

# The IT-Based Organization in the Digital Economy

CHAPTER

# 1

## Chapter Preview

This chapter discusses how business is done at the beginning of the twenty-first century and the fundamental and powerful roles that information technologies play in helping businesses survive and prosper in today's dynamic, competitive, global environment. We describe how various types of pressures, particularly new technologies, are forcing businesses to transition from the Old Economy to the New Economy. We show you how any information system, properly used, can be *strategic*, meaning that the information system can provide a competitive advantage. We also describe information systems that have failed, often at great cost to the enterprise. We finish up the chapter with an explanation of why you should learn about information technology.

## Chapter Outline

- 1.1** Doing Business in the Digital Economy
- 1.2** Business Pressures, Organizational Responses, and IT Support
- 1.3** Competitive Advantage and Strategic Information Systems
- 1.4** Strategic Information Systems: Examples
- 1.5** Why Should You Learn About Information Technology?

## Learning Objectives

- 1.** Describe the characteristics of the digital economy and e-business.
- 2.** Discuss the relationships among business pressures, organizational responses, and information systems.
- 3.** Describe strategic information systems (SISs) and explain their advantages.
- 4.** Describe Porter's competitive forces model and how information technology helps companies improve their competitive positions.
- 5.** Describe 12 strategies that companies can use to achieve competitive advantage in their industries.

## DELTA AIR LINES' DIGITAL NERVOUS SYSTEM

### THE BUSINESS PROBLEM



A major hub-and-spoke airline like Delta (*delta.com*) has costs that can be 150 percent higher than those of “no-frills” carriers. AirTran, JetBlue, and Southwest are squeezing all the major network carriers, but Delta is feeling it the most. The Atlanta-based company, which lost \$1.3 billion in 2002, estimates that 40 percent of its customers can choose service from low-cost carriers—more than any other major carrier. In 2002, in key New York-to-Florida markets, JetBlue grabbed 80 percent of the market from Delta.

Delta’s business problems fall into two major areas. First, the company must cut costs across every area of its operations, including: ticketing, baggage handling, customer service, and maintenance. Second, the company is starting two new businesses: a new, low-cost airline called Song (a \$75 million venture) and a new business that provides maintenance services to other airlines.

### THE IT SOLUTION

Over the past five years, Delta spent \$1.5 billion to develop a new information technology infrastructure, which it named the Delta Nervous System (DNS). The DNS cuts inefficiencies out of virtually every area of Delta’s operations. The DNS links some 30 to 40 customer and flight databases that track everything from reservations and ticketing, to check-in and baggage handling, to flight and crew operations. Linked through the DNS, individual systems report changes—a new ticket reservation, a flight delay, a gate change—in real time. Messaging software carries each change to any system that needs it. A ticket reservation, for example, will be recorded in Delta’s financial systems, its frequent-flier database, and its boarding and flight records, among other systems.

### THE RESULTS

Delta is using its DNS to push ticket purchasing away from travel agents and toward its Web site (*delta.com*). A ticket booked through a travel agent costs an airline more than \$20 in fees. A reservation handled live by the carrier’s own call center can cost \$15, but it costs only about \$6 to handle the reservation online. In 2002, Delta sold 13 percent of all its tickets over its Web site, a savings of \$57 million in ticket costs and \$25 million in call center costs. Delta’s goal is to sell at least half of its tickets online.

Delta is also using its DNS to computerize baggage-processing. Delta bag handlers attach scannable tags to bags, and the bags’ destinations show up on screens on the airfield carts that the handlers drive, allowing them to figure out the fastest route to distribute a load of bags to various aircraft. It costs Delta \$150 to track a lost bag. In 2002, use of the DNS in baggage-handling resulted in a savings of \$8.7 million in bags that did not go astray.

The DNS also improves customer service. At each gate, huge flat-screen plasma displays list passengers by name for the flight’s standby list; give the times various rows will be called to board the plane; show scheduled departure times; and update the weather in the destination city. These gate displays are a big part of how Delta is using its system to streamline check-in and boarding procedures. Self-service kiosks are another key component. The DNS has enabled Delta to reduce the number of agents at each gate. Potential savings range from \$300 to \$450 million per year.

The DNS also allows Delta to automate its aircraft maintenance, repair, and overhaul (MRO) unit. While labor is an airline’s highest cost, aircraft maintenance is second—usually about 25 percent of an airline’s costs. Delta is offering its maintenance and repair facility to other airlines. To accomplish this, the company must accurately track people and parts. The company uses specialized software to calculate fleet air-time, aircraft types, upgrade schedules, and other factors in order to determine which parts are going to be needed when. In 2002, savings in maintenance expense totaled \$90 million. In addition, Delta has signed long-term service and maintenance contracts with World Airways and Miami Air, and two major contracts with Boeing to maintain a fleet of military and executive jets. Delta is generating \$150 million in new revenue from its for-profit maintenance operation.

Delta's Digital Nervous System has provided the airline with a competitive advantage over its rivals. And Delta's lead is likely to grow, considering the financial condition of competitors like United Airlines and American Airlines.

Source: D. Gage and J. McCormick, "Delta's Last Stand" (2003), *Baseline Magazine*, April 1, 2003.

This case illustrates how a company can achieve competitive advantage in the digital age through the use of information technology. Delta's Digital Nervous System illustrates the following points: It is sometimes necessary to change business models and strategies to succeed in the digital economy. Web-based IT enables companies to gain competitive advantage and to survive in the face of serious corporate threat. IT may require a large investment over a long period of time. Extensive networked computing infrastructure is necessary to support a large global organization. And Web-based applications can be used to provide superb customer service.

We see that fierce competition drives even large corporations in mature industries such as the airlines to find ways to reduce costs, increase productivity, and improve customer service. These efforts are best achieved by using Web-based systems, which are the major enablers in the transformation to an e-business in the digital economy.

In this chapter, we describe the extremely competitive business environment in which companies operate today, the business pressures under which they operate, and what companies are doing to counter these pressures.

#### WHAT WE LEARNED FROM THIS CASE

## 1.1 DOING BUSINESS IN THE DIGITAL ECONOMY

Conducting business in the digital economy means using Web-based systems on the Internet and other electronic networks. First, we will consider the concept of networked computing and then we will look at the impact it has made on how companies do business.

### Networked Computing

As described in the opening case, Delta Airlines was an established "old-economy" operation that saw the need to transform into a "new-economy" business, performing various functions electronically in order to enhance its operations. Delta's Digital Nervous System is a good example of networked computing that facilitates electronic commerce. Delta uses its DNS to cut costs (for example, selling tickets on its Web site and computerizing baggage-handling to minimize lost bags) and to start a new line of business (its for-profit aircraft maintenance operation).

Any organization that performs business functions (e.g., buying and selling goods and services, servicing customers, collaborating with business partners) electronically, in order to enhance its operations, is considered to be doing **e-business** or **e-commerce**. The infrastructure for e-business is *networked computing*, which connects computers and other electronic devices via telecommunication networks. Such connections allow users to access information stored in many places and to communicate and collaborate with others, all from their desktop or mobile computers. These computers may be connected to the global networked environment, known as the *Internet*, or to its counterpart within organizations, called an *intranet*. In addition, many companies link their intranets to those of their business partners over networks called *extranets*. These connections typically are done via wireline systems; since 2000, though, more and more communication and collaboration are done via wireless systems.

In general, the collection of computing systems used by an organization is termed **information technology (IT)**, which is the focus of this book. Almost all organizations, private and public, in most industries use information technologies to support their operations. The reason for this widespread IT use is that IT has become the major facilitator of business activities in the world today. IT is also a catalyst of fundamental changes in the structure, operations, and management of organizations, due to the

**e-business / e-commerce** *The conducting of business functions (e.g., buying and selling goods and services, servicing customers, collaborating with business partners) electronically, in order to enhance an organization's operations.*

**information technology** *The collection of computing systems used by an organization.*

**Table 1.1 Major Capabilities of Information Systems**

- Perform high-speed, high-volume, numerical computations.
- Provide fast, accurate, and inexpensive communication within and between organizations.
- Automate both semiautomatic business processes and manual tasks.
- Store huge amounts of information in an easy-to-access, yet small space.
- Allow quick and inexpensive access to vast amounts of information, worldwide.
- Facilitate the interpretation of vast amounts of data.
- Enable communication and collaboration anywhere, any time.
- Increase the effectiveness and efficiency of people working in groups in one place or in several locations, anywhere.
- Facilitate work in hazardous environments.

capabilities shown in Table 1.1. These capabilities support the five general business objectives of improving productivity, reducing costs, improving decision making, enhancing customer relationships, and developing new strategic applications.

### What Is the Digital Economy?

**digital economy** *An economy based on digital technologies, including communications networks (the Internet, intranets, and extranets), computers, software, and other related technologies; also sometimes called the Internet economy, the new economy, or the Web economy.*

All organizations—for-profit, nonprofit, private sector, public sector—in the twenty-first century operate in the **digital economy**, which is an economy based on digital technologies, including digital communications networks (the Internet, intranets, private *value-added networks* or VANS, and extranets), computers, software, and other related information technologies. The digital economy is also sometimes called the *Internet economy*, the *new economy*, or the *Web economy*.

In this new economy, digital networking and communications infrastructures provide a global platform over which people and organizations interact, communicate, collaborate, and search for information. This platform includes, for example (Choi and Whinston, 2000):

- A vast array of digitizable products (products that can be converted to digital format)—databases, news and information, books, magazines, TV and radio programming, movies, electronic games, musical CDs, and software—which are delivered over the digital infrastructure any time, anywhere in the world
- Consumers and firms conducting financial transactions digitally—through digital currencies or financial tokens carried via networked computers and mobile devices
- Physical goods such as home appliances and automobiles that are embedded with microprocessors and networking capabilities

The term *digital economy* also refers to the convergence of computing and communications technologies on the Internet and other networks, and the resulting flow of information and technology that is stimulating electronic commerce and vast organizational change. This convergence enables all types of information (data, audio, video, images) to be stored, processed, and transmitted over networks to many destinations worldwide. The digital economy has helped create an economic revolution, which was evidenced by unprecedented economic performance and a long period of continuous economic expansion (from 1991 until 2000).

