What Is an Information System?

An information system (IS) can be any organized combination of people, hardware, software, communications networks, data resources, and policies and procedures that stores, retrieves, transforms, and disseminates information in an organization.

People rely on modern information systems to communicate with one another using a variety of physical devices *(hardware)*, information processing instructions and procedures *(software)*, communications channels *(networks)*, and stored data *(data resources)*.

Although today's information systems are typically thought of as having something to do with computers, we have been using information systems since the dawn of civilization.

Even today we make regular use of information systems that have nothing to do with a computer. Consider some of the following examples of information systems:

• **Smoke signals for communication were** used as early as recorded history and can account for the human discovery of fire. The pattern of smoke transmitted valuable information to others who were too far to see or hear the sender.

• **Card catalogs in a library** are designed to store data about the books in an organized manner that allows readers to locate a particular book by its title, author name, subject, or a variety of other approaches.

Your book bag, day planner, notebooks, and file folders are all part of an information system designed to help you organize the inputs provided to you via handouts, lectures, presentations, and discussions. They also help you process these inputs into useful outputs: homework and good exam grades.

• **The cash register at your favorite fast-food restaurant** is part of large information system that tracks the products sold, the time of a sale, inventory levels, and the amount of money in the cash drawer; it also contributes to the analysis of product sales in any combination of locations anywhere in the world.

• **A paper-based accounting ledger** as used before the advent of computer-based accounting systems is an iconic example of an information system. Businesses used this type of system for centuries to record the daily transactions and to keep a record of the balances in their various business and customer accounts.

Figure 1.2 illustrates a useful conceptual framework that organizes the knowledge presented in this text and outlines areas of knowledge you need about information systems. It emphasizes that you should concentrate your efforts in the **following five areas of IS knowledge:**

• **Foundation Concepts.** Fundamental behavioral, technical, business and managerial concepts about the components and roles of information systems. Examples include basic information system concepts derived from general systems theory or competitive strategy concepts used to develop business applications of information technology for competitive advantage.

• **Information Technologies.** Major concepts, developments, and management issues in information technology—that is, hardware, software, networks, data management, and many Internet-based technologies.

• **Business Applications.** The major uses of information systems for the operations, management, and competitive advantage of a business.

• **Development Processes.** How business professionals and information specialists plan, develop, and implement information systems to meet business opportunities.
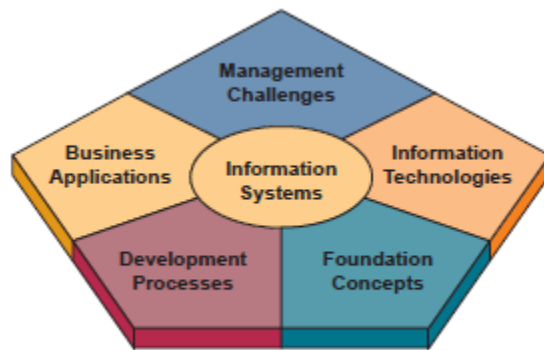

FIGURE 1.2
A framework that outlines the major areas of information systems knowledge needed by business professionals.

The Fundamental Roles of IS in Business
Support of Business Processes and Operations. As a consumer, you regularly encounter information systems that support the business processes and operations at the many retail stores where you shop. For example, most retail stores now use **computer-based information systems** to help their employees record customer purchases, keep track of inventory, pay employees, buy new merchandise, and evaluate sales trends. Store operations would grind to a halt without the support of such information systems.

Support of Business Decision Making. Information systems also help store managers and other business professionals make better decisions. For example, decisions about what lines of merchandise need to be added or discontinued and what kind of investments they require are typically made after an analysis provided by computer-based information systems. This function not only supports the decision making of store managers, buyers,

and others, but also helps them look for ways to gain an advantage over other retailers in the competition for customers.

Support of Strategies for Competitive Advantage. Gaining a strategic advantage over competitors requires the innovative application of information technologies. For example, store management might make a decision to install touch-screen kiosks in all stores, with links to the e-commerce Web site for online shopping. This offering might attract new customers and build customer loyalty because of the ease of shopping and buying merchandise provided by such information systems. Thus, strategic information systems can help provide products and services that give a business a comparative advantage over its competitors.

Types of Information Systems

Conceptually, the applications of information systems that are implemented in today's business world can be classified in several different ways. For example, several **types of information systems** can be classified as either operations or management information systems. Figure 1.6 illustrates this conceptual classification of information systems applications. Information systems are categorized this way to spotlight the major roles each plays in the operations and management of a business. Let's look briefly at some examples of such information systems categories.

