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Solutions – Chapter 2

Critical Thinking Exercise

Reducing New Product Stockout at Coles

Review Questions

1. One benefit of virtual teams is that they enable organizations to enlist the best people in different geographical regions to solve important organizational problems. Another benefit is that they provide the ability to staff a team with people who have a range of experience and knowledge that stems from a variety of professional experiences and cultural backgrounds.

2. Virtual organization members must be sensitive to the different cultures and practices of the various team members to avoid misunderstandings that can destroy team chemistry.

Critical Thinking Questions

1. Student responses will vary. Student should provide a paragraph briefly outlining background and experience.

2. Student responses may vary. Communications are greatly improved when participants can see one another and pick up facial expressions and body language. I would recommend initial face-to-face meetings while the team is forming and defining goals, roles, and expectations on how its members will work together. It helps if virtual team members take the time to get to know one another by sharing experiences and personal background information.

Critical Thinking Exercise

Review Questions

1. Organizations often outsource a process so they can focus more closely on their core business—and target their limited resources to meet strategic goals.

2. A growing number of organizations are finding that outsourcing does not necessarily lead to reduced costs. One of the primary reasons for cost increases is poorly written contracts that allow the service provider to tack on unexpected charges. Other potential drawbacks of outsourcing include loss of control and flexibility, the potential for data breaches of information stored on the service provider's computer hardware, overlooked opportunities to strengthen core competencies of the firm's own employees, and low employee morale.

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Critical Thinking Questions

1. Organizations often find that it takes years of ongoing effort and a large up-front investment to develop a good working relationship with an outsourcing firm. Finding a reputable outsourcing partner can be especially difficult for a small or midsized firm that lacks experience in identifying and vetting contractors.

2. Student responses may vary, but you might want to address the inevitability of eliminating the accounting department. What are the company's plans for downsizing?

Critical Thinking Exercise

Change Management for ERP System Project

Review Questions

1. Managers must take the time to explain the many tangible and intangible benefits for the organization as well as for the individual. Since this change will have a major impact on 50 members, the positive impact of the change should be stressed. Each person should be thoroughly informed of all job changes and requirements and provided any necessary training.

2. Human resources might want to identify a small subset of the 50 members who can will be good candidates for early adopters of the new system.

Critical Thinking Questions

1. Student responses may vary. You should meet with the project manager to discuss expectations, document criteria, and share project status. In order to build rapport and trust, it might be a good idea to meet informally for coffee or lunch.

2. Student responses may vary. People are the key to the successful implementation of any change so communication with the business users is very important. Managers must take the time to listen to the fears and concerns of the users and use that opportunity to stress the benefits and positive impact the changes will have on the company and the individual.

Critical Thinking Exercise

Product Supply Turns to Shadow IT

Review Questions

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1. Shadow IT enables the business to test quick solutions to business needs without delays brought on by involvement of information systems. It can create an innovative, synergistic partnership between the information systems department and other business units as well as provide the opportunity to evaluate and test many more information system initiatives. Conversely, the systems and processes developed may lack necessary levels of security required to meet compliance standards, it might create tension with the CIO, it might be more expensive than going through central purchasing, it may duplicate work, and issues can arise over responsibility to fix "nonapproved" solutions.

2. Student responses may vary. Your manager may want to skirt formal procedures associated with the purchase of large capital expense items—including scrutiny by the information system department—in order to get the inventory system up and running quickly.

Critical Thinking Questions

1. Student responses may vary. Issues often arise when a shadow IT solution "breaks" and questions are raised about who is responsible for fixing it and supporting the end users. There are also security risks associated with using a cloud service provider.

2. Student responses may vary. You may want to ask if the information systems department is aware of the plan to contract with a cloud service provider. Who will offer support to the system? Who will have access to the system?

Review Questions

1. A value chain is a series (chain) of events that includes inbound logistics, warehouse and storage, production, finished product storage, outbound logistics, marketing and sales, and customer service. A supply chain is a network of suppliers, distributors, and retailers that participate in the production of a product.

2. Supply chain management (SCM) helps determine what supplies are required for the value chain, what quantities are needed to meet customer demand, how the supplies should be processed (manufactured) into finished goods and services, and how the shipment of supplies and products to customers should be scheduled, monitored, and controlled.

3. The members of a virtual team are distributed geographically, but collaborate and complete work through the use of information systems. Members may seldom meet face to face. Virtual team members must be prepared to do work anywhere, anytime. As a result, members of a virtual team may feel that their work day never ends.

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4. Sustaining innovation results in enhancements to existing products, services, and ways of operating. Such innovations are important because they enable an organization to continually increase profits, lower costs, and gain market share. A disruptive innovation is one that initially provides a lower level of performance than the marketplace has grown to accept. Over time, however, the disruptive innovation is improved to provide new performance characteristics, becoming more attractive to users in a new market.

5. Business process reengineering is the radical redesign of business processes, organizational structures, information systems, and values of the organization to achieve a breakthrough in business results.

6. Continuous improvement is a form of innovation that constantly seeks ways to improve business processes and add value to products and services.

7. Outsourcing is a long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function. Offshoring is an outsourcing arrangement where the organization providing the service is located in a country different from the firm obtaining the services.

8. The soft side of implementing change involves work designed to help employees embrace a new information system and way of working.

9. Organizational culture consists of the major understandings and assumptions for an organization. Organizational learning is the adaptations and adjustments made within an organization based on experience and ideas over time.

10. Leavitt's diamond proposes that every organizational system is made up of four main components—people, tasks, structure, and technology—that all interact; any change in one of these elements will necessitate a change in the other three elements. Thus, to successfully implement a new information system, appropriate changes must be made to the people, structure, and tasks affected by the new system.

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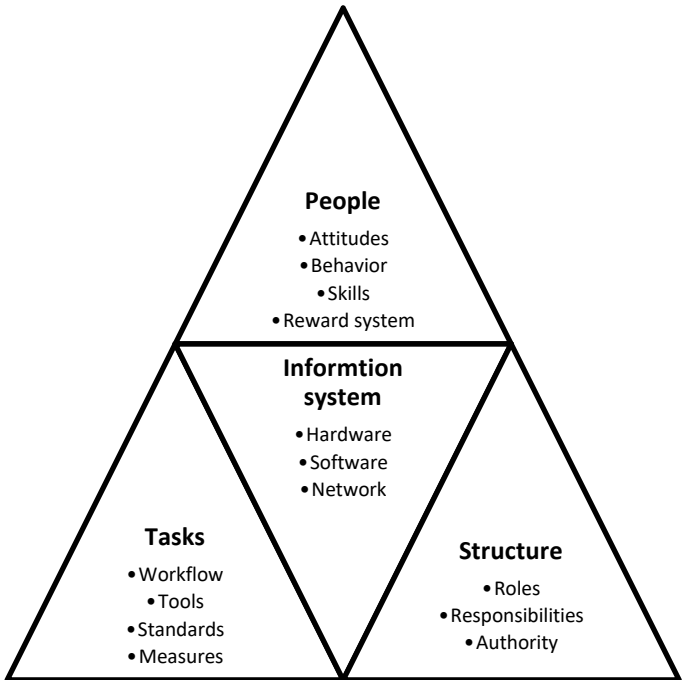

11. Student responses will vary. Three sites might include:

    - CareerBuilder: This site is one of the biggest job boards, and its robust search function allows you to filter by several criteria, including location, degree required and pay range. CareerBuilder partners with news media around the country and collects job listings from them. It also provides career advice and resources for candidates.
    - TheLadders: This site focuses on job openings for upper-level executives and professionals who are aiming for the management suite.
    - Glassdoor: This site promotes itself as giving job seekers insights into a company's work conditions, interview processes, salaries and benefits. In addition to providing job listings, Glassdoor allows employers to identify job candidates and market their companies to job seekers.

    Source: https://www.roberthalf.com/job-seekers/career-center/job-hunting-tips/10-best-job-search-websites

12. The role of CIO is to employ an IS department's equipment and personnel to help the organization attain its goals. CIOs also understand the importance of finance, accounting, and return on investment. They can help companies avoid damaging ethical challenges by monitoring how their firms are complying with a large number of laws and regulations.

13. Shadow It is the term used to describe the information systems and solutions built and deployed by departments other than the information systems department. In many cases, the information systems department may not even be aware of these efforts.

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Discussion Questions

1. Student responses may vary. As an example of a simple value chain, the gift wrapping department of an upscale retail store takes packages from customers, covers them with appropriate, decorative wrapping paper, and gives the package back to the customer, thus increasing the customer's (and the recipient's) perceived value of the gift.

2. Student answers will vary. Students should detail a virtual team they are a member of.

3. Student answers may vary, but some examples might include the failure to promote creativity among the employees and failure to receive employee input prior to decisions. To encourage innovation, some IS departments are creating separate groups that explore new, innovative ideas. Innovative companies include Apple, Facebook, Google, Amazon, Twitter, Kickstarter, and PayPal.

4. The main similarity between outsourcing and downsizing is the goal of cutting costs. Outsourcing is a long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function. This might lead to downsizing, or reducing the number of employees, as a number of job functions may have been eliminated. However, outsourcing does not always lead to downsizing. Outsourcing may occur to enable employees who were stretched too thin to focus on their core business.

5. Student answers will vary.

6. Student responses will vary. Perceived usefulness and ease of use can influence an individual's attitude toward the system, which also affects the worker's behavioral intention to use the system.

7. Technology diffusion is a measure of how widely technology is spread throughout an organization. An organization in which computers and information systems are located in most departments and areas has a high level of technology diffusion. Therefore, you would need to measure the use of the new system across the organization.

8. Students who use the Internet and other nontraditional sources to find IS jobs have more opportunities to land a job. Most large companies list job opportunities on their Web sites. These sites allow prospective job hunters to browse job opportunities, locations, salaries, benefits, and other factors. In addition, some sites allow job hunters to post their résumés.

   Note that students are often warned to be careful of what they post on social media sites, including Facebook. Employers often search the Internet to get information about potential employees before they make hiring decisions.

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9. The CIO should be a customer relationship manager, a strategic communicator, and a project manager, delicately balancing project portfolios, available resources, and governance. He/she should also be a leader, not a dictator; a technologist, not a technician; a business person, not an accountant; and finally, a diplomat, not a politician.

10. Student responses will vary.

Problem-Solving Exercises

1. Student should create a spreadsheet similar to Figure 2.12 using five occupations of his choice.

2. Student should develop a force field analysis of the restraining forces and driving forces that would impact his decisions to change majors or jobs.

3. GE's Change Acceleration Management process illustrates the key processes involved in facilitating effective change. The student should research this and summarize the key steps with a slide presentation.

Team Activities

1. Students should interview a manager of a successful organization about organizational culture.

2. Students should develop interview questions and an assessment process to evaluate user satisfaction or a new system.

3. Students should develop focus group questions to assess feelings about a new information system.

Web Exercises

1. Student should search for H-1B visas data by job category.

2. Students should search for information on the top-ranked places to work. According to Fortune, the three top-ranked companies for 2016 are Google, ACUITY, and Boston Consulting Group.

