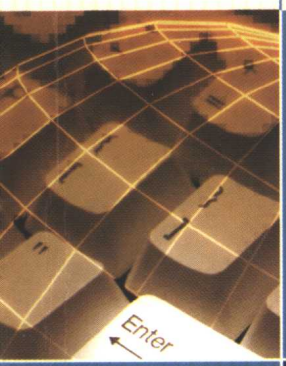
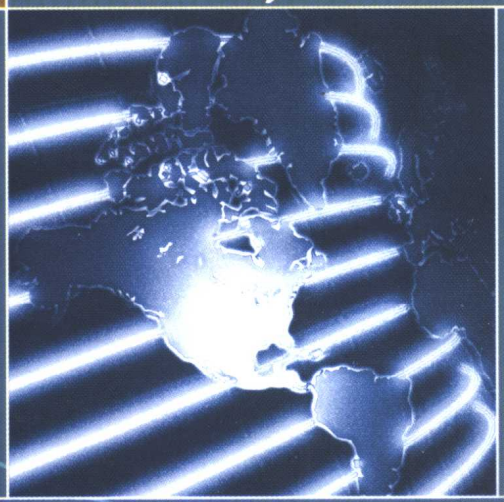
管理信息系统概论



[第 11 版] 影印版

Introduction to Information Systems

Essentials for the e-Business Enterprise



• James A. O'Brien

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James A. O'brien

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由于这批教材的作者所在国家的经济、政治、社会文化等与我国均有所不同，书中内容和观点难免有偏颇和错误之处，希望读者在阅读时注意鉴别。

我们希望这批影印教材的出版，对各高等院校的经济管理类专业的教学有所促进和帮助。

高等教育出版社

2002 年 9 月

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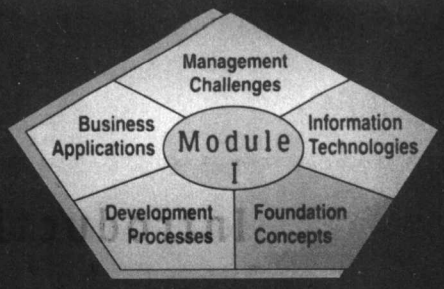


Module I

Foundation Concepts

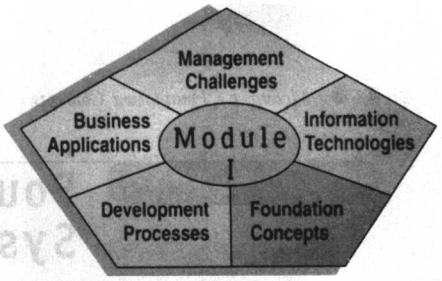
Why study information systems? Why do businesses need information technology? What do you need to know about the use and management of information technologies in business? The introductory chapters of Module I are designed to answer these fundamental questions about the role of information systems in e-business enterprises.

- **Chapter 1: Foundations of Information Systems in Business** presents an overview of the five basic areas of information systems knowledge needed by business professionals, including the conceptual system components and major types of information systems.
- **Chapter 2: Competing with Information Technology** introduces fundamental concepts of competitive advantage through information technology, and illustrates strategic applications of information systems that can gain competitive advantages for today's global e-business enterprise.

After completing these chapters, you can move on to study chapters on information technologies (Module II), business applications (Module III), development processes (Module IV), and the management challenges of information systems (Module V).

Introduction to Information Systems

Essentials for the e-Business Enterprise



Chapter 1

Foundations of Information Systems in Business

Chapter Highlights

Section I
Foundation Concepts: Information Systems and Technologies

Why Information Systems Are Important
The Real World of Information Systems
Real World Case: General Electric Company: Implementing e-Business and e-Commerce Initiatives
What You Need to Know
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Developing e-Business Solutions
Ethics and IT
Challenges of IT Careers

Learning Objectives

After reading and studying this chapter, you should be able to:

1. Explain why knowledge of information systems is important for business professionals and identify five areas of information systems knowledge they need.
2. Give examples to illustrate how electronic business, electronic commerce, or enterprise collaboration systems could support a firm's business processes, managerial decision making, and strategies for competitive advantage.
3. Provide examples of the components of real world information systems. Illustrate that in an information system, people use hardware, software, data, and networks as resources to perform input, processing, output, storage, and control activities that transform data resources into information products.
4. Provide examples of several major types of information systems from your experiences with business organizations in the real world.
5. Identify several challenges that a business manager might face in managing the successful and ethical development and use of information technology in a business.