FIGURE 1.6 Operations and management classifications of information systems. Note how this conceptual overview emphasizes the main purposes of information systems that support business operations and managerial decision making.
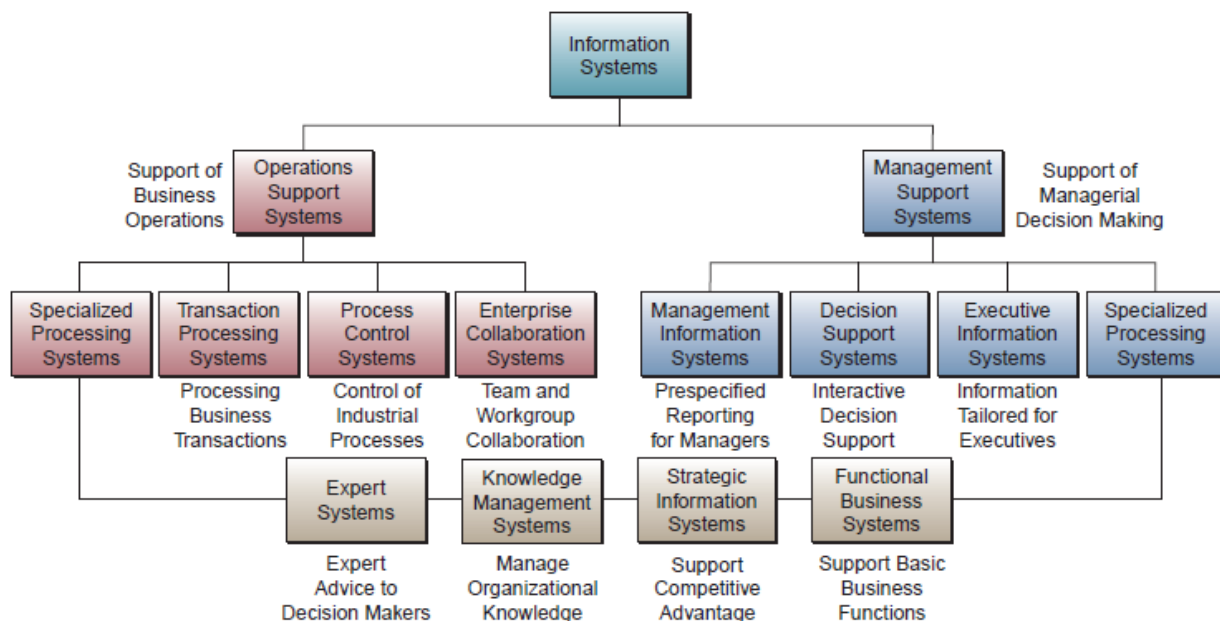

databases efficiently. See Figure 1.7.

FIGURE 1.7 A summary of operations support systems with examples.

Operations Support Systems
• **Transaction processing systems.** Process data resulting from business transactions, update operational databases, and produce business documents. Examples: sales and inventory processing and accounting systems.
• **Process control systems.** Monitor and control industrial processes. Examples: petroleum refining, power generation,

Management Support Systems

When information system applications focus on providing information and support for effective decision making by managers, they are called **management support systems.** Providing information and support for decision making by all types of managers and business professionals is a complex task. Conceptually, several major types of information Systems support a variety of decision-making responsibilities: (1) management information systems, (2) decision support systems, and (3) executive information systems. See Figure 1.9 .

FIGURE 1.9   A summary of management support systems with examples.

Management Support Systems
• **Management information systems.** Provide information in the form of prespecified reports and displays to support business decision making. Examples: sales analysis, production performance, and cost trend reporting systems.
• **Decision support systems.** Provide interactive ad hoc support for the decision-making processes of managers and other business professionals. Examples: product pricing, profitability forecasting, and risk analysis systems.
• **Executive information systems.** Provide critical information from MIS, DSS, and other sources tailored to the information needs of executives. Examples: systems for easy access to analyses of business performance, actions of competitors, and economic developments to support strategic planning.

Other Classifications of Information Systems

FIGURE 1.11
A summary of other categories of information systems with examples.

Other Categories of Information Systems
• **Expert systems.** Knowledge-based systems that provide expert advice and act as expert consultants to users. Examples: credit application advisor, process monitor, and diagnostic maintenance systems.
• **Knowledge management systems.** Knowledge-based systems that support the creation, organization, and dissemination of business knowledge within the enterprise. Examples: intranet access to best business practices, sales proposal strategies, and customer problem resolution systems.
• **Strategic information systems.** Support operations or management processes that provide a firm with strategic products, services, and capabilities for competitive advantage. Examples: online stock trading, shipment tracking, and e-commerce Web systems.
• **Functional business systems.** Support a variety of operational and managerial applications of the basic business functions of a company. Examples: information systems that support applications in accounting, finance, marketing, operations management, and human resource management.

FIGURE 1.15

Careers in IS are as diverse and exciting as the technologies used in them; IS professionals have career opportunities in every business environment and activity throughout the world.