3. Students should research how recruiters use social network data to screen applicants. Recruiters can use social media data in a number of ways. Some examples might include:

    - Interested in seeing which candidates are the most (or least) connected
    - Use a candidate's social media pages to test the candidate's professionalism.

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- Look for specific traits of interest to the company.

Career Exercises

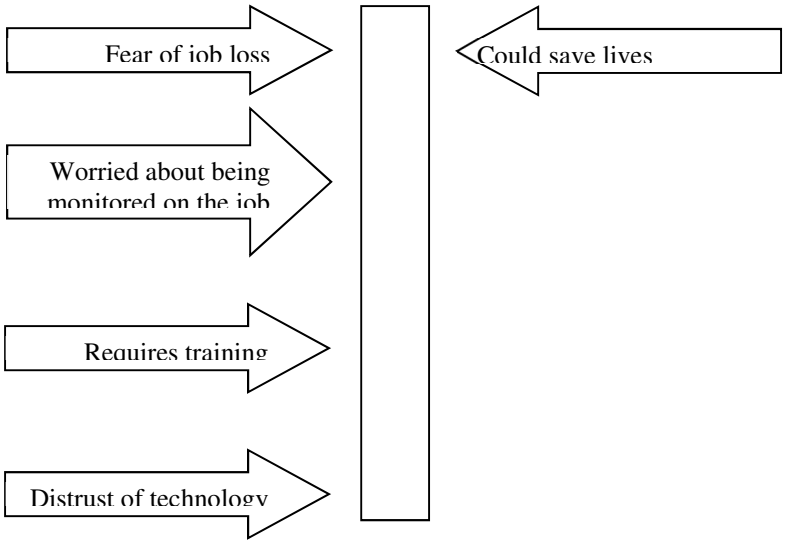
1. Students could conduct research about an entrepreneur that they admire.
2. Student response will vary.
3. Student response will be based on ideal job.

Case Studies

Case One: Railroads struggle to Implement Positive Train Control

Critical Thinking Questions

1. Student answers may vary. This is an example of a simple analysis.



2. Responses will vary. Arguments for PTC might include:
   - Rail worker safety
   - Passenger safety
   - Enforcement of line speeds/monitor trains

   Arguments against PTC might include:
   - High cost
   - High time commitment
   - Frequency conflicts

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3. Students should research the current status of PTC. They should note that congress extended the original PTC implementation deadline from December 31, 2015 to at least December 31, 2018. In addition, in August 2016, the U.S. Department of Transportation's (DOT) Federal Railroad Administration (FRA) awarded $25 million in grants for 11 projects in six states and the District of Columbia to assist in implementing PTC.

   Source: https://www.transportation.gov/briefing-room/fra-awards-25-million-grants-positive-train-control-implementation

Case Two: Nordstrom's Innovation Efforts Recognize the Importance of the Soft Side of Implementing Change

Critical Thinking Questions

1. The soft side of implementing change involves work designed to help employees embrace a new information system and way of working. Moving the technology innovators out if the lab allows them to work more closely with the end users. This keeps the end users involved and more connected to the innovation process and more willing and likely to accept change.

2. Student responses may vary. The resistance Nordstrom faced was probably typical resistance an organization faces when implementing change. This resistance might include fear of job loss, uncomfortable with changes to job, distrust of technology, or distrust of innovators and/or end users. As in all cases, managers need to take the time to explain the tangible and intangible benefits to both the individual and the organization.

3. With Nordstrom's focus on the soft side of implementing change, employees are more likely to embrace change and innovation.

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Chapter 2

Information Systems in Organizations

At a Glance

Instructor's Manual Table of Contents

- Overview
- Principles and Objectives
- Teaching Tips
- Quick Quizzes
- Class Discussion Topics
- Additional Projects
- Additional Resources
- Key Terms

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Overview

Information systems have changed the way organizations work in recent years. While information systems were once used primarily to automate manual processes, they have transformed the nature of work and the shape of organizations themselves. Use this chapter to explore the benefits and issues associated with the use of information systems in today's organizations around the globe.

Principles and Objectives

Principles	Learning Objectives
Organizations are open systems that affect and are affected by their surrounding environment.	• Sketch a general model of an organization showing how information systems support and work within the automated portions of an organizational process. • Define the term value chain and identify several examples within a typical manufacturing or service organization.
Positive change is a key ingredient for any successful organization.	• Define the term innovation and identify two types. • Define reengineering and continuous improvement and explain how they are different. • Discuss the pros and cons outsourcing, offshoring, and downsizing.
Information systems must be implemented in such a manner that they are accepted and work well within the context of an organization and support its fundamental business goals and strategies.	• Define the term "the soft side of implementing change," and explain why it is a critical factor in the successful adoption of any major change. • Identify and briefly describe four change models that can be used to increase the likelihood of successfully introducing a new information system into an organization.

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The information system worker functions at the intersection of business and technology and designs, builds, and implements solutions that allow organizations to effectively leverage information technology systems.	• Define the types of roles, functions, and careers available in the field of information systems.

Teaching Tips

Organizations and Information Systems

1. Explain that an organization is a group of people that is structured and managed to meet its mission or set of group goals. Structured means that there are defined relationships between members of the organization and their various activities, and that processes are defined that assign roles, responsibilities, and authority to complete the various activities. Use Figure 2.1 to aid the discussion.

2. Pose the following question to students: *How does the organizational system increase the value of resources?*

3. Introduce the term **value chain**. The value chain is a series (chain) of activities that an organization performs to transform inputs into outputs in such a way that the value of the input is increased. Use Figure 2.2 to aid the discussion.

4. Introduce and discuss the term **supply chain management**. Supply chain management (SCM) encompasses all the activities required to get the right product into the right consumer's hands in the right quantity at the right time and at the right cost—from the identification of suppliers and the acquisition of raw materials through manufacture and customer delivery. Use Figure 2.4 to aid the discussion.

Teaching Tip	When introducing the material in this section, be sure to use a number of case studies and examples to show how different companies are using various types of information systems to achieve their goals.

Virtual Teams and Collaborative Work

1. Define a virtual team as a group of individuals whose members are distributed geographically, but who collaborate and complete work through the use of information systems.

2. Point out that virtual team members must be prepared to do work anywhere, anytime.

3. Stress that communications are greatly improved when participants can see one another and pick up facial expressions and body language. Thus, even with sophisticated

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information system tools, virtual teams still benefit from occasional face-to-face meetings.

Change in the Organization

1. Stress that an organization's current products, services, and ways of accomplishing work are doomed to obsolescence. Fail to change and your competition will take away your customers and your profits.

Innovation

1. Define innovation is the application of new ideas to the products, processes, and activities of a firm, leading to increased value. Innovation is the catalyst for the growth and success of any organization.

2. Mention that sustaining innovation results in enhancements to existing products, services, and ways of operating. Such innovations are important because they enable an organization to continually increase profits, lower costs, and gain market share.

3. Mention that a disruptive innovation is one that initially provides a lower level of performance than the marketplace has grown to accept.

Reengineering and Continuous Improvement

1. Introduce the terms **reengineering,** also called **process redesign** and **business process reengineering (BPR)**, which involves the radical redesign of business processes, organizational structures, information systems, and values of the organization to achieve a breakthrough in business results.

2. Note the idea of continuous improvement (often referred to by the Japanese word "Kaizen") is a form of innovation that constantly seeks ways to improve business processes and add value to products and services.

Teaching Tip	When introducing the material in this section discuss table 2.1 and use it to compare business process reengineering with continuous improvement.

Outsourcing, Offshoring, and Downsizing

1. Define **outsourcing** is a long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function.

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2. Point out that **offshore outsourcing** (also called **offshoring**) is an outsourcing arrangement in which the organization providing the service is located in a country different from the firm obtaining the services.

3. Highlight that companies considering outsourcing need to take into account many factors. A growing number of organizations are finding that outsourcing does not necessarily lead to reduced costs.

4. Make it clear that outsourcing part or all of a business process introduces significant risks that the service provider will introduce quality problems into the supply chain.

5. Explain downsizing, a term frequently associated with outsourcing, involves reducing the number of employees to cut costs.

Teaching Tip	For an interesting article about offshoring, visit: http://www.economist.com/blogs/freeexchange/2014/03/offshoring

Teaching Tip	Outsourcing is a controversial issue because many companies outsource existing jobs to other countries where labor costs are much lower. Ask students to discuss whether outsourcing is beneficial or harmful to a country. What are the benefits of outsourcing? Who gets to enjoy these benefits—the company, the workers, and/or the consumers? What are the disadvantages of outsourcing?

Quick Quiz 1

1. A(n) ____ is a group of people that is structured and managed to meet its mission or set of group goals.
   Answer: organization

2. Which of the following is a series of activities that an organization performs to transform inputs into outputs in such a way that the value of the input is increased?

   a. value chain
   b. supply chain
   c. SCM
   d. process chain

   Answer: a. value chain

3. ____ encompasses all the activities required to get the right product into the right consumer's hands in the right quantity at the right time and at the right cost, from acquisition of raw materials through customer delivery.

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Answer: Supply chain management

4. Which of the following best describes the application of new ideas to the products, processes, and activities of a firm, leading to increased value?

    a. growth
    b. innovation
    c. reengineering
    d. process redesign

    Answer: b. innovation

Organizational Culture and Change

1. Define **culture** as a set of major understandings and assumptions shared by a group, such as within an ethnic group or a country.

2. Highlight that **organizational culture** consists of the major understandings and assumptions for an organization. The understandings, which can include common beliefs, values, and approaches to decision making, are often not stated or documented as goals or formal policies.

3. Discuss how **organizational change** deals with how organizations successfully plan for, implement, and handle change.

4. Mention that the **soft side of implementing change** involves work designed to help employees embrace a new information system and way of working.

5. Point out that a **change management model** describes the phases an individual or organization goes through in making a change and provides principles for successful implementation of change.

Lewin's Change Model

1. Introduce and discuss the three-stage approach for change called **Lewin's change model**. Use Figure 2.6 to aid the discussion.

Lewin's Force Field Analysis

1. State that a frequently encountered stumbling block to the successful implementation of change, including the implementation of a new system, is negative user reaction.

2. Point out that Lewin extended his change model theory to include **force field analysis**, which identifies both the driving (positive) and restraining (negative) forces that influence whether change can occur.

3. Introduce and discuss the terms **driving forces** and **retraining forces**. Use Figure 2.7 to aid the discussion.

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Teaching Tip	When introducing the material related to Lewin's force field analysis have your students openly discuss how restraining forces influence whether change can occur.

Leavitt's Diamond

1. Introduce and discuss Leavitt's diamond. **Leavitt's diamond** proposes that every organizational system is made up of four main components—people, tasks, structure, and technology—that all interact; any change in one of these elements will necessitate a change in the other three elements. Use Figure 2.9 to aid the discussion.

2. Highlight that organizational learning is closely related to organizational change. All organizations adapt to new conditions or alter their practices over time. Collectively, these adaptations and adjustments based on experience and ideas are called **organizational learning**.

User Satisfaction and Technology Acceptance

1. Introduce and discuss the **technology acceptance model (TAM)**, which specifies the factors that can lead to better attitudes about the use of a new information system, along with its higher acceptance and usage. Use Figure 2.10 to aid the discussion.