### The New Economy versus the Old Economy

The changes brought by the digital economy are significant. Computer-based information systems of all kinds have been enhancing business competitiveness and creating strategic advantage on their own or in conjunction with e-commerce applications (see Carr, 2001). Here are a few examples that illustrate differences between doing business in the new economy and the old economy.

### Example #1: Buying and Selling Textbooks

**Old Economy.** You go to the local bookstore and buy your textbooks, either new or used. After your semester ends, you go back to the bookstore to sell your books at a reduced price. The bookstore is your only alternative for buying and selling your books.

**New Economy.** You go online to the Web site of the textbooks' publishers, where you can buy the books direct and have them shipped to your residence. Or, you go online to *amazon.com*, *half.com*, *buy.com*, *bestwebbuys.com*, or *eBay.com*, where you buy or sell your books and can negotiate the prices. The Internet provides you with additional outlets and information to improve your buying or selling positions. The next step will be all-digital books, to be downloaded at your convenience from a publisher.

### Example #2: Registering for Classes

**Old Economy (the way your parents' generation registered).** To register for classes, you walk around the campus to each department that offers the course you want. At that department, you pick up a computer punchcard with the course information on it. After picking up the cards for all the courses you want, you go to the Registrar's Office, where you wait in long lines to turn in your cards, manually fill out your registration, and have it approved by a clerk.

**New Economy.** To register for classes, you access your campus Web site, log into the registration site, and electronically register for classes without leaving your room. The registration Web site automatically checks for prerequisites, overloads, full classes, or other constraints.

### Example #3: Photography

**Old Economy.** You buy film at the store, insert it into your camera, and take pictures. Once you complete the roll of film, you take it to the store for processing. You get the photos back and examine them to see which you like. You go back to the store and pay for enlargements and duplications. You mail some of the photos to family and friends. Of course, if you want to take moving pictures, you need a second, different camera.

**New Economy.** In first-generation digital photography, you followed the old-economy process up to the point of getting the pictures back from the photo lab. But when you had the pictures, you scanned the ones you liked, and then made reprints, enlarged them, or sent them to your family and friends via e-mail.

In the second generation of digital photography, you use a *digital camera*, which can also take videos. No film is needed, and no processing is required. You can see the results immediately, and you can enlarge photos and position and print them quickly. In minutes, you can send the pictures to your family and friends. They can view the pictures on their personal computer, personal digital assistant (PDA), or cell phone. You can print pictures, or use them in a multimedia presentation.

In the third generation of digital photography, your digital camera can be small enough to be installed in your cell phone, a palmtop computer, or a pair of binoculars. You are traveling, and you see interesting scenery or an athletic event. You take pictures with your tiny digital camera, and within a few seconds they are sent to any destination on the Internet for viewing or reprints. Cameras of this type are already in use (e.g., by the paparazzi who sell pictures of celebrities to tabloids).

### Example #4: Paying for Gasoline

**Old Economy.** You drive up to the pump at a gas station, fill up your car, and then go inside to stand in line to pay for your gas, using either cash or a credit card.

**New Economy.** Using the first generation of "pay-at-the-pump" systems, you drive up to the pump, insert your credit card in the card-swipe slot on the pump, receive authorization for the charge, pump your gas, receive your receipt, and drive away.

The Exxon Mobil ([exxonmobil.com](http://exxonmobil.com)) Speedpass is an example of the second generation of pay-at-the-pump systems. The Speedpass token, usually carried on a key ring, allows customers to fill their tanks with a wave of the token at a gas-pump sensor. The Speedpass stores customer details on a small chip. When waved over the sensor, a short-range wireless link starts an automatic activation and authorization process, and the total purchase is then charged to a preapproved credit card. The pump recognizes you electronically, so there is no waiting for credit authorization and pump activation, and no buttons to push. You never have to take your credit cards or cash out of your car. (You can enroll online to get your Speedpass at [mobil.com/speedpass](http://mobil.com/speedpass).)

#### Example #5: Paying for Transportation in New York City

**Old Economy.** At first, travelers had to pay cash to a cashier for public transportation. Long delays caused mass transit to turn to metal tokens. For over 50 years, New Yorkers have used tokens to pay for transportation on buses and subways. The tokens save time and are easy for travelers to use. However, it costs \$6 million a year to manufacture replacement tokens and to collect the tokens out of turnstiles and fare boxes (“New York City Transit Tokens. . .,” 2003). New York needs this money badly for other services.



**New Economy.** The new-economy solution has been to switch to MetroCards. By 2002, only 9 percent of all commuters were still using tokens. Despite the fact that they have to occasionally swipe the MetroCard through the card reader several times, travelers generally like the new cards. (A new generation of contactless cards does not have this problem.) MetroCards are offered at discounts, which riders like.

Other cities have made the transition to electronic cards as well. Chicago’s transit system moved to cards in 1999, replacing the century-old tokens. Washington, D.C., Paris, and London also use transit cards. In Hong Kong, millions use a contactless card not only for transportation but also to pay for telephone, Internet access, food in vending machines, and much more.

The next generation of public transport payment will use wireless devices, perhaps carried on a key chain. Commuters will simply walk past a reader, and their credit cards, debit cards, or bank accounts will be debited automatically.

#### Example #6: Paying for Goods: The Checkout Experience

**Old Economy.** In the “old-old” economy, when you visit stores that sell any type of retail product (e.g., groceries, office supplies), you place your items in a shopping cart and proceed to checkout. At the checkout counter, you stand in line while a clerk punches in the price of each item on a manual adding machine. After the clerk adds up all your items, you pay for them in cash. Note here that no information is gathered about the item itself, other than the price.

Using the next generation of checkout technology, you take your items to a clerk, who swipes the barcode of each item over a “reader.” The reader captures data on the price and description of each item and automatically enters that data into the organization’s database. (This is an example of *source-data automation*, where human intervention in data input is minimized.) You receive an itemized account of your purchases and the total price.

**New Economy.** In the new economy, you take your items to a self-service kiosk, where you swipe the barcode of each item over a reader. After you have swiped all your items, the kiosk gives your directions about how to pay (cash, credit card, or debit card). Your wait in line is minimized.

In the next generation of checkout technology, all items will have wireless radio frequency identification tags either attached to or embedded in them. After you have finished shopping, you will simply walk your cart with all its items through a device similar to an airport security scanner. This device will “read” the wireless signals from each item, generate an itemized account of all your purchases, total up the price, and automatically debit your debit card or credit card. You will not wait in line at all, but walk from the store to your car.

### Example #7: Supplying Commercial Photos

**Old Economy.** Thousands of companies around the world provide photos of their products to retailers who advertise products in newspapers, in paper catalogs, or online. In the old economy, the retailer sends the manufacturer a request for a picture of the item to be advertised, say a Sony TV set. Sony then sends to a designated ad agency, by courier, alternative pictures that the agency can use. The agency selects a picture, designs the ad, gets an approval from the retailer, and sends the approved picture by courier to the printer. There it is rephotographed and entered into production for the catalog. An improvement in the old-economy process, introduced several years ago, allows the ad agency to send the picture to a scanning house. There, a digital image is made, and that image is moved to the printer.

In both of the old-economy processes, both the retailer and the ad agency may be involved in a quality check at various times, further slowing the process. The cycle time per picture can be four to six weeks. The total processing cost per picture is about \$80.

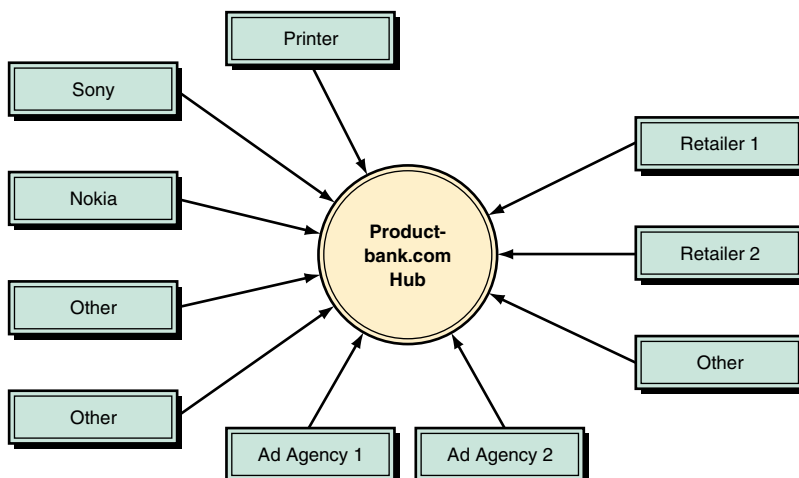
**The New Economy.** Orbis Inc., a very small Australian company, changed the old-economy linear supply chain to a hub-like supply chain, as shown in Figure 1.1. In the new process, the manufacturer (e.g., Sony) sends many digitized pictures to Orbis (at [productbank.com.au](http://productbank.com.au)), and Orbis organizes the pictures in a database. When a retailer needs a picture, it enters the database and selects a picture (or several alternatives). The choice is e-mailed with the picture's ID number to the ad agency. The agency enters the database, views the digitized pictures, and works on them. The final digitized pictures are e-mailed to the printer. The entire process takes less than a week at a cost of about \$50 per picture.

In each of the examples above, we can see the advantage of the new economy over the old economy in terms of at least one of the following: cost, quality, speed, innovation, and customer service. Information technology can also transform universities. As we see in IT's About Business 1.1, Dartmouth College is using wireless technology to enable students and faculty to communicate in new ways to enhance learning and teaching.

The new economy brings not only digitization, but also the opportunity to use new business models. In the next section, we discuss business models of the digital economy, all of which are enabled by Web-based information technology.

### Business Models in the Digital Economy

The Internet is revolutionizing the economic, societal, and technological foundations of the old economy. Organizations are developing new models for business, the economy, and government.