Systems Analyst	System Consultant	Business Applications Consultant
Chief Information Officer	Computer Operator	Computer Serviceperson
Network Administrator	Data Dictionary Specialist	Network Manager
Database Administrator	Database Analyst	Documentation Specialist
IS Auditor	End-User Computer Manager	Equipment Manufacturer Representative
PC Sales Representative	Programmer	Program Librarian
Project Manager	Records Manager	Hardware Sales Representative
Scheduling and Control Person	Security Officer	Office Automation Specialist
Senior Project Leader	Service Sales Representative	Software Sales Representative
Technical Analyst	Software Quality Evaluator	Technical Writer
Telecommunications Specialist	Training & Standards Manager	User Interface Specialist

The IS Function

The successful management of information systems and technologies presents major challenges to business managers and professionals. Thus, the information systems function represents:

• A major functional area of business equally as important to business success as the functions of accounting, finance, operations management, marketing, and human resource management.

• An important contributor to operational efficiency, employee productivity and morale, and customer service and satisfaction.

- A recognized source of value to the firm.

• A major source of information and support needed to promote effective decision making by managers and business professionals.

• A vital ingredient in developing competitive products and services that give an organization a strategic advantage in the global marketplace.

• A dynamic, rewarding, and challenging career opportunity for millions of men and women.

• A key component of the resources, infrastructure, and capabilities of today's networked business enterprises.

• A strategic resource.

Information System Resources

Our basic IS model shows that an information system consists of five major resources: people, hardware, software, data, and networks. Let's briefly discuss several basic concepts and examples of the roles these resources play as the fundamental components of information systems. You should be able to recognize these five components at work in any type of information system you encounter in the real world. Figure 1.20 outlines several examples of typical information system resources and products.

FIGURE 1.20: Examples of information system resources and products.

Information System Resources and Products

People Resources
    Specialists—systems analysts, software developers, systems operators.
    End Users—anyone else who uses information systems.

Hardware Resources
    Machines—computers, video monitors, magnetic disk drives, printers, optical scanners.
    Media—floppy disks, magnetic tape, optical disks, plastic cards, paper forms.

Software Resources
    Programs—operating system programs, spreadsheet programs, word processing
    programs, payroll programs.
    Procedures—data entry procedures, error correction procedures, paycheck
    distribution procedures.

Data Resources   Product descriptions, customer records, employee files, inventory databases.
Network Resources   Communications media, communications processors, network access, control software.

Information Products
    Management reports and business documents using text and graphics displays, audio
    responses, and paper forms.

Businesses can counter the threats of competitive forces that they face by implementing one or more of the five basic **competitive strategies.**

• **Cost Leadership Strategy.** Becoming a low-cost producer of products and services in the industry or finding ways to help suppliers or customers reduce their costs or increase the costs of competitors.

• **Differentiation Strategy.** Developing ways to differentiate a firm's products and services from those of its competitors or reduce the differentiation advantages of competitors. This strategy may allow a firm to focus its products or services to give it an advantage in particular segments or niches of a market.

• **Innovation Strategy.** Finding new ways of doing business. This strategy may involve developing unique products and services or entering unique markets or market niches. It may also involve making radical changes to the business processes for producing or distributing products and services that are so different from the way a business has been conducted that they alter the fundamental structure of an industry.

• **Growth Strategies.** Significantly expanding a company's capacity to produce goods and services, expanding into global markets, diversifying into new products and services, or integrating into related products and services.

• **Alliance Strategies.** Establishing new business linkages and alliances with customers, suppliers, competitors, consultants, and other companies. These linkages may include mergers, acquisitions, joint ventures, formation of virtual companies, or other marketing, manufacturing, or distribution agreements between a business and its trading partners.

FIGURE 2.3: A summary of how information technology can be used to implement the five basic competitive strategies. Many companies are using Internet technologies as the foundation for such strategies.

Basic Strategies in the Business Use of Information Technology
Lower Costs • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers.
Differentiate • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services at selected market niches.
Innovate • Create new products and services that include IT components. • Develop unique new markets or market niches with the help of IT. • Make radical changes to business processes with IT that dramatically cut costs; improve quality, efficiency, or customer service; or shorten time to market.
Promote Growth • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services.
Develop Alliances • Use IT to create virtual organizations of business partners. • Develop interenterprise information systems linked by the Internet and extranets that support strategic business relationships with customers, suppliers, subcontractors, and others.

FIGURE 2.5 Additional ways that information technology can be used to implement competitive strategies.

Other Strategic Uses of Information Technology
• Develop interenterprise information systems whose convenience and efficiency create switching costs that lock in customers or suppliers.
• Make major investments in advanced IT applications that build barriers to entry against industry competitors or outsiders.
• Include IT components in products and services to make substitution of competing products or services more difficult.
• Leverage investment in IS people, hardware, software, databases, and networks from operational uses into strategic applications.