Diffusion of Innovation Theory

1. Explain that the **diffusion of innovation theory** was developed by E.M. Rogers to explain how a new idea or product gains acceptance and diffuses (or spreads) through a specific population or subset of an organization.

2. Highlight that a key point of this theory is that adoption of any innovation does not happen all at once for all members of the targeted population; rather, it is a drawn-out process, with some people quicker to adopt the innovation than others. Use Figure 2.11 to aid your explanation.

Quick Quiz 2

1. ____ is a set of major understandings and assumptions shared by a group, such as within an ethnic group or a country.
   Answer: culture

2. Which of the following identifies both the driving (positive) and restraining (negative) forces that influence whether change can occur?

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a. Lewin's change model
b. force field analysis
c. driving forces
d. restraining forces
Answer: b. force field analysis

3. The____ is the description of the phases an individual or organization goes through in making a change and principles for successful implementation of change.
Answer: change management model

4. Which of the following best describes an organizational change model that proposes that every organizational system is made up of four main components—people, tasks, structure, and technology—that all interact; any change in one of these elements will necessitate a change in the other three elements?

a. Leavitt's force field
b. Standard's diamond
c. Leavitt's diamond
d. Driving forces
Answer: c. Leavitt's diamond

Careers in Information Systems

1. Students may find it interesting to learn that technology is one of the fastest-growing areas in the U.S. economy, and information systems professionals are in high demand. The U.S. Bureau of Labor Statistics (BLS) forecasts an increase of 1.2 million new computing jobs in the time period 2012 to 2022. Use Table 2.3 to aid the discussion.

2. Stress that a career in information systems can be challenging, exciting, and rewarding, there are also some drawbacks to such a career. As reliance on technology increases, organizations have increasing expectations of their information system workers

3. Briefly, mention that some of the best places to work as an IS professional are listed in Table 2.5.

Roles, Functions, and Careers in IS

1. Explain that professionals with careers in information systems can work in an IS department or outside a traditional IS department as Web developers, computer programmers, systems analysts, computer operators, and many other positions.

2. Note that the typical IS organization is divided into three main functions: operations, development, and support. Use Figure 2.14 to aid the discussion.

Typical IS Titles and Functions

1. Point out that the organizational chart shown in Figure 2.14 is a simplified model of an IS department in a typical medium-sized or large organization.

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2. The following topics should also be discussed:

   - **Chief Information Officer**: The role of the CIO is to employ an IS department's equipment and personnel to help the organization attain its goals. CIOs also understand the importance of finance, accounting, and return on investment.

   - **Senior IS Managers**: Job titles associated with IS management include vice president of information systems, manager of information systems, and chief technology officer (CTO).

   - **Operations Roles**: Professionals in the operations group include data center managers, system operators, information systems security analysts, and LAN administrators.

   - **Development Roles**: Professionals in the development group include software developers, systems analysts, programmers, and Web developers.

   - **Support:** Professionals in the support group include database administrators and help desk support specialists.

IS-Related Roles outside the IS Organization

1. Explain that in addition to IS workers placed within the IS organization; some companies have people who take on IS-related roles but reside outside the IS organization. For example, data scientists, can be found in the marketing, sales, and supply chain management departments of large organizations. Data scientists are responsible for understanding the business analytics technology as well as the business, and then putting all of that together to deliver improvements in decision making.

2. Point out that **shadow IT** is a term used to describe the information systems and solutions built and deployed by departments other than the information systems department. In many cases, the information systems department may not even be aware of these efforts.

3. Discuss that shadow IT enables business managers to quickly create highly innovative solutions to real business problems and to test out these solutions. Such systems may serve as prototypes that evolve into future approved IT solutions. However, shadow IT solutions frequently employ nonapproved vendors, software, or hardware and may not meet the IS department standards for control, documentation, security, support, and reliability. Use Table 2.6 to aid the discussion.

Certification

1. It is important for students to understand that the people-filling IS roles have usually completed some form of certification. Certification is a process for testing skills and knowledge; successful completion of a certification exam results in an endorsement by the certifying authority that an individual can perform specific tasks or jobs.

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2. Point out that according to a recent survey, 65 percent of employers use IT certifications to differentiate between equally qualified candidates, while 72 percent of employers require some form of IT certification as a requirement for certain job roles.

Other IS Careers

1. Explain that in addition to working for an IS department in an organization, IS personnel can work for large consulting firms, such as Accenture, IBM, and Hewlett- Packard. Some consulting jobs entail frequent travel because consultants are assigned to work on various projects, wherever the client is.

2. Point out that other IS career opportunities include being employed by technology companies, such as Oracle, IBM, HP, Microsoft, Google, and Dell. Such a career enables an individual to work on the cutting edge of technology, which can be challenging and exciting.

Working in Teams

1. Briefly, mention that most IS careers involve working in project teams that can consist of many of the positions and roles discussed earlier. Thus, it is always good for IS professionals to have good communication skills and the ability to work with other people.

Finding a Job in IS

1. Briefly mention and discuss that traditional approaches to finding a job in the information systems area include attending on-campus visits from recruiters and getting referrals from professors, friends, and family members.

2. Highlight that many professional organizations and online user groups can be helpful in finding a job, staying current once employed, and seeking new career opportunities. Many companies use Twitter to advertise job openings in industries such as advertising and public relations, consulting, consumer products, and education, among others.

Quick Quiz 3

1. Which professional in the operations group sets up and manages the network hardware, software, and security processes?

    a. LAN administrator
    b. System operator
    c. Data center manager
    d. IS security analysts

    Answer: a. LAN administrator

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2. The role of the ____ is to employ an IS department's equipment and personnel to help the organization attain its goals.
   Answer: chief information officer (CIO)

3. ____ run and maintain IS equipment. They are responsible for efficiently starting, stopping, and correctly operating mainframe systems, networks, tape drives, disk devices, and printers.
   Answer: System operators

4. Which professional in the development group designs and maintains Web sites, including site layout and function, to meet the client's requirements?

   a. Programmer
   b. Web developer
   c. Software developer
   d. System support

   Answer: b. Web developer

Class Discussion Topics

1. What are the implications of using reengineering versus continuous improvement in a systems development effort?

2. What steps would you take to align the IS functions of an organization with its organizational mission?

3. What are the four components of Leavitt's triangle, and how do they interact?

Additional Projects

1. After choosing a well-known company, use the Internet to research the strategies the company is using to achieve competitive advantage. Summarize your findings in two to three paragraphs.

2. Choose a position in an IS department to research. Find out what qualifications are required to work in this position. Is certification required or helpful? What are the responsibilities of someone working in this position? Write a two- to three-paragraph report summarizing your findings.

Additional Resources

1. Supply Chain Management:
   http://logistics.about.com/od/supplychainintroduction/a/into_scm.htm

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2. Computer Certification: http://certification.about.com/index.htm

3. Virtual team collaboration tools: http://www.thecouchmanager.com/the-ultimate-list-of-virtual-team-technology-tools/

4. Force field analysis: https://www.mindtools.com/pages/article/newTED_06.htm

5. Offshoring: http://www.economist.com/blogs/freeexchange/2014/03/offshoring

Key Terms

- **certification:** A process for testing skills and knowledge; successful completion of a certification exam results in a statement by the certifying authority that confirms an individual can perform specific tasks.
- **change management model:** A description of the phases an individual or organization goes through in making a change and principles for successful implementation of change.
- **continuous improvement:** Constantly seeking ways to improve business processes and add value to products and services.
- **culture**: A set of major understandings and assumptions shared by a group, such as within an ethnic group or a country.
- **diffusion of innovation theory:** A theory developed by E.M. Rogers to explain how a new idea or product gains acceptance and diffuses (or spreads) through a specific population or subset of an organization.
- **downsizing:** Reducing the number of employees to cut costs.
- **driving forces:** The beliefs, expectations, and cultural norms that tend to encourage a change and give it momentum.
- **force field analysis:** An approach to identifying both the driving (positive) and restraining (negative) forces that influence whether change can occur.
- **innovation:** The application of new ideas to the products, processes, and activities of a firm, leading to increased value.
- **Leavitt's diamond:** An organizational change model that proposes that every organizational system is made up of four main components—people, tasks, structure, and technology—that all interact; any change in one of these elements will necessitate a change in the other three elements.
- **Lewin's change model:** A three stage approach for implementing change that involves unfreezing, moving, and refreezing.
- **offshore outsourcing (offshoring):** An outsourcing arrangement where the organization providing the service is in a country different from the firm obtaining the services.
- **organization:** A group of people that is structured and managed to meet its mission or set of group goals.
- **organizational change:** How for profit and nonprofit organizations plan for, implement, and handle change.

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- **organizational culture:** The major understandings and assumptions for a business, corporation, or other organization.
- **organizational learning:** The adaptations and adjustments made within an organization based on experience and ideas over time.
- **outsourcing:** A long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function.
- **reengineering (process redesign/business process reengineering, BPR):** The radical redesign of business processes, organizational structures, information systems, and values of the organization to achieve a breakthrough in business results.
- **restraining forces:** Forces that make it difficult to accept a change or to work to implement a change.
- **shadow IT:** The information systems and solutions built and deployed by departments other than the information systems department. In many cases, the information systems department may not even be aware of these efforts.
- **soft side of implementing change:** The work designed to help employees embrace a new information system and way of working.
- **supply chain management (SCM):** The management of all the activities required to get the right product into the right consumer's hands in the right quantity at the right time and at the right cost—from the identification of suppliers and the acquisition of raw materials through manufacture and customer delivery.
- **supply chain:** A key value chain whose primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and service.
- **technology acceptance model (TAM):** A model that specifies the factors that can lead to better attitudes about an information system, along with higher acceptance and usage of it.
- **value chain:** A series (chain) of activities that an organization performs to transform inputs into outputs in such a way that the value of the input is increased.
- **virtual team:** A group of individuals whose members are distributed geographically, but who collaborate and complete work using information systems.

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Chapter 2

ETHICAL & SOCIETAL ISSUES

Electronic Medical Records

Doctors have been recording information about their patients since the days of ancient Egypt. Written records served well when medicine was less specialized than it is today, people were less mobile, and patients were (for better or worse) more tolerant of physician errors.

Today, the world is moving to electronic medical records (EMRs) to consolidate medical information about a patient in a central place. According to Trisha Torrey, a patient advocate, an EMR is "a digital record kept by your doctor's office, your insurance company or a facility where you are a patient." She goes on to say that "EMR systems are intended to keep track of a patient's entire health and medical history in a computerized, electronic format. By keeping these potentially vast records in this manner, they are more easily retrievable, and can make a patient's navigation through the health care system much safer and more efficient."

In the United States, the federal government has thrown its weight behind EMRs. It will pay physicians up to $18,000 each for their use. To earn this incentive, physicians must reach certain stages of "meaningful use" at milestones from 2011 through 2014. Similar incentives, with different definitions of meaningful use, apply to hospitals and other health care organizations.