**Figure 1.1** Changing a linear supply chain to a hub.

## IT'S

## ABOUT BUSINESS

MIS

## 1.1: Dartmouth College Goes Wireless

Dartmouth College ([dartmouth.edu](http://dartmouth.edu)), one of the oldest in the United States (founded in 1769), was one of the first to embrace the wireless revolution. Operating and maintaining a campuswide information system with wires is very difficult, since there are 161 buildings with more than 1,000 rooms on campus. In the year 2000 the campus introduced a campuswide wireless network that includes more than 500 Wi-Fi (wireless fidelity) systems (see Chapter 6). By the end of 2002 the entire campus became a fully wireless, always-connected community—a microcosm that provides a peek at what neighborhood and organizational life may look like for the general population in just a few years.

As a pioneer in campuswide wireless, Dartmouth has made many innovative uses of the system, some of which are the following:

- Students are developing new applications for the Wi-Fi. For example, one student has applied for a patent on a personal-security device that pinpoints the location of campus emergency services to one's mobile device.
- Students no longer have to remember campus phone numbers, as their mobile devices contain all the numbers and can be accessed anywhere on campus.
- Students primarily use laptop computers on the network. However, an increasing number of Internet-enabled PDAs and cell phones are used as well. The use of regular cell phones is declining on campus.
- Students are making extensive use of SMS (short message service), sending messages to each other. Messages reach the recipients in a split second, any time, anywhere, as long as they are sent and received within the network's coverage area.

- Students can submit their class work via the network, as well as watch streaming video and listen to Internet radio.
- Professors are using wireless-based teaching methods. For example, students armed with Handspring Visor PDAs, equipped with Internet access cards, can evaluate material presented in class and can vote on multiple-choice questions relating to the presented material. Tabulated results are shown in seconds, promoting discussions. According to faculty, the system significantly increases participation.
- In the fall of 2003, Dartmouth moved into the world of voice-over IP (VoIP) via its wireless network. Students entering the class of 2007 were given the option of downloading VoIP software onto their computers. Using the software together with a headset, the students can make local or long-distance calls free. Each student is assigned a traditional seven-digit telephone number.

Sources: K. Hafner, "A New Kind of Revolution in the Dorms of Dartmouth," *New York Times*, September 23, 2003; and [dartmouth.edu](http://dartmouth.edu).

## QUESTIONS

1. In what ways is the Wi-Fi technology changing the life of Dartmouth students?
2. Is the wireless system at Dartmouth contributing to improved learning, or just adding entertainment that may reduce the time available for studying? Debate your point of view with students who may hold a different opinion.
3. What are the major benefits of the wireless system over the previous wireline system? Do you think wireline systems will disappear from campuses one day? (Do some research on this topic.)

**business model** *A method of doing business by which a company can generate revenue to sustain itself; spells out how the company adds value to its products or services.*

A **business model** is a method of doing business by which a company can generate revenue to sustain itself. The model spells out how the company adds value that consumers are willing to pay for, in terms of the goods and/or services the company produces in the course of its operations.

**Five Representative Business Models of the Digital Age.** Here we present five business models that have arisen in response to business pressures. Further discussion of new business models will be found throughout this book and at [digitalenterprise.org](http://digitalenterprise.org).

**Name-Your-Own-Price.** Pioneered by Priceline ([priceline.com](http://priceline.com)), the *name-your-own-price* model allows the buyer to state a price he or she is willing to pay for a specific product or service. Using information in its database, Priceline will try to match the buyer's request with a supplier willing to sell on these terms. Customers may have

to submit several bids before they find a price match for the product they want. Price-line's major area of operation is travel (airline tickets, hotels).

**Bidding Using Reverse Auctions.** Big buyers typically employ the *bidding using reverse auctions model*. Via a *request for quote (RFQ)*, the buyer indicates a desire to receive bids on a particular item, and would-be sellers bid on the job. Pioneered by General Electric Corporation (*gxs.com*), bidding systems are popular. In fact, several government entities are mandating electronic bidding as the only way to sell to them.

**Affiliate Marketing.** *Affiliate marketing* is an arrangement in which marketing partners place a banner ad for a company on their Web site. Every time a customer clicks on the banner, moves to the advertiser's Web site, and makes a purchase there, the advertiser pays a 3 to 15 percent commission to the host site. In this way, businesses can turn other businesses into their *virtual commissioned sales force*. Pioneered by CDNow (now *amazon.com*), the concept is now widespread.

**Group Purchasing.** Typically, companies pay less per unit when buying more units. Using the concept of *group purchasing*, where the purchase orders of many buyers are aggregated, a small business, or even an individual, can get a discount. This method can be facilitated by making contacts online. *Electronic aggregators* (e.g., *etrana.com* and *usa-llc.com*) find individuals or small/medium enterprises that want to buy the same product, aggregate their small orders, and then negotiate (or conduct a bid) for the best deal.

**E-Marketplaces.** *E-marketplaces* are markets in which buyers and sellers negotiate online. They introduce operating efficiencies to trading, and if well managed, can provide benefits to both buyers and sellers. Of special interest are *vertical e-marketplaces*, which concentrate on one industry (for example, *chemconnect.com* in the chemical industry and *covisint.com* in the automotive industry). Chapter 5 will explore e-marketplaces in more detail.

**e-marketplaces** Markets in which buyers and sellers negotiate online.

Now that we have considered some aspects of doing business in the digital economy, we turn our attention to the business pressures that companies face in the new, digital economy and some responses to those pressures.

### Before you go on . . .

1. What are the major differences between the old economy and the new economy?
2. What are some other examples of the new economy versus the old economy?
3. Which new economy business model is most applicable for you as a student?  
(Hint: Think about your textbooks.)

## 1.2 BUSINESS PRESSURES, ORGANIZATIONAL RESPONSES, AND IT SUPPORT

Modern digital organizations must compete in a challenging marketplace—one that is rapidly changing, unpredictable, complex, global, hypercompetitive, and customer-focused. Companies must rapidly react to problems and opportunities arising from this dynamic environment.

### Business Pressures

The *business environment* is the combination of social, legal, economic, physical, and political factors that affect business activities. Significant changes in any of these



**Figure 1.2** IT support for organizational responses.

factors are likely to create business pressures on organizations. Organizations typically respond to these pressures with activities supported by IT. Figure 1.2 shows the relationships among business pressures, organizational responses, and IT. We will focus on three types of business pressures that organizations face—market, technology, and societal pressures. We first discuss the business pressures.

**Market Pressures.** Market pressures come from the global economy and strong competition, the changing nature of the workforce, and powerful customers.

**Global Economy and Strong Competition.** The move to a global economy has been facilitated by advanced telecommunications networks and particularly by the Internet. Regional agreements such as the North American Free Trade Agreement (United States, Canada, and Mexico) and the creation of a unified European market with a single currency, the euro, have contributed to increased world trade.



*Low labor costs make Chinese firms attractive as partners in joint manufacturing ventures.*

One important pressure that exists for businesses in a global market is the cost of labor, which varies widely among countries. In general, labor costs are higher in developed countries than in developing countries. Also, developed countries usually pay high fringe benefits to employees, which makes the cost of doing business even higher. Therefore, many labor-intensive industries have moved their operations to countries with low labor costs. These moves are greatly facilitated with IT (see Chapter 5).

**Changing Nature of the Workforce.** The workforce, particularly in developed countries, is becoming more diversified, as increasing numbers of women, single parents, minorities, and persons with disabilities work in all types of positions. Information technology is easing the integration of this wide variety of employees into the traditional workforce. IT is also allowing people to work from home (telecommute). (See Chapter 4.)

**Powerful Customers.** Consumer sophistication and expectations increase as customers become more knowledgeable about the availability and quality of products and services. On the Internet, customers can now easily find detailed information about products and services, compare prices, and buy at electronic auctions.

Customers today want customized products and services, with high quality and low prices. For example, Nike will let you design your own sneakers online and will make and ship them to your home in two weeks (*nike.com*). Also, automakers are selling build-to-order cars whose configuration is done on the Internet (see *jaguar.com*).

The importance of customers has forced organizations to increase efforts to acquire and retain customers. An enterprisewide effort to do just that is called **customer relationship management (CRM)**. (We address this topic in detail in Chapter 8.)

**customer relationship management (CRM)** An enterprisewide effort to acquire and retain customers, often supported by IT.

**Technology Pressures.** The second category of business pressures consists of those pressures related to technology. Two major pressures here are technological innovation and information overload.

**Technological Innovation and Obsolescence.** New and improved technologies rapidly create or support substitutes for products, alternative service options, and superb quality. As a result, today's state-of-the-art products may be obsolete tomorrow. The technology that contributes the most to this pressure is Web-based information technology.

**Information Overload.** The amount of information available on the Internet more than doubles every year, and much of it is free. The Internet and other telecommunications networks are bringing a flood of information to managers. Therefore, the accessibility, navigation, and management of data, information, and knowledge, which are necessary for managerial decision-making, are critical. The only effective solutions are provided by information technology (e.g., search engines, intelligent databases, data mining).



*"Every two years the speed doubles and the size decreases. They'll soon be infinitely fast, but so tiny we won't be able to use them."*

**Societal Pressures.** The third category of business pressures consists of those pressures related to society. These pressures include social responsibility, government regulation/deregulation, spending for social programs, spending to protect against terrorism, and ethics.

**Social Responsibility.** Social issues that affect businesses range from the state of the physical environment to companies' contributions to education (e.g., by allowing interns to work in companies). Some corporations are willing to spend time and/or money on solving various social problems. These various activities are known as *organizational social responsibility*.

One social problem is the *digital divide*, which means that between countries and between different groups of people within countries, there is a wide division between those who have access to information and communications technology and are using it effectively, and those who do not. In the following example, IBM responds to this problem.

#### EXAMPLE

**IBM Helps Bridge the Digital Divide.** Boys & Girls Clubs of America (*bgca.org*) comprises a national network of more than 3,300 neighborhood-based facilities annually serving some 3.6 million young people, primarily from disadvantaged circumstances. IBM has provided wireless computing environments, known as Wi-Fi, for more than 600 Boys & Girls Clubs across the United States, providing Internet access for more than 200,000 children. For many of these children, it is the first time they have had the opportunity to use a computer or access the Internet after school.

