instances, jobs have been de-skilled, while in others they have been enhanced. When the business process changes, the organization's structure, which defines the relationships among jobs, also can change.

The influence of scientific management is still prevalent in most enterprises today, as their production line methods and functional organizations show. All that is beginning to change as enterprises begin to understand the dynamics (i.e., new paradigms) of competing in a twenty-first century, networked global marketplace. The Ford Motor Company Case at the end of part IV provides a good example. The chapter describes several work redesign concepts based primarily on behavioral and sociotechnical systems approaches.

The purpose of a job design program is to organize work and assign responsibility for completing tasks in ways that create jobs that motivate and empower employees to achieve organizational objectives. Major characteristics of motivating jobs are autonomy, skill variety, task identity, task significance, and feedback from the job itself. Five strategies for designing individual jobs are combining tasks, forming natural work groups, establishing client relationships, vertically loading jobs, and establishing feedback channels.

Designing effective work groups is more complex than designing individual jobs. Additional characteristics that must be addressed include task-required inter-dependencies and social interaction. Self-managing work groups include temporary task forces, permanent cross-functional teams such as decision-making committees and many types of management teams, and production teams. By far the most difficult to design are self-managing production teams.

Technology is a catalyst for redesign programs that provide new opportunities for helping people work more productively and creatively. Redesigning work is a complex process, but the payoff for those who succeed can be extremely high.

KEY TERMS

- Accountability
- Authority
- Business process redesign (or reengineering)
- Command and control management

- Computer-mediated work
- Core business process
- De-skilling
- Empowerment
- Enhancing
- Job
- Job design
- Job enlargement
- Job enrichment
- Job rotation
- Quality of work life (QWL)
- Responsibility
- Self-managing work groups
- Sociotechnical systems
- Third wave management
- Two-factor theory of motivation

DISCUSSION QUESTIONS

1. Define *business process redesign.* What is the relationship between information technology and business process redesign?
2. Define *job redesign.* Discuss the importance of job redesign in the Information Age.
3. List and describe the four phases of BPR methodology.
4. Differentiate *task analysis* from *job analysis.*
5. Trace the development of approaches to job redesign from scientific management to third wave management.
6. Technology changes the very nature of work. Discuss. Offer examples of how PCs and digital networks have changed the way work is done.
7. Define *empowerment.* How does the concept of empowerment differ from delegation of authority in the industrial era command-and-control management model?
8. Hackman and Oldham have done pioneering work in job redesign, offering basic strategies for implementing work design. For each of these strategies, explain how a marketing manager's job could be redesigned.
9. How do jobs typically get designed? How should they be designed? Who should be involved?
10. Define *self-managing work groups.* How do they differ from coacting groups? In addition to the five core job characteristics, what factors must be taken into consideration when designing work for self-managed work groups?

APPLICATION EXERCISES

1. Ask a secretary or administrative assistant with 5 to 10 years experience how PCs have changed job requirements and practices. Compare your answers with those of your classmates. How do the responses compare?

2. Interview a manager or other knowledge worker who has recently begun using a PC or the Internet. What software are they using and for what purposes? Ask for a summary of how the job has changed as a result of information technology. Integrate the answers with your comments. How do your findings compare with those of your classmates?
3. Find two or three recent articles about business process redesign (reengineering) and job redesign efforts in different types of enterprises. Identify key characteristics that contributed to the success of the restructuring efforts described in these articles. As a class, compare the characteristics found in different articles. What role did technology play in these redesign efforts?

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USEFUL WEBSITES

- Business Processes Reengineering Learning Center—BPR. *http://www.prosci.com/bpraccess.htm* The BPR Learning Center for Business Process Re-engineering provides a number of resources online including best practices, online tutorial, white papers, and more.
- Process management and improvement. *http://www.dtic.dla.mil/c31/bprcd/3003s2.htm* A Department of Defense (DoD) document that helps explain the differences among various approaches to process management, such as business process reengineering, business process redesign, and others. Links are provided to other material from the government's extensive Electronic College of Process Innovation.