Brighton Hospital is at the forefront of EMR adoption. Located in Brighton, Michigan, it is the second oldest alcohol and substance abuse treatment center in the United States. Its goal for EMRs was "to increase [the hospital's] efficiency and patient safety without dramatically changing its workflow. Its staff also wanted to be able to more easily collect data and process a multitude of reports from that data." Since adopting EMRs in 2010, Brighton Hospital has achieved several specific benefits. One was a reduction of 2.5 (full-time equivalent) nurses, releasing them to areas that had no funds to hire new employees. The following are other benefits the hospital realized:

- 80 percent reduction in medication errors
- Increased patient safety and compliance
- Around the clock access to patient records
- Enhanced decision making using EMR data

Yet EMRs are not without concerns. Some are technical: will hardware and software be sufficiently reliable so that EMRs remain accessible and will electronic records be safe from intrusion? Other concerns, however, relate to the human side of health care. Dr. Danielle Ofri writes, "In the old days, when a patient arrived in my office ... I looked directly at the patient. As we spoke, I would briefly drop my eyes to jot a note on the page, and then look right up to continue our conversation. My gaze and my body language remained oriented toward the patient.... In the current computerized medical world, this is impossible. I have to be turned toward the computer screen." She summarizes: "The computer has much to offer, but I mourn the loss of intimacy that it has engendered."

As with so many other advances, innovations often involve trade-offs as an organization gains one benefit while losing another. Information system professionals can help to optimize the benefits while minimizing the losses.

Discussion Questions

1. Consider Dr. Ofri's comments about the trade-offs of using EMRs in the context of your most recent visit to a health care professional. Did he or she use a computer? If so, did you feel that it interfered with your discussion? Compare answers with your classmates.

2. Suppose your family lives in Vermont, you attend school in Texas, and you break your leg while skiing in Colorado. Describe how EMRs could help in that situation.

Critical Thinking Questions

1a. (For U.S. students) The United States has been criticized for having excellent health care but no health care system. Do you feel that criticism is justified? What, if anything, can EMRs do to address this concern?

1b. (For students outside the United States) Compare what your country is doing with EMRs with the situation in any other country at approximately the same economic level. Is your country ahead of the other in its adoption or behind? Why is this so? In your opinion, is that a problem?

2. Find the definition of "meaningful use" of EMRs on the Web. Do you feel that the meaningful use standards for physicians force them to move too fast? Let them move too slowly?

SOURCES: Dollinger, A., "Ancient Egyptian Medicine," *www.reshafim.org.il/ad/egypt/timelines/topics/medicine.htm*, updated November 2010, accessed December 19, 2011; Torrey, T., "What is an EMR (Electronic Medical Record) or EHR (Electronic Health Record)?" *About.com*, *http://patients.about.com/od/electronicpatientrecords/a/emr.htm*, April 11, 2011, accessed December 19, 2011; Fiegl, C., "Early EMR adoption get a break, tougher criteria delayed to 2014," *American Medical News*, *www.ama-assn.org/amednews/2011/12/12/gol11212.htm*, December 12, 2011, accessed December 19, 2011; iPatientCare, "iPatientCare Helps Brighton Hospital Fulfill Its Passion for Paperless," *www.ipatientcare.com/KnowledgeCenter.aspx*, July 2011, downloaded December 19, 2011; Ofri, D., "When Computers Come between Doctors and Patients," *The New York Times*, *http://well.blogs.nytimes.com/2011/09/08/when-computers-come-between-doctors-and-patients*, September 8, 2011, accessed December 19, 2011.

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INFORMATION SYSTEMS @ WORK

Profile of a CIO: Bringing Technology to Health Care

A CIO, or chief information officer, is the top manager responsible for how an organization uses information systems to advance the purpose of the organization. Aside from supervising programmers and network technicians, what do these people really think about? What's on the mind of a CIO?

Dr. John Halamka is CIO of Beth Israel Deaconess Medical Center (BIDMC) and an emergency room physician. He summarizes his job as follows in a post on his blog of November 1, 2011: "The modern CIO is no longer a technologist or evangelist for innovation. The modern CIO is a customer relationship manager, a strategic communicator, and a project manager, delicately balancing project portfolios, available resources, and governance."

Dr. Alan Shark is the author of *CIO Leadership for Cities and Counties, Emerging Trends and Practices* (Washington, DC: Public Technology Institute, 2009). As he puts it, "The new CIO has to be a leader, not a dictator; a technologist, not a technician; a business person, not an accountant; and finally, a diplomat, not a politician." A CIO must lead with "vision, knowledge, and team-building." In that context, BIDMC has been an early adopter of "electronic health records, patient portals, and clinical decision support tools. [It] began offering subsidized, hosted EHRs to its 300 affiliated doctors more than a year before the American Recovery and Reinvestment Act's HITECH provision provided financial incentives for hospitals to roll out Web-based EHRs to their affiliated physicians in the effort to get more of these doctors wired."

To lead with "vision, knowledge, and team-building," on what should CIOs focus? Gary Beach, publisher emeritus of *CIO* magazine, surveyed CIOs to learn how they spend their time now and how they want to spend time in the future. He distills their answers as follows:

> In the "how they currently spend their time" category, the top three vote-getters are: 1) aligning IT and business goals, 2) implementing new architectures, and 3) managing cost control. For "where they want to spend more time in the future," the list looks like this: 1) developing new go-to-market strategies and technologies, 2) studying market trends for commercial opportunities, and 3) identifying opportunities for competitive differentiation.

Only two of these six items have anything to do with technology. Four, and part of a fifth, are about business. According to the CIOs surveyed, CIOs are primarily managers.

As managers, CIOs are responsible for developing their staff. BIDMC follows this model. Halamka says, "The only way I am able to succeed is by hiring people smarter than me." He goes on to explain that it's the CIO's job to turn those people into a *team*.

Halamka also plays an important role outside of the medical center, a role he takes seriously. He speaks at conferences, writes a blog, and gives interviews. He is a forthright advocate for using technology to improve health care and spends about one day a week in Washington, D.C., advising legislators on how to accomplish that goal. A recent *Information Week* article described him as "the hardest-working man in health IT." Not all CIOs are as visible as Halamka, but many are. Because CIOs focus on "aligning IT and business goals," as Gary Beach found, part of the job often involves gathering and communicating business information.

Developing a diverse set of skills that allows a CIO to manage people effectively and keep up with innovations in technology can be challenging. In a recent blog post, Halamka quotes Meg Aranow, the CIO of Boston Medical Center: "The content of our jobs is great, the context is really challenging." Halamka calls that "a profound observation." He goes on to list other challenges health care CIOs reported in 2011, including:

- You don't receive credit for everything that works. Instead, you are held accountable for the .01% that doesn't work.
- Demand always exceeds supply. Success is finishing half the projects you are asked to complete.
- The pace of change in consumer information systems creates expectations that far exceed the abilities of a thinly staffed IS organization.
- Regulatory burdens will increase exponentially. Compliance is a must-do, though your "customers" do not want their projects or services postponed while you work on compliance.

Why does Halamka keep this job when he could return to the practice of emergency room medicine or move into a different management position? In his blog post of February 24, 2011, he wrote, "The organizations in which I work will last for generations. Their reputations transcend anything I will ever do personally. My role is to champion, support, and publicize a few key innovations every year that will keep the organizations highly visible. That visibility will attract smart people and retain the best employees who want to work for a place on a rising trajectory." These reasons make the work worthwhile.

Discussion Questions

1. Do you think you would enjoy the job of a CIO? Do you think you would be successful as a CIO? Explain why you feel this way.
2. What should someone study in school if his or her eventual career objective is a CIO's job? Compare your answers with those of your classmates. Discuss any differences.

Critical Thinking Questions

1. An organization's CFO (chief financial officer) does not manage an organization's assets. If a company owns a truck, the CFO doesn't decide where it should go, what it should carry, or when to replace its tires. A CFO must, however, budget for its cost, pay taxes on it, choose a depreciation method, and handle capital gains or losses when it is disposed of. How do a CIO's responsibilities in the information area parallel these? How are they conceptually different?
2. Contact your school's CIO or that of a nearby organization. Find out how the CIO typically allocates time to the following major categories of activity:
   - Meetings with top management and people in other departments
   - Meetings with others in the IS department
   - Meetings with people outside the organization
   - Keeping current: reading, Web research, seminars
   - Individual work: budgeting, writing memos/reports, planning, HR work
   - Other technical tasks (ask for examples)
   - Other nontechnical tasks (ask for examples)

   Also find out the total hours the CIO works in a week. Combine your results with those of your classmates to assemble a composite picture of the CIO's job.

SOURCES: Beach, Gary, "Time Is Money: What CIOs Should Know About How They Spend Their Time," *CIO*, www.cio.com/article/638037/Time_Is_Money_What_CIOs_Should_Know_about_How_they_Spend_Their_Time, November 2, 2011, accessed November 4, 2011; Halamka, John D., "Life as a Healthcare CIO," blog, http://geekdoctor.blogspot.com, accessed November 1, 2011; McGee, M.K., Mitchell, R.N., and Vernal, N., "Healthcare CIO 25: The Leaders Behind the Healthcare IT Revolution," *Information Week*, http://reports.informationweek.com/abstract/105/5954/Healthcare/research-healthcare-cio-25-the-leaders-behind-the-healthcare-it-revolution.html (free registration required), March 18, 2011, downloaded December 19, 2011; Motorola, "The Evolving Role of the CIO" (interview with Dr. Alan Shark), Enterprise, http://ecise.motorola.com/enterprise/n=443, October 2009, accessed November 5, 2011; Opensource.com (under screen name "opensourceway"), "Dr. John Halamka on Openness and Privacy in Medicine" (video), www.youtube.com/watch?v=4zn_9tUfc4, July 6, 2010, accessed December 15, 2011; Vernal, Neil, "Halamka to Leave Harvard Med School CIO Post," *Information Week*, www.informationweek.com/news/healthcare/leadership/231002440, July 22, 2011, accessed December 18, 2011.

ETHICAL & SOCIETAL ISSUES

Outsourcing Background Checks in the United Kingdom

In the United Kingdom as well as in other countries, child abuse is a serious problem. One in five children has experienced sexual abuse, serious physical abuse, or severe physical or emotional neglect. For every victim the government identifies and intervenes to protect, an estimated eight more have suffered mistreatment. In 2011, the British parliament passed the Protection of Freedoms Act. The act regulated surveillance and reduced counterterrorism powers within the United Kingdom, but it also stepped up its protection of vulnerable groups, including children and the elderly.

The act provided for the creation of the Disclosure and Barring Service (DBS) through the merger of the Criminal Records Bureau and the Independent Safeguarding Authority. One of the main purposes of the agency is to provide efficient background checks for organizations and private companies that provide caretaking services. The DBS also bars certain individuals from working in regulated activities, such as childcare.

At the end of 2012, the U.K. Home Office announced that it had awarded Tata Consultancy Services (TCS), the leading IT consultant firm in India, a multimillion pound, multiyear contract to implement electronic background checks, improve decision making within DBS, and reduce processing times.

"Our proposed IT solution supports the U.K. Government's 'Digital by Default' initiative and fully meets the business objectives of DBS to modernize and transform its business," says Shankar Narayanan, head of U.K. and Ireland for TCS.