The use of Wi-Fi allows the Clubs to bridge the digital divide, while reducing expenses for hardware, software, and installation by more than 50 percent. Wi-Fi has turned each Club into a digital center where up to 10 children can simultaneously access the Internet, using 6,400 IBM desktop PCs equipped with wireless cards. The children are learning skills that will be essential in the job market. (Source: *ibm.com*.)

**Government Regulations and Deregulation.** Other business pressures are related to government regulations regarding health, safety, environmental control, and equal opportunity. Government regulations are usually viewed as expensive constraints on businesses. In general, government deregulation intensifies competition.

**Protection Against Terrorist Attacks.** Since September 11, 2001, organizations have been under increased pressure to protect themselves against terrorist attacks. In addition, employees in the military reserves may be called up for active duty, creating personnel problems.

Information technology can contribute in the area of protection, by providing security systems and possibly identifying patterns of behavior that will help to prevent terrorist attacks (including cyberattacks) against organizations. One weapon in the global attack on terrorism is facial-recognition software, as the next example illustrates.

**EXAMPLE**

**Facial-Recognition Software Helps Fight Terrorism.** For a fleeting moment, Mohamed Atta appeared on an airport security camera minutes before he boarded one of the planes that crashed into the World Trade Center on September 11, 2001. Was there any way the camera or its operator would have been able to identify Atta as a suspect before he hijacked and flew the first of two planes into the twin towers? A new technology might answer this question.

This new technology for recognizing faces scans and maps the human face as a three-dimensional surface, by measuring the distances between a number of points on that surface. The advantage of the system is its ability to compare facial structures as they appear in different poses, light conditions, or facial expressions. The system could be employed at airports or border crossings where 3-D security cameras could scan faces and compare them with a database of 3-D pictures of suspected criminals or terrorists. Facial signatures could also be embedded in credit cards. People withdrawing money from an ATM or seeking access to a secure facility could have their identity verified by an on-site camera. (Source: *cnn.com*.)



**ethics** Standards of right and wrong.

**Ethical Issues.** **Ethics** relates to standards of right and wrong, and *information ethics* relates to standards of right and wrong in information-processing practices. Ethical issues are very important because, if handled poorly, they have the power to damage the image of an organization and to destroy the morale of employees.

The use of information technology raises many ethical issues, ranging from monitoring e-mail to potential invasion of privacy of millions of customers whose data are stored in private and public databases. Chapter 12 covers ethical issues in detail.

The pressures on organizations are increasing, mandating that organizations be prepared to take responsive actions if they are to succeed. These organizational responses are described next.

## Organizational Responses

Traditional organizational responses may not be effective with new types of business pressures. Therefore, many old solutions need to be modified, supplemented, or eliminated. Organizations' major responses are divided here into seven categories: strategic systems, customer focus, continuous improvement, restructuring, make-to-order and mass customization, business alliances, and e-business. The Delta case at the beginning of the chapter provides an example of all seven categories of business responses.

**Strategic Systems.** Strategic systems provide organizations with advantages that enable them to increase their market share and/or profits, to better negotiate with suppliers, or to prevent competitors from entering their markets. We discuss strategic systems in detail in the next section of this chapter.

**Customer Focus.** Organizational attempts to provide superb customer service can make the difference between attracting and keeping customers, or losing them to competitors. Numerous IT tools and business processes are designed to keep customers happy (see Chapter 8).

Superb customer service is a necessity in the healthcare industry, which is a huge business in the United States (\$1.4 *trillion* spent in 2002). As IT's About Business 1.2 demonstrates, Medco Health Solutions uses Web-enabled technologies to take excellent care of its subscribers, many of whom are elderly, while increasing efficiency and cutting costs.

**Continuous Improvement.** Many companies conduct programs that continuously attempt to improve their productivity and quality, and these programs are facilitated by IT. Examples of such programs are total quality management (TQM), Six Sigma, and just-in-time (JIT) processing. The underlying purpose of IT support in

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## 1.2: Web-Enabled Business Operations at Medco

In 2002, Medco Health Solutions amassed more than \$1.4 billion in sales through its Web site (*medco-health.com*), a 51 percent increase over 2001. The Web site fills 260,000 prescriptions every week. It takes a sophisticated infrastructure to handle all these transactions. Medco's Internet business is not a standalone operation, but a component linked to the company's retail and mail-order businesses. With over 64 million subscribers, Medco manages prescription drug plans for some of the nation's largest enterprises, including insurance companies and HMOs. Although some members order drugs directly from Medco, others purchase from one of the 58,000 retail pharmacies that use Medco to process and adjudicate benefits claims.

The Web site customizes the customer experience, displaying all the patients' options—retail, mail-order, and Internet—along with prices. The site suggests low-cost generic alternatives. The advantage to patient is seeing the options. The advantage to Medco: If a patient does not need a medication immediately, steering patients from retail pharmacies to Medco's home-delivery channels reduces the cost of filling prescriptions. Also, when a patient places an order, the Web site automatically checks the pa-

tient's history from all channels to see whether he or she had previously ordered medication that might adversely interact with the new prescription.

One challenge has been to make the site accessible for older users. Prescription drug use tends to increase with age. The average age of a Medco mail-order customer is about 65. So, the site is designed for accessibility. Buttons and tabs are large, and users can navigate with keyboards—handy for those lacking the dexterity to use a mouse.

Source: A. Cohen, "Online Prescriptions," *PC Magazine*, August 19, 2003.

## QUESTIONS

1. Electronic commerce can be conducted by virtual companies that exist only as an organized network of order-filling suppliers and a Web-based transaction entity—almost no "brick-and-mortar" infrastructure. Are the values of brand names more or less important to such companies compared to traditional companies?
2. What are the various functions provided by Medco's Web site? Can you think of others the company might add?

continuous improvement is to monitor and analyze performance and productivity and to gather, share, and better use organizational knowledge.

**Restructuring Business Processes.** To achieve dramatic improvements, organizations initially used the *business process reengineering (BPR)* approach, where the company fundamentally and radically redesigned a particular business process (e.g., purchasing, accounts payable, or new product design) (Hammer and Champy, 1993). Such radical redesign causes a major innovation in an organization's structure and the way it conducts its business. If done on a scale smaller than corporatewide, the redesign process may be referred to as a *restructuring*. Information technology plays a major role in restructuring. IT provides automation; allows business to be conducted in different locations; provides flexibility in manufacturing; permits quicker delivery to customers; creates or facilitates new business models; and supports rapid and paperless transactions among suppliers, manufacturers, and retailers.

**Make-to-Order and Mass Customization.** **Build-to-order** is a strategy of producing customized products and services. The business problem is how to provide customization and do it efficiently and at a reasonably low cost. Part of the solution is to change manufacturing processes from mass production to mass customization. In mass production, a company produces a large quantity of identical items. In **mass customization**, items are produced in a large quantity but are customized to fit the desires of each customer. IT and electronic commerce are ideal facilitators of mass customization, for example, by enabling interactive communications between buyers and designers so that customers can quickly and correctly configure the products they want. Also, electronic ordering reaches the production facility in minutes.

**build-to-order** *The strategy of producing customized products and services.*

**mass customization** *Production process in which items are produced in a large quantity but are customized to fit the desires of each customer.*



**virtual corporation** *A business that operates through telecommunications networks, usually without a permanent headquarters, to produce a product or service.*

For example, at this time the automakers are trying to move in the direction of mass customization, but it is extremely difficult to build cars to order and still keep costs at a reasonable level. A startup company, though, called Build-To-Order Inc. (*btogroup.com*), plans to build highly customized vehicles (starting at a price of \$35,000) by outsourcing just about all aspects of the cars' construction to suppliers and consolidating final construction at the factory. BTO will publish specifications for all parts of the car on the Web to encourage suppliers to build components to standard sizes.

For additional information on the build-to-order production model, see Appendix W1.1 on the book's Web site.

**Business Alliances.** Many companies realize that alliances with other companies, even competitors, can be very beneficial. For example, Lockheed Martin and Northrop Grumman are working together on the next-generation Joint Strike Fighter for the U.S. Air Force (see *lmaeronautics.com* and *northgrum.com*).

One of the most interesting types of business alliance is the **virtual corporation**, in which business partners operate through telecommunications networks, usually without a permanent headquarters, to produce a product or a service. Rather than forming virtual corporations with business partners, some individual companies *operate virtually*, as the example of Trend Micro (*trendmicro.com*) shows.

#### EXAMPLE

**Quicker Responses to Virus Attacks.** When the first reports surfaced at 12:17 P.M. Pacific Time on August 11, 2003, that the Blaster computer virus was spreading, researchers at antivirus-software company Trend Micro Inc. scrambled to come up with a fix. Meanwhile, the company's five global alert commanders began sizing up Blaster via cell-phone calls and e-mails. At 1:55 P.M., the commander based in Japan declared a global alert, signaling that this virus was nasty enough to require all the company's resources. Just 51 minutes later, a cure was ready.

The company routinely is among the first responders to viruses, often delivering fixes 30 minutes before market leader Symantec Corp. (*symantec.com*), according to GEGA IT-Solutions (*gega-it.de*) in Germany, a response tester. Trend Micro is able to respond so quickly partly because it is not organized like most companies. It has spread its top executives, engineers, and support staff around the world to improve its response to new virus threats. The main virus response center is in the Philippines. (Source: Hamm, 2003.)

Trend Micro is among a new type of high-tech companies (called *transnationals*) aiming to transcend nationality altogether. The company represents what has been identified as the fourth stage of globalization. In the first stage, companies operate in one country and sell into others. Second-stage multinationals set up foreign subsidiaries to handle one country's sales. The third stage involves operating an entire line of business in another country. In the fourth stage, the executive suite is virtual. Companies place their top executives and core corporate functions in different countries to gain a competitive edge through the availability of talent or capital, low costs, or proximity to their most important customers. This dispersal of key corporate functions is made possible by information technologies, especially the Internet.