Section I

Foundation Concepts: Information Systems and Technologies

Why Information Systems Are Important

> *The blending of Internet technologies and traditional business concerns is impacting all industries and is really the latest phase in the ongoing evolution of business. All companies need to update their business infrastructures and change the way they work to respond more immediately to customer needs* [12].

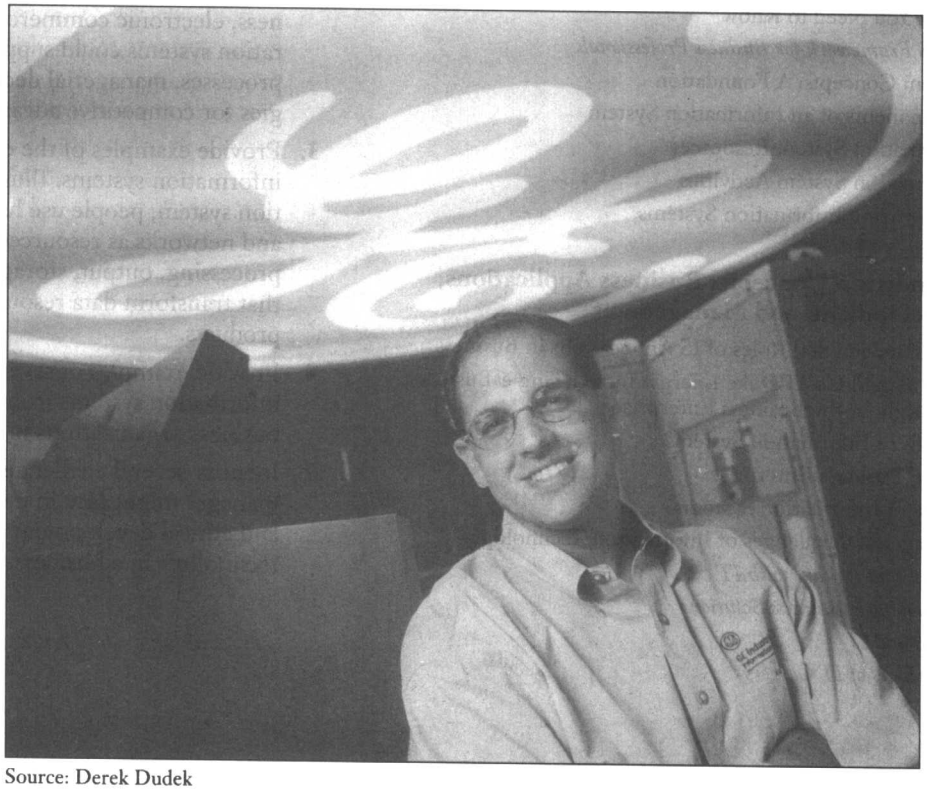
Why study information systems and information technology? That's the same as asking why anyone should study accounting, finance, operations management, marketing, human resource management, or any other major business function. Information systems and technologies (including e-business and e-commerce technologies and applications) have become a vital component of successful businesses and organizations. They thus constitute an essential field of study in business administration and management. That's why most business majors must take a course in information systems. Since you probably intend to be a manager, entrepreneur, or business professional, it is just as important to have a basic understanding of information systems as it is to understand any other functional area in business.

The Real World of Information Systems

Let's take a moment to bring the real world into our discussion of the importance of information systems (IS) and information technology (IT). Read the Real World Case on General Electric on the next page. Then let's analyze it together. See Figure 1.1.

Figure 1.1

Stuart Scott, CIO of GE Industrial Systems, directs the continued development of GE's Support Central knowledge management system.



Source: Derek Dudek

General Electric Company: Implementing e-Business and e-Commerce Initiatives

No company has made as vocal a commitment to radically transforming business by shifting to e-business and e-commerce as General Electric. What motivated GE has been a fear that new competition would cut into its extraordinary profits. That's what former CEO Jack Welch tried to hammer into his managers in January 1999, ordering them "to destroy their businesses and rebuild them for the Internet . . . before start-up dot-coms get the chance to destroy you." From that moment, the shift to e-business became a policy imperative, with every GE business unit jumping to integrate its suppliers and customers with its internal processes.