However, the contract testifies to an increasing willingness on the part of the U.K. government to outsource IT development to TCS and other foreign companies. In 2010, TCS sealed a ten-year deal to provide the IT infrastructure, back-office processing, business applications, and customer-facing systems for the largest universal occupational pension scheme in the United Kingdom, the National Employment and Savings Trust (NEST). Yet, news of this deal was delayed eight months—until after the program was operational.

While the U.K. government is becoming more comfortable with outsourcing IT jobs to India, it is also taking baby steps toward moving its operations—even sensitive operations—into the cloud. In May 2013, Skyscape Cloud Services won a $2.3 million yearly contract with DBS to add cloud connectivity to the solutions TCS builds. Public servants in the United Kingdom have long been wary of the security implications of moving into the cloud. They are, for example, concerned about privacy. Most cloud providers are based in the United States where legal standards give the government and law enforcement easier access to digital data than in Europe.

Skyscape promises that all client data will stay in the United Kingdom. In addition, when the government or a company uses a cloud service provider, it is relying on the cloud service provider to protect its data from physical disruptions and from cyberattacks. If the cloud provider fails to provide adequate data protection, its client is vulnerable. The DBS contract, as well as Skyscape's contract with the British equivalent of the Internal Revenue Service, indicates that the reduced costs and better service delivery made possible by the cloud are overriding these fears.

Discussion Questions

1. The U.K. government is increasingly willing to outsource jobs to India. Is this good stewardship of its citizens' personal data? Are certain activities simply too sensitive to outsource even if it saves money?
2. Do other advantages outweigh these concerns?

Critical Thinking Questions

1. DBS obtains and reveals information about individual's run-ins with law enforcement, arrests, and convictions. Do you think such sensitive information should be supported through cloud services that may not be as secure as traditional IT infrastructure?
2. Why do you think the United Kingdom is embracing the cloud despite its security concerns?

SOURCES: "How Safe Are Our Children?" NSPCC Research April 2013, National Society for the Prevention of Cruelty to Children Web site, *www.nspcc.org.uk/Inform/research/findings/howsafe/how-safe-2013_wda95178.html*, accessed September 30, 2013; Protection of Freedoms Act 2012, *www.legislation.gov.uk/ukpga/2012/9/contents/enacted*, accessed August 13, 2013; "TCS Wins Multi-Million Pound Contract from the United Kingdom's Home Office," Press Release, November 28, 2012, TCS Web site, *www.tcs.com/news_events/press_releases/Pages/TCS_multi-million_pound_contract_UK_Home_Office.aspx*; Baker, Sophie, "How Tata Helped Build a Nest," *Financial News*, April 15, 2013, *www.efinancialnews.com/story/2013-04-15/tata-consultancy-services-nest?ea9c8a2de0ee111045601ab04d673622*; Jones, Ben, "How Safe Is Cloud Computing?" Cloud Computing Topics Web site, May 20, 2013, *http://cloudcomputingtopics.com/2013/05/how-safe-is-cloud-computing*; Flood, Gary, "British Cloud Firm Wins Background Check Security Contract," *InformationWeek*, May 20, 2013, *www.informationweek.com/cloud-computing/platform/british-cloud-firm-wins-background-check/240155243?queryText=outsourcing*.

Challenges and Responsibilities of a CIO

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Discussion Questions

1. What different roles and responsibilities does a CIO take on in a company?
2. Of these roles and responsibilities, which is most challenging? Why?

Critical Thinking Questions

1. Do you think you would enjoy the job of a CIO? Do you think you would be successful as a CIO? Explain why you feel this way.
2. Contact your school's CIO or the CIO of a nearby organization. Find out how the CIO typically allocates time to the following major categories of activity:
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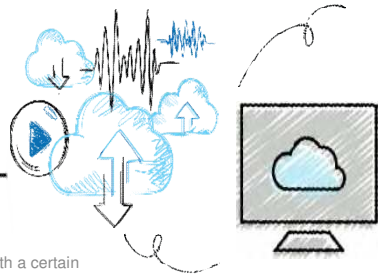
Chapter 2

Information Systems in Organizations



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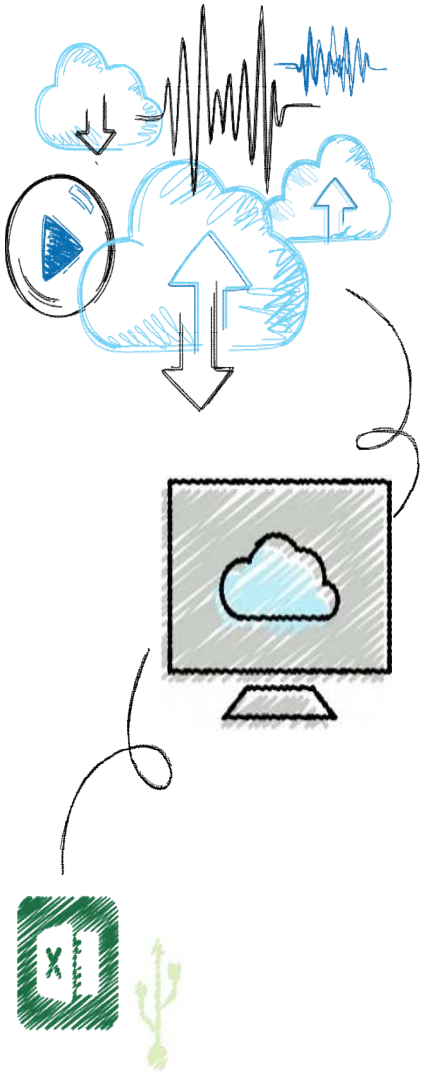

Objectives

After completing this chapter, you will be able to:

Sketch a general model of an organization showing how information systems support and work within automated portions of an organizational process

Define the term value chain and identify several examples within a typical manufacturing or service organization

Define the term innovation and identify two types

Define reengineering and continuous improvement and explain how they are different

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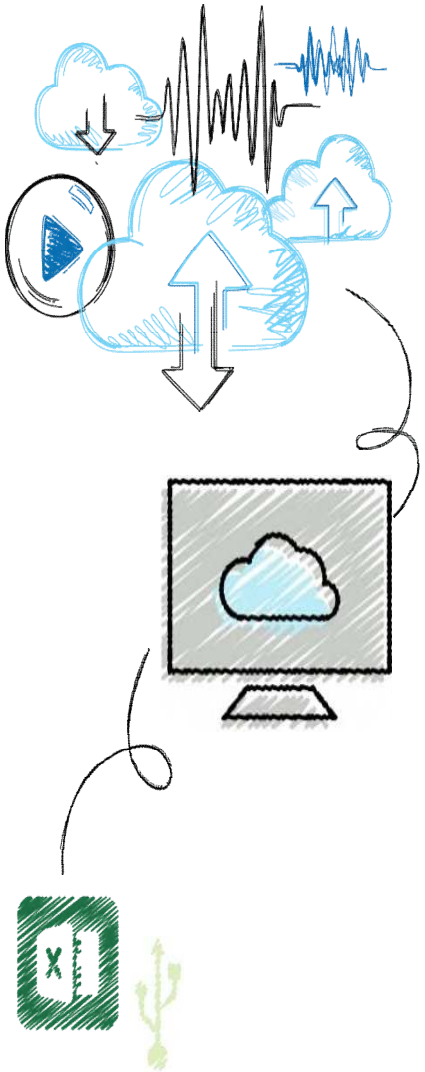

Objectives

After completing this chapter, you will be able to:

Discuss pros and cons of outsourcing, offshoring, and downsizing

Define the term “the soft side of implementing change” and explain why it is a critical factor in the successful adoption of any major change

Identify and describe four change models used to increase the likelihood of successfully introducing a new IS into an organization

Define the types of roles, functions and careers available in the field of IS

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Organizations and Information Systems

- Organization: a group of people that is structured and managed to meet its mission or set of group goals
  - There are relationships between members of the organization and their various activities
  - Processes are defined that assign roles, responsibilities, and authority to complete the various activities
- Organizations are open systems
  - They affect and are affected by their surrounding environments

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Organizations and Information Systems

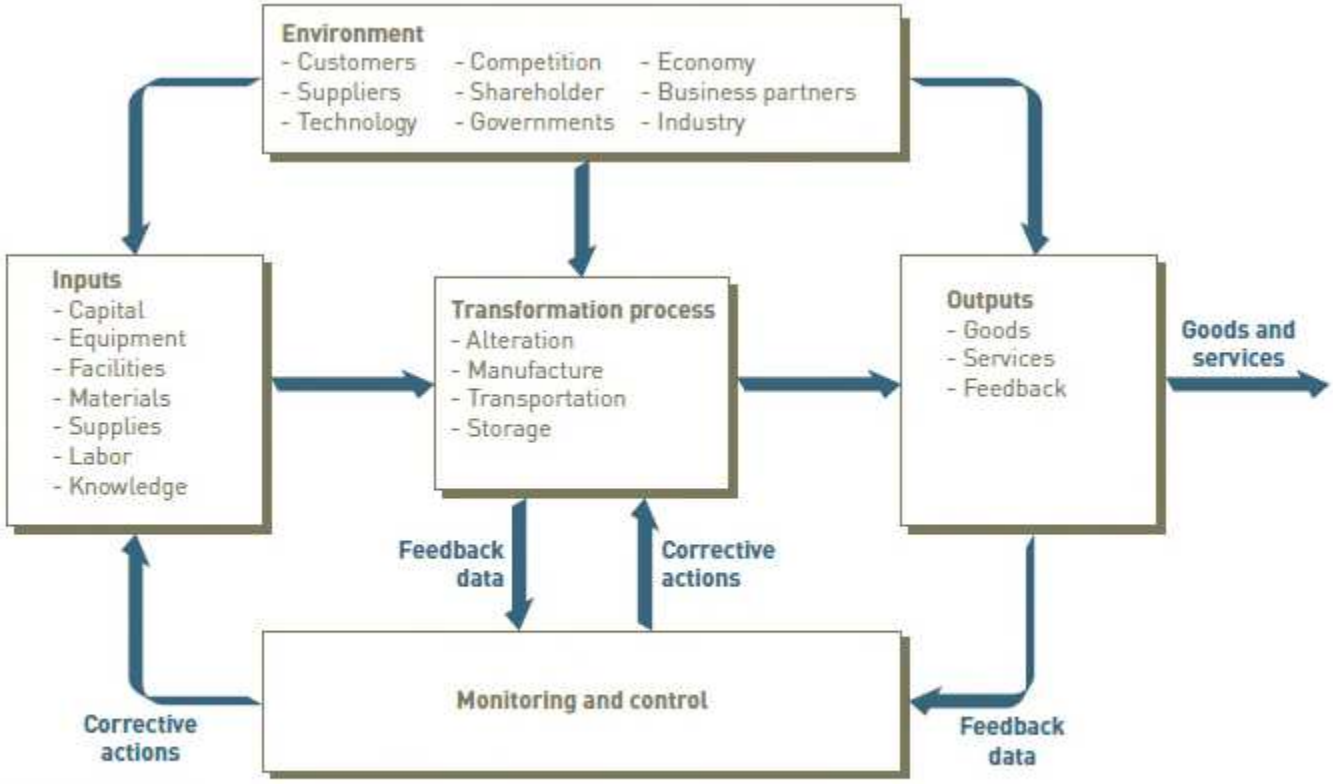

FIGURE 2.1

General model of an organization

Information systems support and work within the automated portions of an organizational process.