Other companies are also using geodiversity to great advantage. Logitech (*logitech.com*), with dual headquarters in Switzerland and Silicon Valley, has placed its manufacturing headquarters in Taiwan to capitalize on low-cost Asian manufacturing. Meanwhile, its business-development headquarters in Europe has lined up strategic partnerships that have kept the company at the cutting edge of peripherals design, particularly for optical pens and mice. Wipro Ltd. (*wipro.com*), the global IT outsourcing and consulting firm, has its vice-chairman in the Silicon Valley to be close to the huge U.S. market. At the same time, the company can underprice Western rivals because 17,000 of its 20,000 software engineers and consultants are in India, where the annual cost per employee is less than one-fifth that of Silicon Valley.

**Electronic Business and E-Commerce.** As seen in the opening case, companies are transforming part or all of their operations into e-businesses. Doing business electronically is the newest and perhaps most promising strategy that many companies can pursue. Chapter 5 will focus extensively on this topic, and e-commerce applications are introduced throughout the book.

We have described the pressures that affect companies in today's business environment and the responses that organizations take to manage these pressures. To plan for the most effective responses, companies formulate strategies. In the new digital economy, these strategies are often enabled by information technology, specifically strategic information systems. In the next section, we discuss corporate strategy and strategic information systems.

### Before you go on . . .

1. Describe some of the pressures that characterize the modern global business environment.
2. What are some of the organizational responses to these pressures? Are any of the responses specific to a pressure? If so, which ones?

## 1.3 COMPETITIVE ADVANTAGE AND STRATEGIC INFORMATION SYSTEMS

A competitive strategy is a broad-based formula for how a business is going to compete, what its goals should be, and what plans and policies will be required to carry out those goals (Porter, 1985). Through its competitive strategy an organization seeks a **competitive advantage** in an industry—an advantage over competitors in some measure such as cost, quality, or speed. Competitive advantage leads to control of a market and to larger-than-average profits.

Competitive advantage in the digital economy is even more important than in the old economy, as we demonstrate throughout our book. In most cases, the digital economy has not changed the *core business* of companies. That is, Internet technologies simply offer the tools that can increase organizations' success through their traditional sources of competitive advantage—such as low cost, excellent customer service, or superior supply chain management. For most organizations, the first step to competitive advantage in the digital economy is to answer this question, "Where, given my industry and position, does my competitive advantage come from?" Then, the second step is to answer the follow-up question, "How can IT, especially the Internet, help my business?" The answer often involves strategic information systems.

**Strategic information systems (SISs)** are systems that help an organization gain a competitive advantage through their contribution to the strategic goals of an organization and/or their ability to significantly increase performance and productivity. An SIS is characterized by its ability to *significantly* change the manner in which business is conducted, in order to give the firm strategic advantage. Any information system that changes the goals, processes, products, or environmental relationships to help an organization gain a competitive advantage *or* reduce a competitive disadvantage is a strategic information system.

**competitive advantage** *An advantage over competitors in some measure such as cost, quality, or speed; leads to control of a market and to larger-than-average profits.*

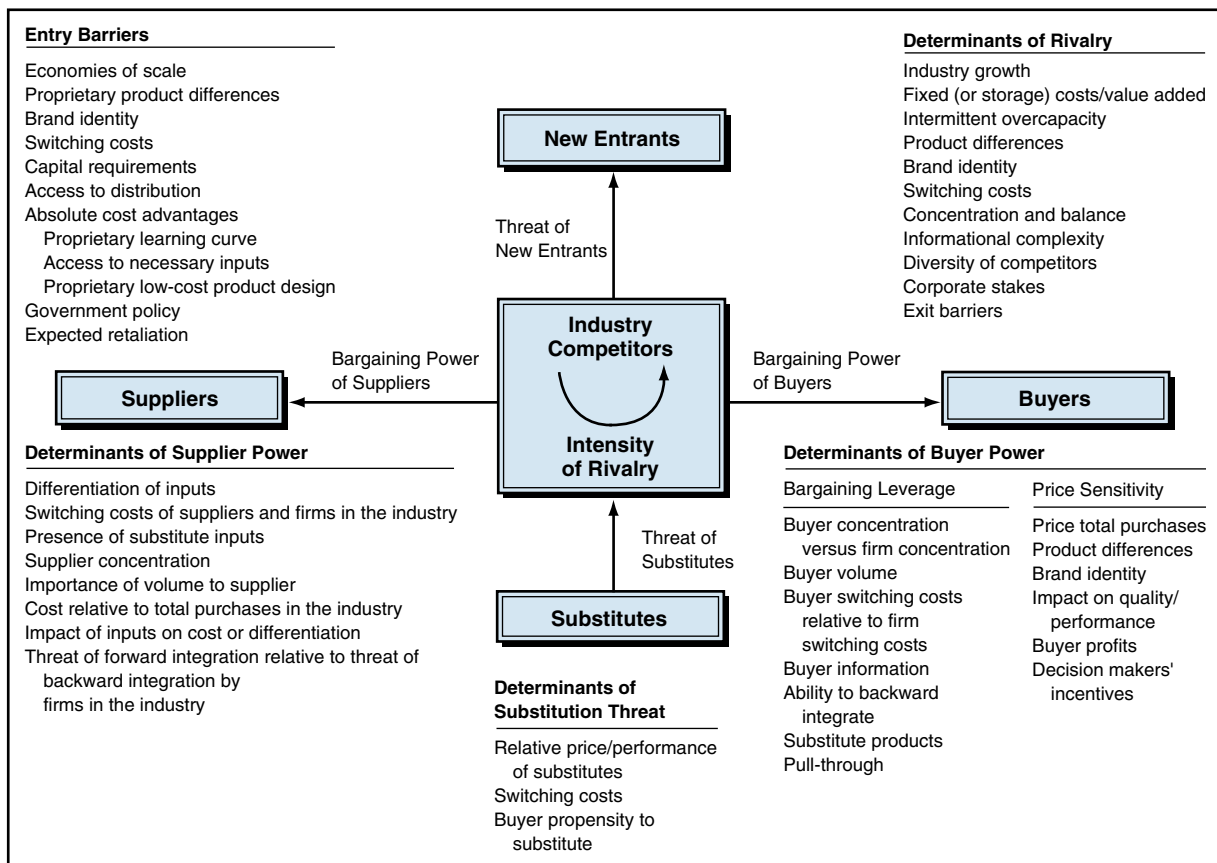
**strategic information systems (SISs)** *Systems that help an organization gain a competitive advantage through their contribution to the strategic goals of an organization and/or their ability to significantly increase performance and productivity.*

### Porter's Competitive Forces Model

The most well-known framework for analyzing competitiveness is Michael Porter's **competitive forces model** (Porter, 1985). It is used to develop strategies for companies to increase their competitive edge. It also demonstrates how IT can enhance the competitiveness of corporations.

The model recognizes five major forces that could endanger a company's position in a given industry (see Figure 1.3). However, the Internet has changed the nature of competition, and Porter (2001) concludes that the *overall* impact of the Internet is to

**competitive forces model** *A business framework, devised by Michael Porter, for analyzing competitiveness by recognizing five major forces that could endanger a company's position.*



**Figure 1.3** Porter's five forces model, including the major determinants of each force. (Source: Adapted with permission of the Free Press, a division of Simon & Schuster, Inc., from Michael Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*, p. 6. © 1985, 1998 by Michael Porter.)

increase competition, which negatively impacts profitability. The five forces and the way that the Internet influences them can be generalized as follows:

- 1. The threat of entry of new competitors.** For most firms, the Internet *increases* the threat of new competitors. First, the Internet sharply reduces traditional barriers to entry, such as the need for a sales force or a physical storefront to sell goods and services. Competitors need only set up a Web site. This threat is particularly acute in industries that perform an intermediation role (e.g., stock brokers and travel agents) as well as in industries where the primary product or service is digital (e.g., the music industry). Second, the geographical reach of the Internet enables distant competitors to compete more directly with an existing firm.
- 2. The bargaining power of suppliers.** The Internet's impact on suppliers is mixed. On one hand, buyers can find alternative suppliers and compare prices more easily, reducing the supplier's bargaining power. On the other hand, as companies use the Internet to integrate their supply chain and join digital exchanges, participating suppliers will prosper by locking in customers and increasing switching costs.
- 3. The bargaining power of customers (buyers).** The Web greatly increases a buyer's access to information about products and suppliers. Internet technologies can reduce customer switching costs (the costs, in money and time, of a decision to buy elsewhere), and buyers can more easily buy from other suppliers. These factors mean that the Internet greatly increases customers' bargaining power.
- 4. The threat of substitute products or services.** Information-based industries are in the greatest danger from substitutes. Any industry in which digitalized information can replace material goods (e.g., music, books, software) must view the Internet as a threat.
- 5. The rivalry among existing firms in the industry.** The visibility of Internet applications on the Web makes proprietary systems more difficult to keep secret, reducing differences among competitors. (That is, when I see my competitor's great new sys-

tem online, I am likely to have to match its features to remain competitive.) In most industries, the tendency for the Internet to lower variable costs relative to fixed costs encourages price discounting. Both these forces encourage destructive price competition in an industry.

In many other ways Web-based systems are changing the nature of competition and even industry structure. For example, bookseller Barnes & Noble, hardware company The Home Depot, and other companies have created independent online divisions, which are competing against the parent companies physical stores. Companies that have both online and offline sales operations are termed “click-and-mortar” firms, because they combine both “brick-and-mortar” and e-commerce operations.

Another way in which Web-based systems are changing industry structure is that some competitors are getting together and becoming more willing to share information. Examples include the vertical exchanges owned by industry leaders. The “Big Three” automobile manufacturers, for example, operate the auto exchange *covisint.com*. Similar exchanges exist in the paper, chemical, and many other industries.

Finally, competition is being affected by the fact that the variable cost of digital products is almost zero. Therefore, if large quantities are sold, the product’s price can be so low that it might be given away for free. For example, some analysts predict that commissions for online stock trading will approach zero for this reason. That is, consumers have the information available now via the Internet to be able to make their own decisions regarding buying and selling stocks. Consumers do not need brokers to give them the information that they can obtain themselves, virtually for free.