Welch had four major business strategies: globalization, business services, e-business, and the total quality program known as Six Sigma. Instead of unveiling a fifth, new CEO Jeff Immelt says, "The best thing I can do is drive GE's four initiatives broader and deeper." Under the banner of "No back office," for instance, he's telling managers to digitize or outsource the parts of their businesses that don't touch the customer. Immelt also supports the development of "digital cockpits" or corporate information portals that let managers track the vitals of their businesses moment by moment. All told, e-business is supposed to save GE $1.6 billion in 2001.

Leading GE's technology charge is CIO Gary Reiner. And Reiner isn't afraid to pose provocative questions and technology-based solutions concerning the business potential of information technology and its impact on the company's performance. Thus, Reiner has been spearheading nothing less than a cultural revolution at GE. The goal is to take full advantage of the Internet to sell products and services, streamline internal operations, and purchase materials and supplies. As a consequence, GE is far ahead of the 50 largest corporations in the United States in squeezing benefits out of the Web.

GE's drive to apply Internet power everywhere—an initiative once dubbed "destroyyourbusiness.com" and now more soberly called digitization—has been three-sided. On the sell side, online sales across GE's divisions grew from nearly nothing in 1998 to more than $7 billion in 2000, about 5 percent of company revenue. That fell short of an eventual goal of 30 percent—but was still more than double Amazon.com's sales, as GE sold everything from mutual funds to jet engine repair services on the Web.

On the buy side, by the end of 2000, GE had purchased more than $6 billion in goods and services through online auctions, and this year it plans to spend $14 to $30 billion online. Engineers in its locomotive business, for example, developed a Web tool that lets GE hold up to 100 auctions a day for companies to bid on contracts to supply GE with materials and services. Online auctions are expected to cut purchasing costs at GE through reductions in prices and transaction costs by over $600 million in 2001.

The rest of the $1.6 billion in costs GE plans to vaporize in 2001 will come from the make side—the internal processes the company is juicing up with Internet technologies. For example, one of the keys to the planned cost reductions is an invasion of Net-based collaboration tools. The company has made a huge commitment to the Lotus Development tools QuickPlace (which lets employees set up web-based work spaces) and Sametime (for realtime online meetings), which permit ad hoc collaboration without help from the IT department.

These tools streamline the company's communication in myriad ways. Thus, GE's recruiting teams can set up QuickPlaces to trade information about prospective hires. And GE engineers share drawings, design requirements, and production schedules with foremen on manufacturing floors. In all, GE has created almost 18,000 QuickPlaces for 250,000 users, says CTO Larry Biagini. "And if we have an engineering project with someone outside the company, we'll set up a QuickPlace or Sametime session and invite outside people."

There's also Support Central, a companywide knowledge management system developed using software from GE's Fanuc division. Employees sign on and complete a survey about their areas of expertise. The responses are added to a knowledge base so people with questions anywhere in GE can find people with answers. "Someone may have a question about, say, titanium metallurgy, and they'll be able to find documents about it, or send e-mail or initiate an online chat with someone who can help," says Stuart Scott, CIO of GE Industrial Systems. The result of all this collaboration? Faster workflow and quicker, smarter decisions, GE executives say.

Case Study Questions

1. Are the buy, sell, and make e-business and e-commerce initiatives of GE applicable to other companies—both large and small? Give examples to support your answer.
2. Could the business value of GE's Web-based collaboration tools be as great as their executives claim? Why or why not?
3. Evaluate the business value of Jeff Immelt's e-business directives for GE. Do you agree with their strategic importance for GE at this time? Explain your answer.

Source: Adapted from Kathy Robello, "The e-Biz 25," *Business Week e-biz*, May 14, 2001, p. EB54; Paul Strassman, "GE's B2B Retreat," *Computerworld*, July 2, 2001, p. 27; Desiree DeMeyer and Don Steinberg, "The Smart Business 50–General Electric," *Smart Business*, September 2001, p. 72; and Jerry Useem, "It's All Yours Jeff, Now What?" *Fortune*, September 17, 2001, p.19. 2001 Time Inc. All rights reserved. Reprinted from Ziff Davis *Smart Business*, September 2001, with permission. Copyright 2001 Ziff Davis Media Inc. All rights reserved.