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Organizations and Information Systems

- Value chain: a series (chain) of activities that an organization performs to transform inputs into outputs
  - The value of the input is increased
- Supply chain: key value chain in a manufacturing organization
- Supply chain management (SCM): encompasses all the activities required to get the right product into the right consumer's hands in the right quantity at the right time and at the right cost

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Organizations and Information Systems

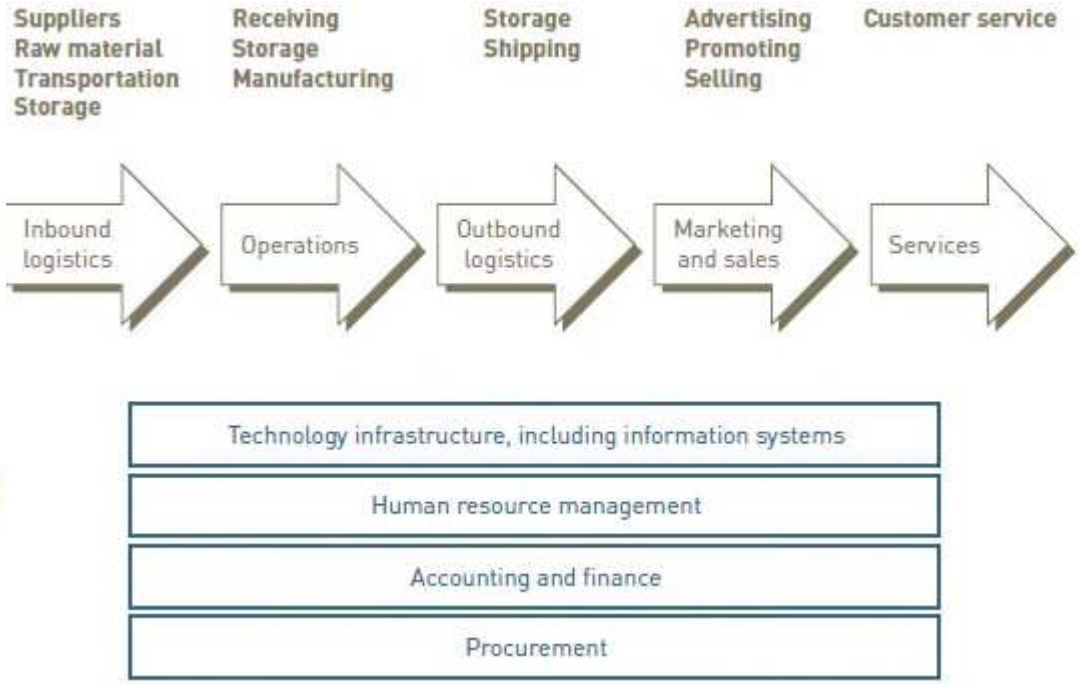

FIGURE 2.2

Supply chain

The primary and support activities of the manufacturing supply chain are concerned with creating or delivering a product or service.

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Organizations and Information Systems

- Supply chain organizations are “linked” together through both physical flows and information flows
  - Physical: supplies and raw materials
  - Information: participants communicating their plans, coordinating their work, and managing the efficient flow of goods and material
- The information system can play an integral role in the supply chain process:
  - Providing input
  - Aiding product transformation
  - Producing output

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Virtual Teams and Collaborative Work

- Virtual team: a group of individuals whose members are distributed geographically, but work as a coherent unit through the use of information systems technology
  - Strength: the best available people are enlisted to solve important organizational problems
  - Supported by electronic communications: email, instant messages, video conferences, etc.

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Innovation

- Innovation: the application of new ideas to the products, processes, and activities of a firm, leading to increased value
  - A catalyst for the growth and success of an organization
- Can lead to cutting-edge products
  - New revenue streams
  - Increased profits
- Types of innovation
  - Sustaining innovation: results in enhancements to existing products, services, and ways of operating
    - Enable an organization to continually increase profits, lower costs, and gain market share
  - Disruptive innovation: one that initially provides a lower level of performance than the marketplace has grown to accept
    - Improved to provide new performance characteristics

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Reengineering and Continuous Improvement

- Reengineering
  - Also called process redesign and business process reengineering (BPR)
  - Involves the radical redesign of business processes, organizational structures, information systems, and values of the organization to achieve a breakthrough in business results
- Continuous improvement
  - Constantly seeking ways to improve business processes and add value to products and services

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Reengineering and Continuous Improvement

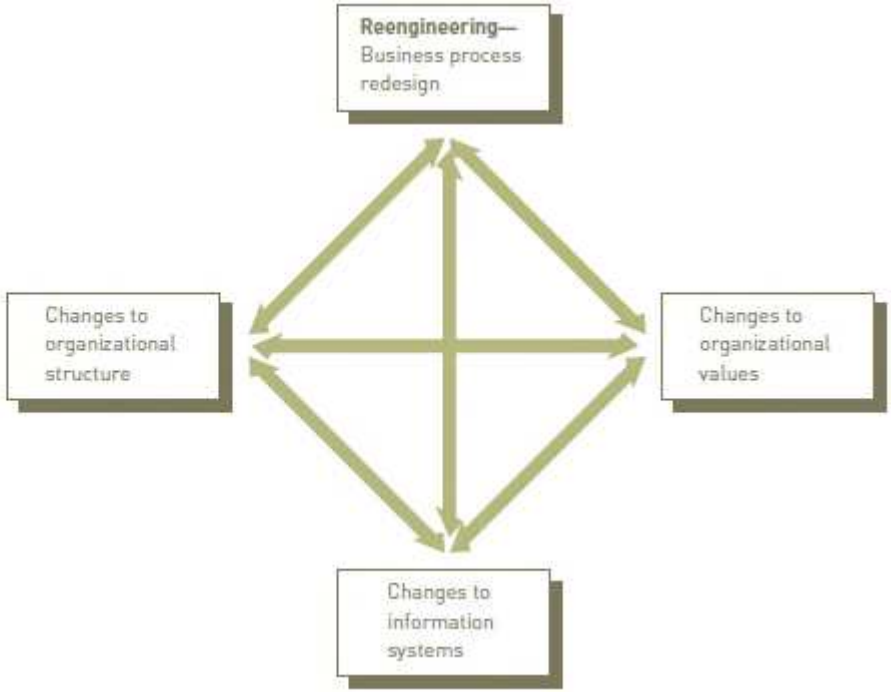

FIGURE 2.5

Reengineering

Reengineering involves the radical redesign of business processes, organizational structure, information systems, and the values of an organization to achieve a breakthrough in business results.

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Reengineering and Continuous Improvement

TABLE 2.1 Comparing business process reengineering with continuous improvement

Business Process Reengineering	Continuous Improvement
Strong action taken to solve serious problem	Routine action taken to make minor improvements
Top-down change driven by senior executives	Bottom-up change driven by workers
Broad in scope; cuts across departments	Narrow in scope; focuses on tasks in a given area
Goal is to achieve a major breakthrough	Goal is continuous, gradual improvements
Often led by resources from outside the company	Usually led by workers close to the business
Information systems are integral to the solution	Information systems provide data to guide the improvement team

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Outsourcing, Offshoring, and Downsizing

- Outsourcing
  - A long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function
- Offshore outsourcing (offshoring)
  - The service is located in a country different than the firm obtaining the services
- A number of companies are finding that outsourcing does not necessarily lead to reduced costs

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Outsourcing, Offshoring, and Downsizing

- Downsizing
  - Reducing the number of employees to cut costs
  - Also referred to as “rightsizing”
  - Product quality and employee morale can suffer

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Organizational Culture and Change

- Culture: a set of major understandings and assumptions shared by a group
- Organizational culture: the major understandings and assumptions for a business, corporation, or other organization
- Organizational change: how organizations plan for, implement, and handle change
- Soft side of implementing change: involves work designed to help employees embrace a new information system and way of working

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Organizational Culture and Change

- Change management model
  - Describes the phases an individual or organization goes through in making a change
  - Provides principles for successful implementation of change
  - There are a number of models for dealing with the soft side of implementing change

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Lewin's Change Model

- Lewin's change model consists of a three-stage approach for change
  1. Unfreezing: preparing for change
  2. Moving: making the change
  3. Refreezing: institutionalizing

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Lewin's Change Model

Unfreezing Preparing for change	Moving Making the change	Refreezing Institutionalizing
Key Tasks	**Key Tasks**	**Key Tasks**
Communicate what, why, when, who, how	Motivate individuals involved or affected	Monitor progress against success criteria
Draw on others, and seek input, ideas	Coach, train, lead, encourage, manage	Establish processes, systems to institutionalize change
Define objectives, success criteria, resources, schedule, budget	Provide appropriate resources	Establish controls to ensure change is occurring
Finalize work plans	Provide on-going feedback	Recognize and reward individuals for exhibiting new behavior
Assign leaders and implementation teams		Provide feedback, motivation, additional training to individuals not exhibiting new behavior

FIGURE 2.6

Lewin's change model

Change involves three stages: unfreezing (preparing for change), moving (making the change), and refreezing (institutionalizing the change).

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Lewin's Force Field Analysis

- Lewin extended his change model theory to include force field analysis
  - Identifies both the driving (positive) and restraining (negative) forces that influence whether change can occur
- Driving forces: beliefs, expectations, and cultural norms that tend to encourage a change and give it momentum
- Restraining forces: those that make it difficult to accept a change or to work to implement a change

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Lewin's Force Field Analysis

FIGURE 2.7
Lewin's force field analysis before addressing concerns
Many strong restraining forces will make it difficult to implement this change.

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Lewin's Force Field Analysis

FIGURE 2.8

Lewin's force field analysis after addressing concerns

Restraining forces have been weakened and driving forces strengthened so there is a much likelihood of successfully implementing this change.