## Strategies for Competitive Advantage

Organizations continually try to develop strategies aimed at establishing a profitable and sustainable position against Porter’s five forces. Porter and others have proposed various strategies to gain competitive advantage; we discuss 12 of those strategies here.

1. **Cost leadership strategy**—produce products and/or services at the lowest cost in the industry. An example is Wal-Mart’s automatic inventory replenishment system, which enables Wal-Mart to reduce inventory storage requirements. As a result, Wal-Mart stores use floor space to sell products, not store them, thereby

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### 1.3: Staples Redesigns the Showroom Floor

Executives at the \$11.6 billion office-supply retailer Staples (*staples.com*) needed to measure corporate performance and product profitability. Their goal was to achieve “one version of the truth” and to track key performance indicators. Staples decided to use business intelligence (BI) software, which allows users to do sophisticated data analysis themselves. Using BI software from Hyperion (*hyperion.com*), Staples built product profitability models, which help managers determine the optimal mix of products and the best strategies for presenting them. The system provides graphical representations of high-level data—for example, revenues and costs for a line of products from a particular vendor. From their desktops, executives can drill down to more detailed levels—for example, checking the costs of marketing, distribution, and rent attributed to a particular stock-keeping unit.

For example, furniture is a product category that at first seemed to be a top performer, because it

tends to produce large gross margins. After Staples’ managers factored in the costs of storage, distribution, handling, damage, labor, and rent, the overall profitability of furniture turned out to be significantly lower than that for less space-intensive categories like basic office supplies. As a result, Staples reduced the floor space devoted to furniture and now devotes more room to categories for which the inventory turns over more often, such as chairs and filing cabinets.

Source: J. Caplan, “Applying a Little Business Intelligence,” *CFO.com*, July 22, 2003.

### QUESTIONS

1. Identify the benefits of the new software to Staples.
2. What does it mean when Staples executives say they want “one version of the truth”?

reducing inventory costs. As IT's About Business 1.3 illustrates, Staples uses software to examine the costs of its products in order to provide pricing that will please customers while generating profits.

2. **Differentiation strategy**—offer different products, services, or product features. Southwest Airlines, for example, has differentiated itself as a low-cost, short-haul, express airline, and that has proven to be a winning strategy for competing in the highly competitive airline industry. Also, Dell has differentiated itself in the personal computer market through its mass-customization strategy.
3. **Niche strategy**—select a narrow-scope segment (niche market) and be the best in quality, speed, or cost in that market. Some of the best-selling products on the Internet are niche products. For example, *dogtoys.com* and *cattoys.com* offer a large variety of pet toys that no other pet toy retailer offers.
4. **Growth strategy**—increase market share, acquire more customers, or sell more products. Web-based selling can facilitate growth by creating new marketing channels, such as electronic auctions. An example is Dell Computer (*dellauction.com*), which auctions both new and used computers mainly to individuals and small businesses.
5. **Alliance strategy**—work with business partners in partnerships, alliances, joint ventures, or virtual companies. This strategy creates synergy, allows companies to concentrate on their core business, and provides opportunities for growth. Alliances are particularly popular in e-commerce ventures. For example, in August 2000, Amazon.com and Toysrus.com launched a co-branded Web site to sell toys, capitalizing on each other's strengths. In the spring of 2001, they created a similar baby-products venture. Of special interest are alliances with suppliers, some of whom monitor inventory levels electronically and replenish inventory when it falls below a certain level (e.g., Wal-Mart and Procter & Gamble).

Alliances can also be made among competitors in a strategy known as “co-opetition” (cooperation + competition). For example, airlines in global alliances such as OneWorld (*oneworldalliance.com*) and the Star Alliance (*star-alliance.com*) compete for ticket sales on some routes, but once the ticket is sold they may cooperate by flying passengers on competitor's planes to avoid half-full planes.

**Table 1.2 Ways for IT to Introduce Technological Innovation**

Innovation	Advantage
<b>New business models</b>	Jump ahead of competitors by being first to establish a new model. The Web enables innovative business models. <i>Example:</i> Priceline's “name-your-own-price,” Auto-by-Tel's infomediary model.
<b>New markets, global reach</b>	Find new customers in new markets. <i>Example:</i> Via the Web, Amazon.com sells books in over 200 countries.
<b>New products</b>	Constantly innovate with new products and services. <i>Examples:</i> Electronic Art Inc. introduced CD-ROM-based video games; MP3 Inc. enabled downloading of music from its Web site.
<b>Extended products</b>	Leverage old products with new extensions. <i>Example:</i> a Korean company introduced “fuzzy logic” in its washing machines, and sales went up 50 percent in a few months.
<b>Differentiated products</b>	Offer unique products or added value. <i>Example:</i> Compaq gained PC market share by providing self-diagnostic disks with its computers.
<b>Supersystems</b>	Erect competitive barriers that cannot be easily duplicated. <i>Examples:</i> American Airlines' reservation system, SABRE, Delta's Digital Nervous System; and Caterpillar's equipment maintenance system.
<b>Interorganizational systems</b>	Link two organizational information systems to lock out the competition. <i>Example:</i> American Hospital Supply installed supply-reordering systems in hospitals.
<b>Computer-aided sales</b>	Provide computer support to marketing and sales. <i>Example:</i> Equip salespeople with wireless handheld computers that allow them to provide price quotations at the customer's location.

6. **Innovation strategy**—introduce new products and services, put new features in existing products and services, or develop new ways to produce them. A classic example is the introduction of automated teller machines (ATMs) by Citibank. The convenience and cost-cutting features of this innovation gave Citibank a huge advantage over its competitors. Like many innovative products, the ATM changed the nature of competition in the banking industry so that now an ATM is a competitive *necessity* for any bank. Eight ways that IT can introduce technological innovation for competitive advantage are listed in Table 1.2.
7. **Operational effectiveness strategy**—improve the manner in which internal business processes are executed so that a firm performs similar activities better than rivals. Such improvements increase employee and customer satisfaction, quality, and productivity, while decreasing time to market. For example, improvements in Delta's baggage handling process saved the airline millions of dollars.
8. **Customer-orientation strategy**—concentrate on making customers happy. Strong competition and the realization of the importance of the customer are the basis of this strategy. Amazon.com, for example, excels at this strategy. Web-based systems are particularly effective in this area because they can provide a personalized, one-to-one relationship with each customer. The major entertainment networks are particularly interested in increasing the number of customers in their fantasy sports leagues, as IT's About Business 1.4 demonstrates.

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## 1.4: Are You Ready for Some Football?

Millions of people are playing fantasy football, a booming entertainment and business phenomenon. Participants create leagues, draft players, set lineups, make trades, and see their teams win or lose based on the performance of real players week after week. The fantasy football champ is CBS SportsLine ([cbs.sportsline.com](http://cbs.sportsline.com)), which has over two million players and also operates the fantasy football games on AOL, CNN.com, and NFL.com. SportsLine has introduced new technology to bring more realism to fantasy-league play.

SportsLine's Football Commissioner technology lets groups of up to 12 players create a league on SportsLine's servers at a cost of \$139.95, divided among the players. SportsLine allows each league to create its own scoring rules before the season starts. For example, if a running back scores a touchdown, he can be awarded six points. But he can also get two points for every 25 yards he rushes or two points for every pass he catches—whatever the league decides. Leagues can also opt for a default set of scoring rules, provided by SportsLine. Once the participants set rules and draft players (this process is done either via the site or offline), each "owner" logs on to his or her own Web page to set lineups, make trades, and drop or add players.

The challenge for SportsLine is to rapidly crunch the numbers according to each league's unique set

of rules. Each Sunday during the regular season, SportsLine will get more than 100 million unique page views on its fantasy football Web site, as fantasy team owners check to see how player performance in the real games affects the fantasy games.

At each stadium, a data-entry specialist keys in the results of each "live" play—yardage and players involved—and sends these stats to SportsLine's data center, where 300 Intel-based servers running Red Hat Linux process the data according to each league's set of scoring rules. The updated stats and scores are then sent to each team owner's Web page, a personalized page where owners see their team rosters side by side with those of opponents. The whole process—from the actual play in the stadium to the fantasy player's on-screen updates—can take as little as 6 seconds. When the real games end on Monday night, SportsLine tallies each team's fantasy points and adjusts the standings accordingly.

Source: A. Cohen, "Fantasy Football: CBS SportsLine," *PC Magazine*, December 24, 2002.

## QUESTIONS

1. What is so important about updating players' Web pages so rapidly?
2. How might CBS use information technology to improve the fantasy football experience for players?

9. **Time strategy**—treat time as a resource, then manage it and use it to the firm’s advantage. One of the driving forces behind time as a competitive strategy is the need for firms to be immediately responsive to customers, markets, and changing market conditions. A second factor is the time-to-market race. Often, most of the economic value of a product is realized early in its life.
10. **Entry-barriers strategy**—create barriers to entry for new competitors. For example, Priceline.com received U.S. patent 5,794,207 on its name-your-own-price business model. Cisco’s Dynamic Configuration Tool ([cisco.com/appcontent/Apollo/configureHomeGuest.html](http://cisco.com/appcontent/Apollo/configureHomeGuest.html)) allows prospective buyers to complete an online configuration of a Cisco product and receive intelligent feedback about compatibility and ordering. Service levels such as this make it difficult for new competitors to compete against Cisco.
11. **Lock in customers or suppliers strategy**—encourage customers or suppliers to stay with you rather than going to competitors. A classic example is frequent-flyer and similar buyer-loyalty programs in the airline, hospitality, and retail industries. A business-to-business example in the car industry is the e-procurement system Covisint, which locks in car manufacturers as customers and parts manufacturers as suppliers.
12. **Increase switching costs strategy**—discourage customers or suppliers from going to competitors for economic reasons. For example, Master Builders builds in switching costs with a concrete additive tank-monitoring system that notifies Master Builders to resupply customers’ tanks on a just-in-time basis. The customer benefits from an assured supply of product, less capital tied up in inventory, and reduced inventory management time and processing.

### Before you go on . . .

1. What are strategic information systems?
2. What are the five forces that Porter says could endanger a firm’s position in its industry or marketplaces?
3. What are some of the strategies that companies might use to gain competitive advantage?