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Analyzing General Electric Company

We can learn a lot about the importance of information technology and information systems from the Real World Case of General Electric Company.

This case dramatizes just one of the countless examples of the business challenges and opportunities created by the growth of the Internet and the World Wide Web. Former CEO Jack Welch drove General Electric into major e-business initiatives in 1999 to counter an expected dot-com invasion into GE's many businesses. Every GE business unit developed e-commerce and e-business systems to use the Web to connect with their suppliers and customers. New CEO Jeff Immelt is continuing the digitization process by encouraging e-business projects that transform internal processes and provide managers with online information for decision making. GE business units are focused on digitizing their buy, sell, and make processes in a variety of ways. Online auctions for suppliers, online sales to customers, and Web-based collaboration tools for employees are just a few examples as GE moves to save $1.6 billion in operating costs in 2001 and transform itself into a premier e-business enterprise.

Thus, information technologies, including Internet-based information systems, are playing a vital and expanding role in business. Information technology can help all kinds of businesses improve the efficiency and effectiveness of their business processes, managerial decision making, and workgroup collaboration and thus strengthen their competitive positions in a rapidly changing marketplace. This is true whether information technology is used to support product development teams, customer support processes, interactive electronic commerce transactions, or any other business activity. Internet-based information technologies and systems are fast becoming a necessary ingredient for business success in today's dynamic global environment.

What You Need to Know

There is no longer any distinction between an IT project and a business initiative. IT at Marriott is a key component of the products and services that we provide to our customers and guests at our properties. As such, there's very little that goes on within the company that either I personally or one of my top executives is not involved in [13].

Those are the words of Carl Wilson, executive vice-president and CIO of Marriott International. So even top executives and managers must learn how to apply information systems and technologies to their unique business situations. In fact, business firms depend on all of their managers and employees to help them manage their use of information technologies. So the important question for any business professional or manager is: What do you need to know in order to help manage the hardware, software, data, and network resources of your business, so they are used for the strategic success of your company?

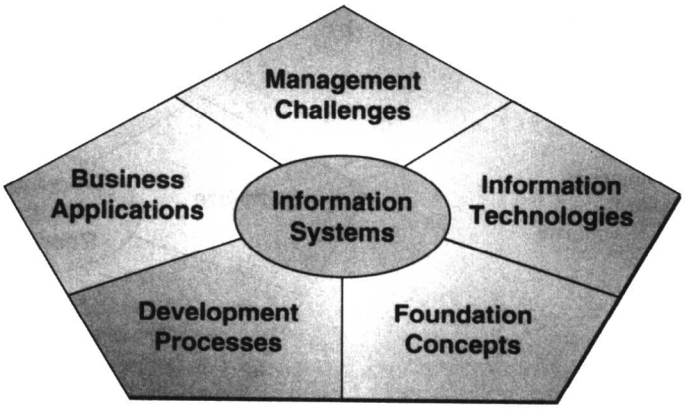
An IS Framework for Business Professionals

The field of information systems encompasses many complex technologies, abstract behavioral concepts, and specialized applications in countless business and nonbusiness areas. As a manager or business professional you do not have to absorb all of this knowledge. Figure 1.2 illustrates a useful conceptual framework that organizes the knowledge presented in this text and outlines what you need to know about information systems. It emphasizes that you should concentrate your efforts in five areas of 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 e-business applications of information technology for competitive advantage. Chapters 1 and 2 and other chapters of the text support this area of knowledge.

Figure 1.2

This framework outlines the major areas of information systems knowledge needed by business professionals.



- **Information Technologies.** Major concepts, developments, and management issues in information technology—that is, hardware, software, networks, data resource management, and many Internet-based technologies. Chapters 3 through 6 provide you with coverage of such topics that supports this area of information systems knowledge.
- **Business Applications.** The major uses of information systems for the operations, management, and competitive advantage of an e-business enterprise, including electronic business, commerce, collaboration and decision making using the Internet, intranets, and extranets are covered in Chapters 7 through 9.
- **Development Processes.** How business professionals and information specialists plan, develop, and implement information systems to meet e-business opportunities using several application development approaches. Chapter 10 helps you gain such knowledge as well as an appreciation of the e-business issues involved.
- **Management Challenges.** The challenges of effectively and ethically managing e-business technologies, strategies, and security at the end user, enterprise, and global levels of a business. Chapters 11 and 12 specifically cover these topics, but all of the chapters in the text emphasize the managerial challenges of information technology in today's global e-business environment.