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Leavitt's Diamond

- A theory that proposes that every organizational system is made up of four main components—people, tasks, structure, and technology—with an interaction among the four components
  - Any change in one of these elements will necessitate a change in the other three elements
- Organizational learning
  - The adaptations and adjustments based on experience and ideas over time
  - Adjustments can require reengineering or can result from continuous improvement

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Leavitt's Diamond

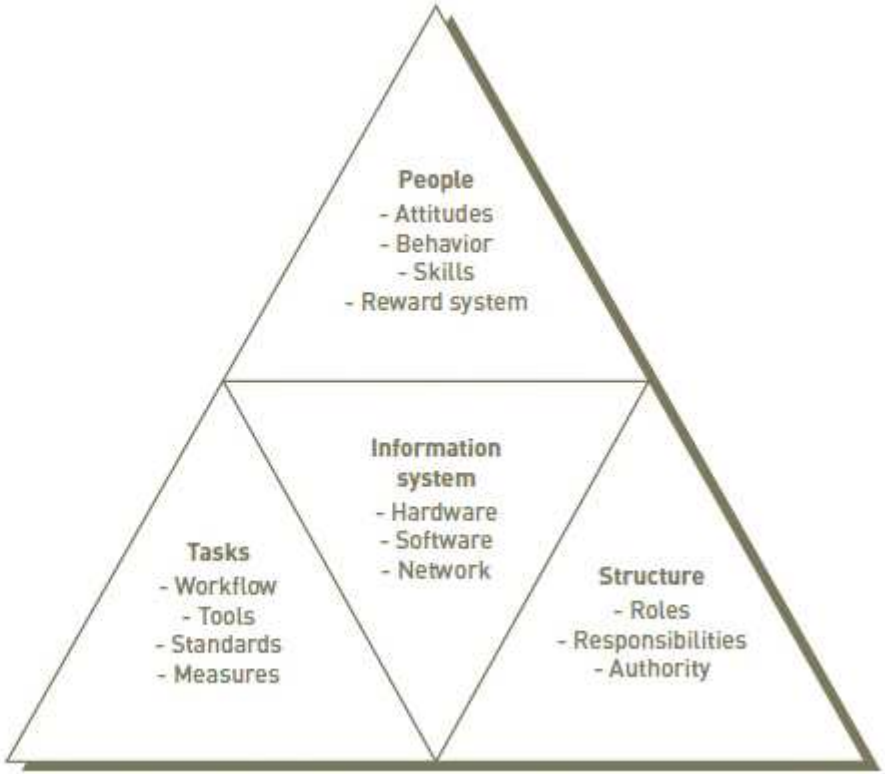

FIGURE 2.9

Leavitt's diamond

Any change in technology, people, task, or structure will necessitate a change in the other three components.

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User Satisfaction and Technology Acceptance

- Technology acceptance model (TAM)
  - Specifies the factors that can lead to better attitudes about the information system

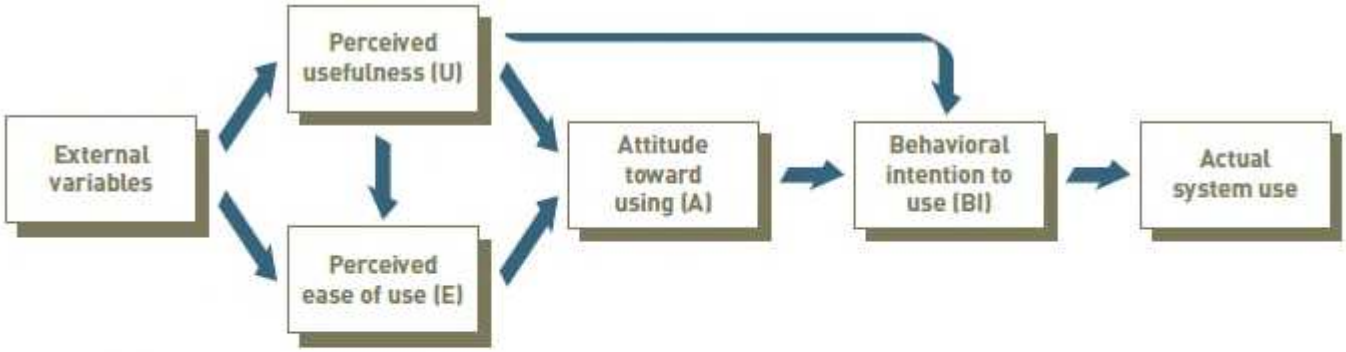

FIGURE 2.10
Technology acceptance model
Perceived usefulness (U) and perceived ease of use (E) strongly influence whether someone will use an information system. Management can improve that perception by demonstrating that others have used the system effectively and by providing user training and support.

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Diffusion of Innovation Theory

- A theory developed by E.M. Rogers
- Explains how a new idea or product gains acceptance and diffuses (or spreads) through a specific population or subset of an organization

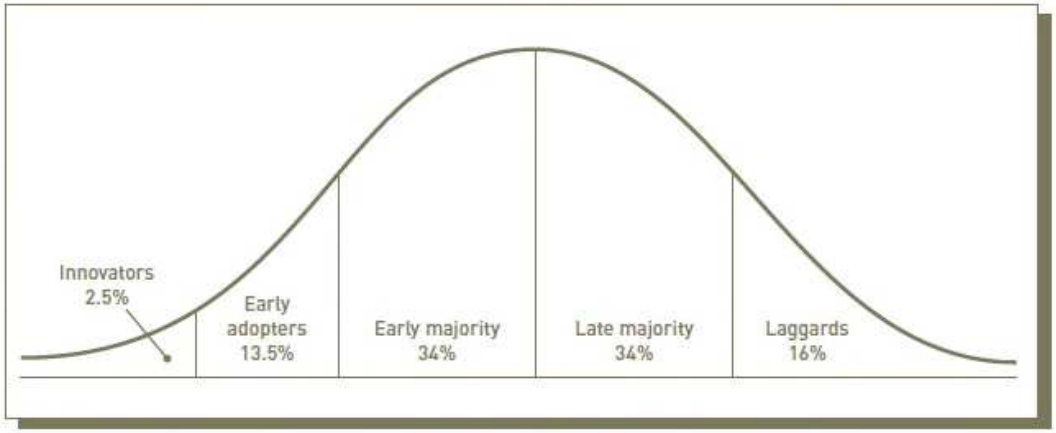

FIGURE 2.11
Innovation diffusion
Adoption of any innovation does not happen all at once for all members of the targeted population; rather, it is a drawn-out process, with some people quicker to adopt the innovation than others.
Source: Everett Rogers, *Diffusion of Innovations*.

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Diffusion of Innovation Theory

TABLE 2.2 Five categories of innovation adopters

Adopter Category	Characteristics	Strategy to Use
Innovator	Risk takers; always the first to try new products and ideas	Simply provide them with access to the new system and get out of their way
Early adopter	Opinion leaders whom others listen to and follow; aware of the need for change	Provide them assistance getting started
Early majority	Listen to and follow the opinion leaders	Provide them with evidence of the system's effectiveness and success stories
Late majority	Skeptical of change and new ideas	Provide them data on how many others have tried this and have used it successfully
Laggards	Very conservative and highly skeptical of change	Have their peers demonstrate how this change has helped them and bring pressure to bear from other adopters

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Careers in Information Systems

- Successful IS workers must:
  - Enjoy working in a fast-paced, dynamic environment
  - Meet deadlines and solving unexpected challenges
  - Possess good communication skills
  - Have solid analytical and decision-making skills
  - Develop effective team and leadership skills
  - Be adept at implementing organization change
  - Be prepared to engage in life-long learning in a rapidly changing field

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Careers in Information Systems

- Technical skills important for IS workers to have:
  - Capability to analyze large amounts of structured and unstructured data
  - Ability to design/build applications for mobile devices
  - Programing and application development skills
  - Technical support expertise
  - Project management skills
  - Knowledge of networking and cloud computing
  - Ability to audit systems and implement necessary security measures

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Careers in Information Systems

- Technical skills important for IS workers to have (cont'd):
  - Web design and development skills
  - Knowledge of data center operations
- The U.S. Bureau of Labor Statistics (BLS) forecasts an increase of 1.2 million new computing jobs between 2012-2022

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Careers in Information Systems

TABLE 2.3 BLS projections of computer-related jobs, 2012 to 2022

National Employment Matrix Title	Number 2012	Number 2022	Change	Job Openings due to Growth and Replacements
Computer and math occupations (all numbers in thousands)				
Computer and information research scientists	26.7	30.8	4.1	8.3
Computer systems analysts	520.6	648.4	127.8	209.6
Information security analysts	75.1	102.5	27.4	39.2
Computer programmers	343.7	372.1	28.4	118.1
Software developers, applications	613.0	752.9	139.9	218.5
Software developers, system software	405.0	487.8	82.8	134.7
Web developers	141.4	169.9	28.5	50.7
Database administrators	118.7	136.6	17.9	40.3
Network and computer systems administrators	366.4	409.4	43.0	100.5
Computer network architects	143.4	164.3	20.9	43.5
Computer support specialists	722.3	845.3	123.0	236.5
Computer occupations, all other	205.8	213.6	7.8	40.2
Total	**3,682.1**	**4,333.6**	**651.5**	**1,240.1**
Yearly average				**124.0**

Source: "Employment by Detailed Occupation 2012–2022," Bureau of Labor Statistics, *www.bls.gov/emp/ep_table_102.htm*, accessed August 13, 2015.

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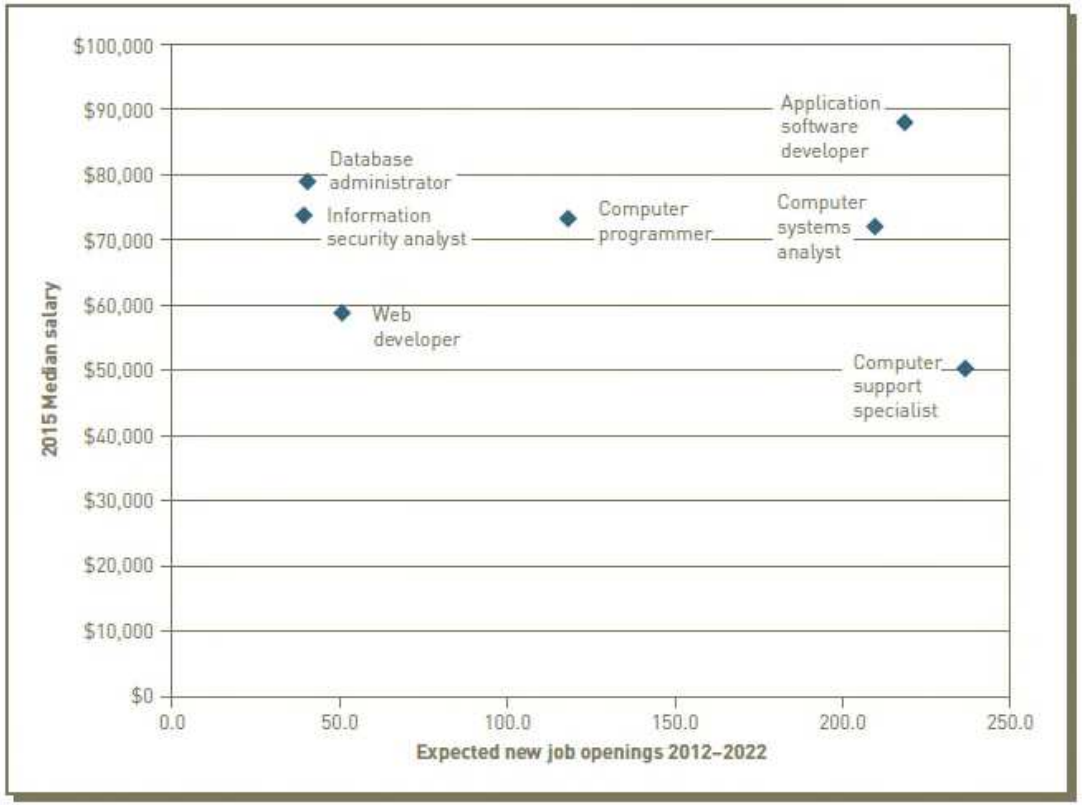

FIGURE 2.12

Occupational outlook for selected information systems positions

This chart shows the IS positions that BLS predicts will be among the fastest growing in the near future, along with the median salary for those positions in 2015.