- Business process reengineering and innovation. *http://wuiw.brint.com/BPR.htm* (@BRINT—A Business Researcher's Interests) The Business Process Reengineering (BPR) section of @BRINT includes links to BPR artides and papers, books, periodicals, bibliographies, and tools, as well as other resources and related topics.
- WARIA Web Sites (Workflow and Reengineering International Association). *http://www.waria.com/@5sites.html* This site provides links to publications, associations, research organizations, and government bodies concerned with work flow and related topics.
- Process management glossary. *http://www.carras.com/glossary.html* This site defines basic terms and concepts used in process management. Developed by Jim Carras, a Texas-based business process management consultant, the site includes information about activity-based costing, integrated definition language (IDEF), cause-and-effect diagrams, knowledge-based processes, and more.

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Case Study The Reengineering of Camera World

Some e-commerce companies believe Internet shoppers are too demanding and impatient. Are shoppers' expectations really out of line? When they place an order with a traditional brick-and mortar mail order house for two-day delivery, they receive the package in two days. The satisfying experience builds customer trust and loyalty in a company and brand. One company that has integrated their fulfillment into their e-commerce business is Camera World Company.

In the 20,000-square-foot warehouse behind the front office, 15 workers scurry down long concrete aisles, clutching sales orders fresh off the network printer. To the casual observer, these warehouse folk seem to have X-ray eyes. Quickly scanning the metal racks loaded with thousands of indistinguishable-looking boxes of equipment, they have an uncanny ability to tell a box holding a $10,000 lens from a virtually identical package bearing a $1,000 one. When they locate the box they're after, they place it in a plastic tub; a bar-code check at the packing station ensures that the order is complete. There, a young man nodding to rock music on a boom box pours Styrofoam peanuts into labeled cardboard shipping boxes and then seals the goods with a deft pull and twist of tape.

Camera World's order-fulfillment and delivery systems have stood the company in good stead. During the 1999 holiday season, many of the company's stalwart 300,000 customers came back and spent an average of $600 a pop. Thanks largely to the explosion of interest in digital cameras, sales soared from $80 million in 1998 to more than $115 million in 1999.

In December 1999, the company's Web site handled an average of 25,000 unique users each day, and Web sales rose by 245 percent over the previous year's figure for the month. (At the same time, mail-order business shot up 67 percent, and sales at the company's downtown Portland, Oregon, store were up 22 percent.) Some 90 percent of Web and mail-order shipments left the warehouse within 24 hours. Return rates for Web sales hovered around 4 percent, paralleling the rate of returns from the store and the mail-order business. "We maintained heavy inventories to ship on time, and it all

worked pretty well," says Camera World's new CEO, Terry Strom. "But one thing's for sure: the Internet is raising the standard of performance for any retailer."

No kidding. The 1999 Christmas season, during which shoppers spent an estimated $6 billion online, saw many a Web site disappointing customers. According to a November 1999 report by the New York City Internet research firm Jupiter Communications, 46 percent of business-to-consumer Web sites took five or more days to respond to a query, never responded, or failed to post an e-mail address on the site for customers' inquiries.

"An awful lot of Web sites don't realize that customer service should be a priority," says Jupiter analyst Cormac Foster. "They focus on customer acquisition but don't spend time on the unsexy stuff, like customer-support infrastructure. Infrastructure doesn't get you headlines, but if you don't have a staff of people to take care of business behind the firewall, you won't get much." Case in point: Toys "R" Us, whose online subsidiary ToysRUs.com (announced with great fanfare in June 1998) found itself suffocating under the rush of online holiday traffic and was unable to fulfill orders on time. The company's back-end infrastructure was built to send truckloads of products to hundreds of stores—not to ship single orders to millions of consumers.

Don't call Camera World a "click-and-mortar" or an old-fashioned retailer with a Johnny-come-lately Web site. Rather, call it a dot-corn with lots of back-end "not-corn" experience. Camera World has long known that the boring stuff—attention to the fine details of customer service, simple and solid fulfillment processes, and trusted supplier relationships—is what really matters. Unless a company masters those three areas well before putting up a Web site, no amount of bells and whistles or transactional and design prowess online wifi make the Web component of the business successful.