In this chapter, we will discuss some of the foundation concepts of information systems and introduce other topics that give you an overview of the five areas of IS knowledge covered in this text.

What Is an Information System?

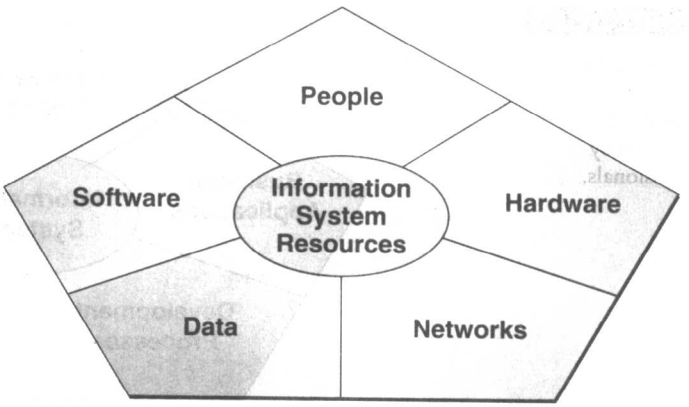
Let's begin with a simple definition of an information system, which we will expand in the next few pages. An **information system** can be any organized combination of people, hardware, software, communications networks, and data resources that collects, transforms, and disseminates information in an organization. See Figure 1.3. People have relied on information systems to communicate with each other using a variety of physical devices *(hardware)*, information processing instructions and procedures *(software)*, communications channels *(networks)*, and stored data *(data resources)* since the dawn of civilization.

Information Technologies

Business professionals rely on many types of information systems. Some information systems use simple manual (paper-and-pencil) hardware devices and informal (word-of-mouth) communications channels. However, in this text, we will

Figure 1.3

Information systems rely on people, and a variety of hardware, software, data, and communications network technologies as resources to collect, transform, and disseminate information in an organization.



concentrate on *computer-based information systems* that use computer hardware and software, the Internet and other telecommunications networks, computer-based data resource management techniques, and many other **information technologies** to transform data resources into an endless variety of information products for consumers and business professionals. Now let's look at some of the basic foundation concepts of information systems and technologies.

System Concepts: A Foundation

System concepts underlie the field of information systems. That's why we need to discuss how generic system concepts apply to business firms and the components and activities of information systems. Understanding system concepts will help you understand many other concepts in the technology, applications, development, and management of information systems that we will cover in this text. For example, system concepts help you understand:

- **Technology.** That computer networks are systems of information processing components that use a variety of hardware, software, data management, and telecommunications network technologies.
- **Applications.** That electronic business and commerce applications involve interconnected business information systems.
- **Development.** That developing ways to use information technology in business includes designing the basic components of information systems.
- **Management.** That managing information technology emphasizes the quality, strategic business value, and security of an organization's information systems.

What Is a System?

What is a *system*? A system can be most simply defined as a group of interrelated or interacting elements forming a unified whole. Many examples of systems can be found in the physical and biological sciences, in modern technology, and in human society. Thus, we can talk of the physical system of the sun and its planets, the biological system of the human body, the technological system of an oil refinery, and the socioeconomic system of a business organization.

However, the following generic system concept provides a more appropriate foundation concept for the field of information systems: a **system** is a group of interrelated components working together toward a common goal by accepting inputs and producing outputs in an organized transformation process.

Such a system (sometimes called a *dynamic* system) has three basic interacting components or functions:

- **Input** involves capturing and assembling elements that enter the system to be processed. For example, raw materials, energy, data, and human effort must be secured and organized for processing.

- **Processing** involves transformation processes that convert input into output. Examples are a manufacturing process, the human breathing process, or mathematical calculations.
- **Output** involves transferring elements that have been produced by a transformation process to their ultimate destination. For example, finished products, human services, and management information must be transmitted to their human users.