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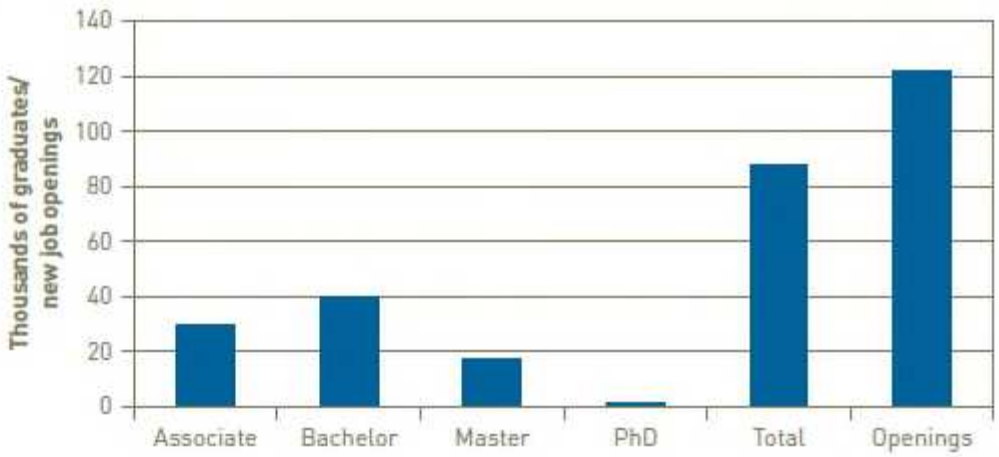
Careers in Information Systems

FIGURE 2.13

Supply versus demand for IS workers

The total number of IS-related job openings is expected to average about 124,000 per year between 2012 and 2022, while the number of IS-related graduates is expected to average about 88,100 per year—for a shortfall of 35,900 workers.

Source: "Computer Science Job Statistics", Exploring Computer Science, *www.exploringcs.org/resources/cs-statistics*, accessed August 19, 2015.



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Careers in Information Systems

- U.S. H-1B and L-1 visa programs seek to allow skilled employees from foreign lands into the United States
  - Programs are limited and are high demand
  - L-1 visa program is often used for intracompany transfers for multinational companies
  - H-1B program can be used for new employees

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Careers in Information Systems

TABLE 2.4 Top H-1B visa employers in 2013 to 2014

Rank	Company	Headquarters	Visas Granted		
			2013	2014	Total
1	Tata	India	6,258	7,149	13,407
2	Cognizant	United States	5,186	5,228	10,414
3	Infosys	India	6,298	4,022	10,320
4	Wipro	India	2,644	3,246	5,890
5	Accenture	Ireland	3,346	2,376	5,722
6	Tech Mahindra	India	1,589	1,850	3,439
7	IBM	United States	1,624	1,513	3,137
8	HCL	India	1,766	927	2,693
9	Larsen & Toubro	India	1,580	1,001	2,581
10	Syntel	United States	1,041	1,149	2,190
11	IGATE Technologies	United States	1,157	927	2,084
12	Microsoft	United States	1,048	712	1,760
13	Amazon	United States	881	811	1,692
14	Google	United States	753	696	1,449
15	CapGemini	France	500	699	1,199

Source: Thibodeau, Patrick and Machlis, Sharon, "Despite H-1B Lottery, Offshore Firms Dominate Visa Use," *Computerworld*, July 30, 2015; Machlis, Sharon and Thibodeau, Patrick, "Offshore Firms Took 50% of H-1B Visas in 2013," *Computerworld*, April 1, 2014.

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Careers in Information Systems

TABLE 2.5 Best places to work as an IS professional

Rank	Small (<1,000 Employees)	Medium (1,001 to 4,999 Employees)	Large (> 5,000 Employees)
1	Noah Consulting	Credit Acceptance	Quicken Loans
2	Sev1Tech	Lafayette General Health	USAA
3	Commonwealth Financial Network	Avanade	Erickson Living
4	Secure-24	Autodesk	Sharp HealthCare
5	Connectria	Nicklaus Children's Hospital	Prudential Financial
6	Axxess	Financial Industry Regulatory Authority	LinkedIn
7	GlobalScape	CHG Health Services	Owens Corning
8	Bounce Exchange	NuStar Energy	DHL Express
9	Liquidnet	Akamai	University of Notre Dame
10	National Rural Electric Cooperative Association	Halifax Health	Genentech

Source: "2015 100 Best Places to Work in IT," *Computerworld*, July 2015.

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Roles, Functions, and Careers in IS

- In addition to technical skills, IS professionals need:
  - Skills in written and verbal communication
  - An understanding of organizations and the way they operate
  - The ability to work with people and in groups

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Roles, Functions, and Careers in IS

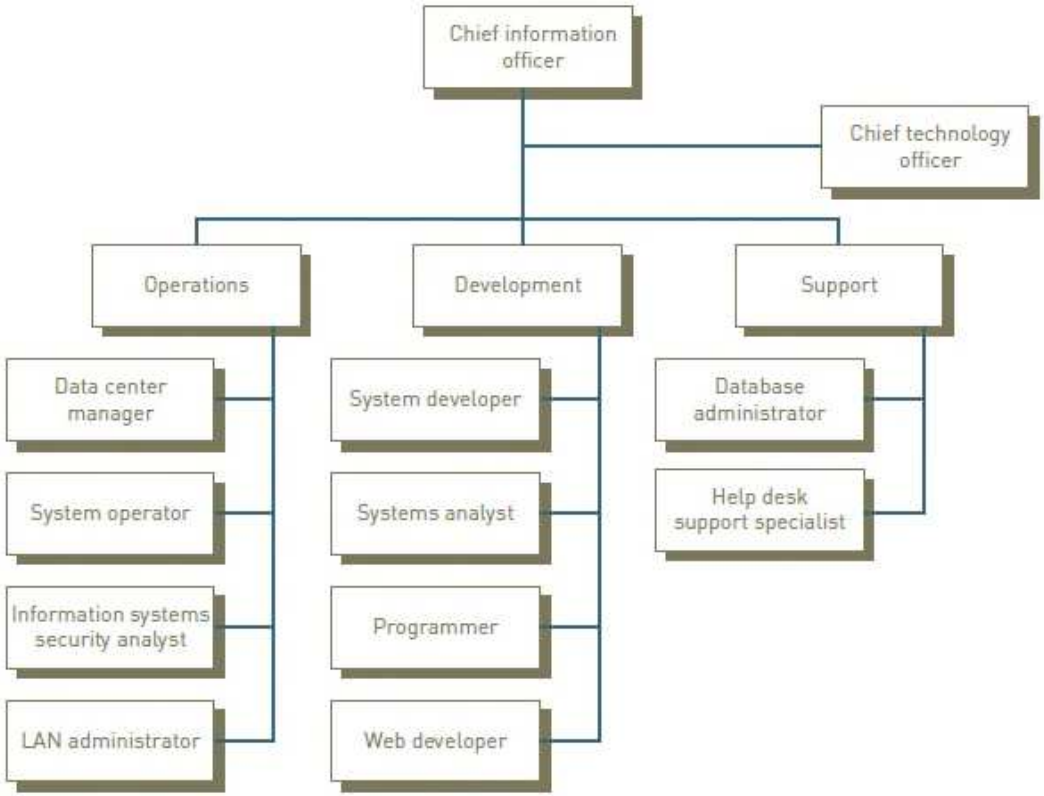

FIGURE 2.14

Three primary functions of the information systems organization

Each of these functions—operations, development, and support—encompasses several different IS roles.

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Typical IS Titles and Functions

- Chief information officer (CIO) employs the IS department's equipment and personnel to help the organization attain its goals
- Senior IS Managers
  - Vice president of information systems
  - Manager of information systems
  - Chief technology officer (CTO)
  - Central role of all of the above is to communicate with other areas of the organization to determine changing business needs

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Typical IS Titles and Functions: Operations Roles

- Data center managers are responsible for the maintenance and operation of the organization's computing facilities
- System operators run and maintain IS equipment
- IS security analysts are responsible for maintaining the security and integrity of their organizations' systems and data
- Local area network (LAN) administrators set up and manage the network hardware, software, and security processes

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Typical IS Titles and Functions: Development Roles

- Software developers write the software that customers and employees use
- Systems analysts consult with management and users, as well as convey system requirements to software developers and network architects
- Programmers convert a program design developed by a systems analyst or software developer into one of many computer languages
- Web developers design and maintain Web sites, including site layout and function, to meet the client's requirements

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Typical IS Titles and Functions: Support

- Database administrators (DBAs) design and set up databases to meet an organization's needs
- System support specialists respond to telephone calls, email, and other inquiries from computer users

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IS-Related Roles outside the IS Organization

- Shadow IT
  - A term used to describe the IS and solutions built and deployed by departments other than the information systems department
  - Enables business managers to quickly create highly innovative solutions to real business problems and to test these solutions out

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IS-Related Roles outside the IS Organization

TABLE 2.6 Pros and cons of shadow IT efforts

Pros	Cons
Enables the business to test quick solutions to business needs without delays brought on by involvement of information systems.	The systems and processes developed may lack necessary levels of security required to meet compliance standards.
Can create an innovative, synergistic partnership between the information systems department and other business units.	Can create tension between the CIO who has responsibility for technology within the organization and business managers who want more of a role in the information system decisions.
Provides the opportunity to evaluate and test many more information system initiatives.	Individual departments may buy services, software, and hardware that the company could get a better deal through central purchasing.
	May be wasteful and duplicate work already being done by the IS organization.
	Issues can arise over responsibility to fix "nonapproved" solutions.

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Certification

- Certification
  - A process for testing skills and knowledge
  - Results in a statement by the certifying authority that confirms an individual is capable of performing particular tasks
- Frequently involves specific, vendor-provided or vendor-endorsed coursework

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Other IS Careers

- Consulting opportunities
- Computer training
- Computer and computer-equipment sales
- Computer repair and maintenance
- Support services
- Employment with technology companies
- Entrepreneurial ventures

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Working in Teams

- Most IS careers involve working in project teams that can consist of many of the positions and roles
- It is always good for IS professionals to:
  - Have good communications skills and the ability to work with other people

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Finding a Job in IS

- Developing an online résumé can be critical to finding a good job
- The Internet
  - Online job sites
  - Company Web sites
  - Social networking sites
- Informal networks of colleagues or business acquaintances

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Summary

- Organizations are open systems that affect and are affected by their surrounding environment
- Positive change is a key ingredient for any successful organization
- Information systems must be implemented in such a manner that they are accepted and work well within the context of an organization and support its fundamental business goals and strategies
- The information system worker functions at the intersection of business and technology and designs, builds, and implements solutions that allow organizations to effectively leverage information technology systems

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