## 1.4 STRATEGIC INFORMATION SYSTEMS: EXAMPLES

As we noted, any information system, properly used, can provide a competitive advantage. Therefore, there are millions of examples of strategic information systems. We provide several examples here, along with the strategies that each example supports. Note that each strategic information system can provide support for multiple organizational strategies.

### EXAMPLES

**The Los Angeles Lakers Gain an Edge.** Chris Bodaken, the video coordinator for the Los Angeles Lakers ([nba.com/lakers/](http://nba.com/lakers/)), sleeps in the office during April. He “slices and dices” hours of video footage in myriad ways to help the team prepare for its usual appearance in the playoffs. Back when he had to manually create tapes using side-by-side VCRs, he averaged one hour of sleep per night. But he now uses a digital video-editing software package from Pinnacle Systems ([pinnaclesys.com](http://pinnaclesys.com)). The system integrates video effects and statistical analysis on the same screen, so that Bodaken can quickly and easily assign a data tag to each play or even insert a tag each time a certain player touches the ball. The system also lets him sift through archived footage of the Lakers against various opponents for the past several years. For example, the team can look at all of Shaquille O’Neal’s post-ups on

the left side of the key against Sacramento during the season. This information gives coach Phil Jackson a powerful tool to plot strategy for dealing with Chris Webber and Mike Bibby in a probable playoff clash with the Sacramento Kings. (*Source*: Salkever, 2003.)

*Strategies supported*: operational effectiveness, differentiation, innovation, time.

#### EXAMPLE

***Burlington Northern Railroad Improves Efficiency.*** About 40 percent of all freight shipping is done by rail. Yet the railroads bring in only about 10 percent as much revenue as the \$300 billion trucking industry. Industry profits have fallen about one third since 1996. Burlington Northern (*bnsf.com*), the nation's second largest railroad, is now using remote-controlled locomotives, satellite-based mapping, and sophisticated software for trip planning and monitoring, to keep trains running on time, to lower fuel and labor costs, and to take market share away from trucks.

In a mile-long three-locomotive train, when the engineer nudges the throttle, a computer wirelessly adjusts and blends the three engines' outputs for maximum efficiency and fuel conservation. Every railcar has a radio-frequency identification tag similar to those used by automobiles at tollbooths. Managers can track the progress of any train in the system on the company's Web site. A train's location is updated each time it passes one of the tag readers scattered along the line.

Every engine is connected to a digital event recorder similar to a black box on an airplane. It records speed, power, throttle positions, braking, air pressure, and other performance measures. This information is sent via Wi-Fi base stations along rail lines to the network operations center at company headquarters, where it is analyzed. The railroad's chief engineer uses the analysis to constantly monitor his engineers' performance. If they are making mistakes, they come into headquarters for additional training on a simulator. Burlington Northern uses a GPS map of all 32,500 miles of its rail lines in its simulator software. Engineers are now tested on a simulation of the exact conditions they will encounter on the line.

Burlington Northern, with its scheduling software, has the ability to meet timetables accurately enough to guarantee arrival times for trucking customers. The railroad is saving hundreds of millions of dollars a year through lower fuel consumption and better asset utilization. Productivity is up: Ton-miles per employee, the railroads' standard productivity gauge, has increased 22 percent since 1998. (*Source*: Schonfeld, 2003.)

*Strategies supported*: operational effectiveness, increase switching costs.

#### EXAMPLE

***Music Retailers Fight Back with Web-Based Alliance.*** The rise of music piracy is such a severe threat that six of the largest music retailers—Best Buy (*bestbuy.com*), Tower Records (*towerrecords.com*), Virgin Entertainment Group (*virgin.com/us/entertainment*), Wherehouse Entertainment (*wherehouse.com*), Hastings Entertainment (*go Hastings.com*), and TransWorld Entertainment (*twec.com*)—have joined into an alliance called Echo (*echo.com*) in an effort to address the two-year decline in CD sales. Wherehouse, for example, recently filed for bankruptcy protection, and Best Buy has closed 107 stores, both as a result of poor CD sales.

Echo is obtaining licenses from the recording companies to distribute their music through their member retailer's own Web sites. The new firm is following the lead of companies like Universal Music Group, which distributes more than 60,000 songs through sites such as Best Buy and Circuit City for 99 cents per song or \$9.99 per album.

Under Echo's plan, once the group receives the necessary licenses, the partners would market their services both together and separately. Efforts might include promotions like "Buy a CD, get a free download." The retailers could also enable customers to download music in stores using portable devices like the Apple iPod. Some

analysts suggest, however, that even alliance strategies like Echo's will not be effective. What has to happen, they say, is for CD prices, which now average \$14.21, to come down to get pirates to move from free sites to legitimate ones. (Source: *echo.com*.)

*Strategies supported:* alliance, customer-orientation, lock-in customers.

#### EXAMPLE

#### *Procter & Gamble Searches for New Products.*

Procter & Gamble (*pg.com*) is a \$40 billion consumer-products manufacturer. Creating new products and getting them quickly to market has been a weak spot for the company. To better leverage its research and development efforts, P&G created InnovationNet, an internal portal for P&G's scientists to share ideas and create new products.

However, the company still struggles to find enough big ideas to fill its pipeline. So, P&G created a "connect-and-develop" program, inviting outsiders onto its team. P&G gives access to Innocentive (*innocentive.com*), a network of research scientists, as well as about 150 individual entrepreneurs. P&G's goal is to look for more ideas like the Crest Spin Brush toothbrush, one of the company's biggest new products in recent years. With a new product idea, P&G uses the Web to test and market the product, largely replacing live focus groups for early-stage analysis. P&G uses virtual presentations that can demonstrate new concepts and allow for rapid prototyping of new features for current products. (Source: *pg.com*.)

*Strategies supported:* innovation, time, alliance, growth.



#### EXAMPLE

#### *Merrill Lynch Manages Information Flow for Analysts and Clients.*

Merrill Lynch (*merrilllynch.com*) recently implemented a service that gathers, organizes, streamlines, and customizes real-time news from thousands of Web sites for 400 desktops in its equity-sales and trading groups. The firm previously had numerous sources for news and research, both internal and external, all coming in through different channels. Searching numerous diverse sources was costing time that could be spent focusing on more valuable activities. The customized service provides each user the ability to set up specific queries, profiles, and interest lists, in order to get the information most relevant for him or her. The system enables users to easily send relevant information to clients and colleagues with no more than a point and click. There is also a capability for users to add their own perspectives into the system in order for other users to view their commentary. (Source: *merrilllynch.com*.)

*Strategies supported:* operational effectiveness, customer orientation.

#### EXAMPLE

#### *MetLife Leads Online Policyholder Support.*

Insurance company MetLife (*metlife.com*) recently launched its first password-protected policy administration site to the general public. The site provides auto and home policyholders access to a multitude of information online, ranging from policy information and billing detail through claims status. The launch is significant because MetLife is the largest issuer of group auto insurance, and its push into e-servicing reflects a trend by major insurers.

On its Web site, MetLife breaks out policy information in a manner that makes it easy for clients to comprehend coverages for multiple cars and multiple drivers. Premiums are displayed so that a policyholder can determine how much each coverage for each vehicle costs. In fact, individual dollar values are assigned to individual coverages and vehicles to give policyholders a detailed view of what makes up their overall premium. On the site, MetLife even notes discounts that policyholders are not currently taking advantage of—a rarity in the industry. (Source: *metlife.com*.)

*Strategies supported:* customer orientation, lock-in customers.

**EXAMPLE**

***Increasing Sales at National Geographic.*** The National Geographic Society (NGS) (*nationalgeographic.com*) has 10 million striking digital images in its photographic archives. Now, some 10,000 of these images are commercially available from the e-commerce site that the nonprofit scientific and educational organization has launched at *ngsimages.com*. Corporations worldwide pay license fees to use the organization's images for advertising campaigns. Until recently, customers worked directly with the sales staff in the NGS Image Sales group, who would research the organization's photographic archives for them.

To increase customer ease-of-use, NGS created its searchable, business-to-business digital media e-commerce site. NGS global customers can log on at their convenience to research and buy from a portfolio of digitized images. This new sales channel has tripled NGS revenue from photographic sales, without having to increase its sales staff. NGS has also substantially cut its handling costs for licensing the images.

Once customers are ready to buy, they can add selected images to a virtual shopping cart and proceed to checkout. The NGS Web site offers customers a variable, usage-based pricing model and an easy-to-use pricing calculator. NGS also offers customers different payment options—credit card or purchase order—as well as the choice of downloading images or receiving a CD or slides. (Source: *ibm.com*, 2003.)

*Strategies supported:* cost leadership, customer orientation, operational effectiveness.

## Information Systems Failures

So far, we have introduced you to many success stories. You may wonder, though, “Is IT all success?” The answer is, “Absolutely not.” There are many failures, and we can learn from failures as much as from successes. We will show you examples of IT failures throughout the book. Our next example and the Real-World Case of Pepsi at the end of this chapter describe two IT failures.

**EXAMPLE**

***Bugs Ground Planes in Japan.*** A software bug in a program running in an air traffic control computer grounded all flights across Japan on Saturday, March 2, 2003. The system, which handles the distribution of flight information to airports, failed at 7 A.M., resulting in the immediate halt of all departures from Japanese airports, said an official.

The fault was thought to have been caused by a bug in new software that was loaded onto the machine at 1 A.M. the same day, said the official. The software handles exchange of data between the control center's computer and a similar computer at the Defense Ministry.

The new software worked for the first six hours. However, it failed at exactly 7 A.M., coinciding with the running of a program that collects data on the previous day's air traffic. The ministry was looking into the possibility that an incompatibility between the two programs caused the problem.

The failure caused the cancellation of 192 flights and the delay of 1,342 flights for 30 minutes or more, said local media reports. The longest delay was more than six hours, and the problems inconvenienced an estimated 270,000 people, including 39,000 travelers who were forced to give up their travel plans. The ministry official said the new software was tested on a backup system for two weeks and no problems were observed. However, the official could not confirm whether data exchange with the new Defense Ministry system or the daily data-gathering software was part of the test. (Source: Williams, 2003.)