Example

A manufacturing system accepts raw materials as input and produces finished goods as output. An information system is a system that accepts resources (data) as input and processes them into products (information) as output. A business organization is a system where economic resources are transformed by various business processes into goods and services. ●

Feedback and Control

The system concept becomes even more useful by including two additional components: feedback and control. A system with feedback and control components is sometimes called a *cybernetic* system, that is, a self-monitoring, self-regulating system.

- **Feedback** is data about the performance of a system. For example, data about sales performance is feedback to a sales manager.
- **Control** involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goal. The control function then makes necessary adjustments to a system's input and processing components to ensure that it produces proper output. For example, a sales manager exercises control when reassigning salespersons to new sales territories after evaluating feedback about their sales performance.

Example

A familiar example of a self-monitoring, self-regulating system is the thermostat-controlled heating system found in many homes; it automatically monitors and regulates itself to maintain a desired temperature. Another example is the human body, which can be regarded as a cybernetic system that automatically monitors and adjusts many of its functions, such as temperature, heartbeat, and breathing. A business also has many control activities. For example, computers may monitor and control manufacturing processes, accounting procedures help control financial systems, data entry displays provide control of data entry activities, and sales quotas and sales bonuses attempt to control sales performance. ●

Other System Characteristics

Figure 1.4 uses a business organization to illustrate the fundamental components of a system, as well as several other system characteristics. Note that a system does not exist in a vacuum, rather, it exists and functions in an *environment* containing other systems. If a system is one of the components of a larger system, it is a *subsystem*, and the larger system is its environment.

Several systems may share the same environment. Some of these systems may be connected to one another by means of a shared boundary, or *interface*. Figure 1.4 also illustrates the concept of an *open system;* that is, a system that interacts with other systems in its environment. In this diagram, the system exchanges inputs and outputs with its environment. Thus, we could say that it is connected to its environment by input and output interfaces. Finally, a system that has the ability to change itself or its environment in order to survive is an *adaptive system.*

Example

Organizations such as businesses and government agencies are good examples of the systems in society, which is their environment. Society contains a multitude of such systems, including individuals and their social, political, and economic institutions. Organizations themselves consist of many subsystems, such as departments, divisions, process teams, and other workgroups. Organizations are examples of open systems because they interface and interact with other systems in their environment. Finally, organizations are examples of adaptive systems, since they can modify themselves to meet the demands of a changing environment. ●

Components of an Information System

We are now ready to apply the system concepts we have learned to help us better understand how an information system works. For example, we have said that an information system is a system that accepts data resources as input and processes them into information products as output. How does an information system accomplish this? What system components and activities are involved?

Figure 1.5 illustrates an **information system model** that expresses a fundamental conceptual framework for the major components and activities of information systems. An information system depends on the resources of people (end users and IS specialists), hardware (machines and media), software (programs and procedures), data (data and knowledge bases), and networks (communications media and network support) to perform input, processing, output, storage, and control activities that convert data resources into information products.

This information system model highlights the relationships among the components and activities of information systems. It provides a framework that emphasizes four major concepts that can be applied to all types of information systems:

Figure 1.4

A business is an example of an organizational system where economic resources (input) are transformed by various business processes (processing) into goods and services (output). Information systems provide information (feedback) on the operations of the system to management for the direction and maintenance of the system (control) as it exchanges inputs and outputs with its environment.