Camera World already was known for excellent customer service, but with e-commerce different goals were spelled out. For starters, the company's Web pages would have to be transformed from simple brochure ware into a true transaction site. Its back-end systems would have to be married to whatever happened on the Web. The company itself would have to move into a larger, better-organized space, with a warehouse that would allow orders to be shipped within 24 hours as opposed to the 5 days required by the mail-order business. To speed everything up, they had to cut out obstacles. They needed to staff up, to fix the bugs in the computer systems, and to upgrade the telephone systems for more lines. They also started streamlining processes.

Today Camera World's site, which costs roughly $10,000 a month to maintain, handles at least 15,000 unique visitors and 400 transactions a day. It's now a full-fledged community for shutterbugs. It keeps visitors interested with increasingly snazzy features—3-D images of featured products, an online auction area, forums, online chats with celebrated photographers, a selection "wizard" that helps customers choose the right camera by assessing their expertise and frequency of use, and so on.

Customers also can get quick answers to their e-mailed questions. Professional photographers respond to them by e-mail or phone—and customers even receive a notice via e-mail showing them where their question is in the queue. For those who eschew telephone handsets, an Internet-telephony feature lets customers whose computers are equipped with a sound card and a microphone connect over the Internet to talk with the sales and support staff.

When a customer orders a camera through the Web site, the transaction is zapped from the servers to the order-fulfillment database via a dedicated, high-speed Ti line. A software interface between the Web site and the database reads the order and translates it

into the order-entry system. Sales reps, customer-support personnel, and shippers and other warehouse workers can review the order by tapping into Camera World's database from PCs.

Every few hours, warehouse personnel print a batch of 50 or so orders. Rush orders are printed on red paper; white paper signifies a standard UPS ground order. After workers locate the correct products and place them in a plastic tub along with the paper orders, they cart them to the shipping station, where the bar-code checking occurs. If the bar code doesn't match the order, a computer screen at the station notes the mismatch. If the match is correct, the inventory database records the product model number; when inventory reaches a low enough level, Camera World reorders. Once the product is packaged for shipping, it's loaded onto a waiting UPS van, which departs at the end of the day. Meanwhile, an e-mail message is sent to the customer, noting the time the package is scheduled to ship. Using a confirmation number supplied by the company, the customer can check the Web site to track the order. The customer tracks the package through the UPS link that is on the Camera World Business2Business Web page.

Most of Camera World's customers are not aware of these systems and do not really care about the specifics. They are just extremely satisfied with the customer service and have shown their loyalty when making purchases. Camera World realized earlier on that they had to provide the same excellent service they had provided for years with the traditional infrastructure.

Sources: Fryer, Bronwyn, "When Something Clicks," *Inc.* (March 15, 2000): *http://www.inc.com/articles/details/O,, ART17848,00.html* accessed on 12/26/00; Rigney, Patrick, "Eliminate Fulfillment Problems," *e-Business Advisor* (March 2000), 28—30; Holstein, William J., "Rewiring the 'Old Economy'," *U.S. News and World Report* (April 10, 2000), 38—40.

CASE STUDY QUESTIONS

1. Camera World reengineered itself from a brick-and-mortar shipping store to a full-fledged business-to-customer and business-to-business Web site. Customers always had been Camera World's top priority How did the Web site change customer relationships?
2. Many retailers maintain a Web presence. Camera World decided they wanted a fully transactional Web site. What back-end system changes were necessary? Consider changes to design, hardware, software, and so forth.
3. In the near future, a greater percentage of camera suppliers will sell their products via the Web. What are some changes that Camera World could make to enhance their fulfillment process?
4. Visit Camera World's Web site *(www.carneraworld. corn)* and Kodak's Web site *(www.kodak.com).* Browse the two sites and note their similarities and differences. Do the sites serve different customers? In your opinion, which site is more customer friendly? Why?