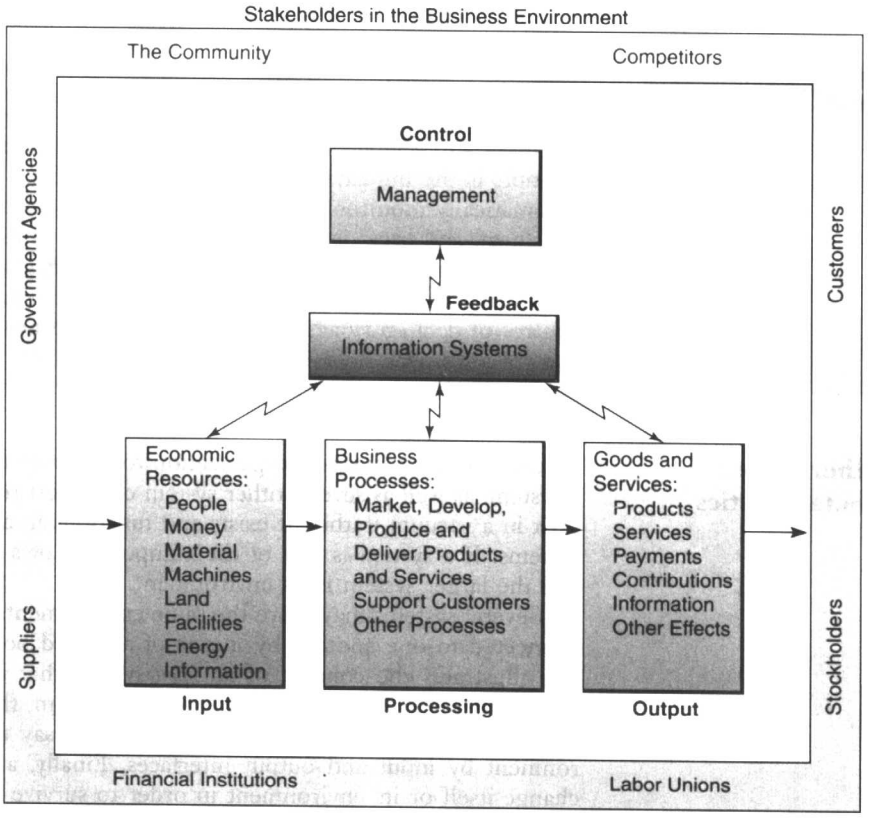
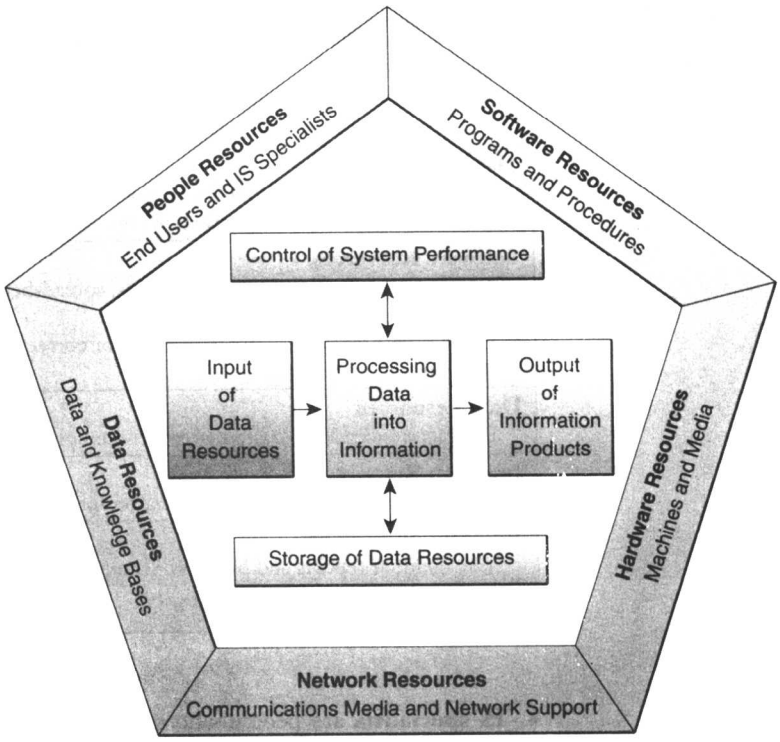


Figure 1.5

The components of an information system. All information systems use people, hardware, software, data, and network resources to perform input, processing, output, storage, and control activities that transform data resources into information products.



- People, hardware, software, data, and networks are the five basic resources of information systems.
- People resources include end users and IS specialists, hardware resources consist of machines and media, software resources include both programs and procedures, data resources can include data and knowledge bases, and network resources include communications media and networks.
- Data resources are transformed by information processing activities into a variety of information products for end users.
- Information processing consists of input, processing, output, storage, and control activities.

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 1.6 outlines several examples of typical information system resources and products.

People Resources

People are required for the operation of all information systems. These people resources include end users and IS specialists.

- **End users** (also called users or clients) are people who use an information system or the information it produces. They can be accountants, salespersons, engineers, clerks, customers, or managers. Most of us are information system end users. And most end users in business are **knowledge workers,** that is, people who spend most of their time communicating and collaborating in teams and workgroups and creating, using, and distributing information.

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