It is also possible that too much IT can be “too much of a good thing.” In fact, Washington Federal Savings and Loan feels that less IT is better, as the following example demonstrates.

**EXAMPLE*****Less IT Proves Better for Savings and Loan.***

Washington Federal Savings and Loan Association ([washingtonfederal.com](http://washingtonfederal.com)) in Seattle, Washington, is one of the West's fastest-growing savings and loan institutions, with 119 branches in eight states and \$7.4 billion in assets. Yet it owns no automated teller machines; it has no online banking, no voice mail, no "press 3" automated phone system. Typewriters still sit on desks at headquarters, and there are only five Internet-connected PCs. Yet the firm last year reported record earnings of \$144 million, a 27 percent increase over fiscal 2001. At a time when some critics are questioning the value of IT, Washington Federal seems to be proving those contrarians right: In this case, less is more.

Washington Federal keeps its technology spending down to 1 percent of its annual operating expenses and has an IT department of seven. While other thrift institutions spend 45 cents to produce \$1 of net revenue, Washington Federal spends 18 cents (including the one cent for IT) to earn a dollar. Washington Federal's CEO notes that the firm's customer base is older and wants "high-touch" levels of service that they cannot get at other institutions, which concentrate mainly on low costs. So Washington Federal employees answer their own phones. The company's Web site provides customer and investor information, with a single e-mail contact for inquiries. (Source: Winkler, 2003.)

Although there are many reasons for failure of an IT project, one of the most critical is our inability to predict the future of information technology with any accuracy. Information technology is evolving and continuously changing in a rapid fashion, as we discuss in Chapter 2.

**Before you go on . . .**

1. Why do strategic information systems support many corporate strategies?
2. What are other reasons that IT projects might fail?

## 1.5 WHY SHOULD YOU LEARN ABOUT INFORMATION TECHNOLOGY?

We have demonstrated in this chapter that we live in a digital economy and that the ways we live and do business are changing dramatically. The organizational impacts of IT are growing rapidly, especially with the introduction of the Internet and e-commerce. We are becoming more and more dependent on information systems. Here we consider several characteristics of IT that answer the question, "Why should I learn about IT?"

### IT Facilitates Work in Organizations

A major role of IT is being a facilitator of organizational activities and processes. That role will become more important as time passes. Therefore, it is necessary that every manager and professional staff member learn about IT not only in his or her specialized field, but also in the entire organization and in interorganizational settings as well.

You will be more effective in your chosen career if you understand how successful information systems are built, used, and managed. You also will be more effective if you know how to recognize and avoid unsuccessful systems and failures. Also, in many ways, having a comfort level with information technology will enable you, at work and at home, to take advantage of new IT products and systems as they are developed. For help gaining this comfort level, see [howstuffworks.com](http://howstuffworks.com). Finally, you should learn about IT because being knowledgeable about information technology can also increase employment opportunities. Even though computerization eliminates some jobs, it creates many more.

## IT Is Used by All Departments

Information technology is vital for every functional area of an organization, and IT systems are integral to every functional area. In *finance* and *accounting*, for example, managers use such systems to forecast revenues and business activity, determine the best sources and uses of funds, manage cash and other financial resources, analyze investments, and perform audits to ensure that the organization is fundamentally sound and that all financial reports and documents are accurate.

In *sales* and *marketing*, managers use information technology to develop new goods and services (product analysis), determine the best location for production and distribution facilities (site analysis), determine the best advertising and sales total revenues (promotion analysis), and set product prices to get the highest total revenues (price analysis). Marketing managers also use IT to manage the customer relationship.

In *manufacturing*, managers use IT to process customer orders, develop production schedules, control inventory levels, and monitor product quality. In addition, these managers use IT to design products (computer-assisted design or CAD) and to manufacture items (computer-assisted manufacturing or CIM).

Managers in *human resources* use IT to screen job applicants, administer performance tests to employees, and monitor employee productivity. These managers also use legal IT to analyze product liability and warranties and to develop important legal documents and reports. IT's About Business 1.5 shows how information technology helps manage the human resources at DaimlerChrysler.

These are just a few examples of the roles of information technology in the various functional areas of an organization. We think it is important for students from the different functional areas to see the value of the information systems in their fields. To help do this, we have included at the end of every chapter a section called “What’s in IT for Me?” that discusses the chapter’s relevance to the various business functions.

IT'S

## ABOUT BUSINESS

HRM

### 1.5: Worldwide Human Resources Management at DaimlerChrysler

DaimlerChrysler ([daimlerchrysler.com](http://daimlerchrysler.com)), one of the world's largest automakers, has manufacturing facilities in 37 countries and over 370,000 employees. The company's strategy, based on global presence, strong brands, broad product range, and technology leadership, means that the firm must find ways to work more efficiently, reduce costs, and enable easy access to information. To meet these goals, the company needed to (1) establish common HR business processes around the world; (2) reduce administrative costs through workforce self-service; and (3) streamline recruitment to better compete for talent in Germany and the United States.

DaimlerChrysler implemented PeopleSoft's HRMS, which provided employees with easy access to information across the enterprise. The company now has a centralized source for global workforce information, delivered through the Internet. The software also provides collaboration tools for employees to use while working on projects.

The software also provides self-service for employees. They can use the applications to change their home address or view a paycheck through any browser—whether they are at work, at home, in an

Internet café, or using a kiosk in the break room of a factory. Self-service helps DaimlerChrysler decrease its administrative costs while providing better service for the workforce.

DaimlerChrysler is also concerned with attracting and retaining the most talented people. Headquartered in Germany and the United States, the company is faced with aging workforces, meaning that there is going to be more competition for a smaller pool of workers. Using PeopleSoft's eRecruit, the company has eliminated much of the paperwork and delays from its recruiting process. Applicants now can apply for jobs online, in real time. With integrated workflow applications, the company is now able to respond to applicants much more quickly.

Sources: [peoplesoft.com](http://peoplesoft.com) and [daimlerchrysler.com](http://daimlerchrysler.com).

1. What are the reasons that DaimlerChrysler needed a human resources information system?
2. What advantages did the company gain from its HR information system?

**Table 1.3 Information Technology Jobs**

Position	Job Description
Chief information officer (CIO)	Highest-ranking IS manager; responsible for strategic planning in the organization.
IS director	Responsible for managing all systems throughout the organization and day-to-day operations of the entire IS organization.
Information center manager	Manages IS services such as help desks, hot lines, training, and consulting.
Applications development manager	Coordinates and manages new systems development projects.
Project manager	Manages a particular new systems development project.
Systems manager	Manages a particular existing system.
Operations manager	Supervises the day-to-day operations of the data and/or computer center.
Programming manager	Coordinates all applications programming efforts.
Systems analyst	Interfaces between users and programmers; determines information requirements and technical specifications for new applications.
Systems programmer	Writes the computer code for developing new applications or maintaining existing applications.
Emerging technologies manager	Forecasts technology trends and evaluates and experiments with new technologies.
Network manager	Coordinates and manages the organization's voice and data network.
Database administrator	Manages the organization's databases and database management software usage.
Auditing or computer security manager	Manages ethical and legal use of information systems.
Webmaster site.	Manages the organization's World Wide Web
Web designer	Creates World Wide Web sites and pages.

## IT Offers Career Opportunities

The demand for traditional information technology staff—such as programmers, systems analysts, and designers—is substantial. In addition, many well-paid opportunities exist in emerging areas such as the Internet and e-commerce, mobile commerce, network security, object-oriented programming, telecommunications, and multimedia design. For details about careers in IT, see *techjourney.com* and also “Career resources” and “Technology careers” at *wageweb.com*. In addition, Table 1.3 provides a list of IT jobs with a description of each type of job.

### Before you go on . . .

1. What are the major reasons why it is important to know about information technology?
2. Why is it important to know about information technology when you are not working as an IT employee?

## WHAT'S IN IT FOR ME?

Regardless of the functional area, managers use information technology as a competitive weapon. Interestingly, due to the magnitude of many strategic decisions, all the functional areas often work together to provide input to a decision.

Consider opening a new factory in another country, clearly a strategic decision. Financial and accounting managers use IT to calculate and analyze the investment, forecast revenues and business activity, determine the best sources and uses of funds (e.g., currency exchange rates), manage cash and other financial resources, and perform ongoing audits to ensure that the concept is fundamentally sound and that all financial reports and documents are accurate.

Marketing managers use IT to perform the site analysis (determine the best location for the facility), determine the best advertising channels in that country, and set product prices. Marketing managers also manage the customer relationship, which entails an in-depth knowledge of the local language and culture.

Production/operations managers use IT to process customer orders, develop production schedules, control inventory levels, and monitor product quality. These managers are responsible for designing the new plant and its products, and then for the actual manufacturing operations (computer-aided design, computer-assisted manufacturing, computer-integrated manufacturing—CAD/CAM/CIM). In addition, they utilize IT to manage the supply chain, which will be a more complex operation because it is international.

Human resources managers use IT to screen job applicants, administer performance tests to employees, and monitor employee productivity. These managers also use legal IT to analyze product liability and warranties and to develop important legal documents and reports.

### FOR ALL BUSINESS MAJORS

#### ACC

### FOR THE ACCOUNTING MAJOR

#### MKT

### FOR THE MARKETING MAJOR

#### POM

### FOR THE PRODUCTION/ OPERATIONS MANAGEMENT MAJOR

#### HRM

### FOR THE HUMAN RESOURCES MANAGEMENT MAJOR

## SUMMARY

- 1. Describe the characteristics of the digital economy and e-business.** Conducting e-business in the digital economy means using Web-based systems on the Internet and other electronic networks. The digital economy is based on digital technologies, including digital communications networks (the Internet, intranets, extranets, and others), computers, software, and other related information technologies. Digital networking infrastructures enable the digital economy by providing a global platform over which people and organizations interact, communicate, collaborate, and search for information.
- 2. Discuss the relationships among business pressures, organizational responses, and information systems.** The business environment is the combination of social, legal, economic, physical, and political

factors that affect business activities. Significant changes in any of these factors are likely to create business pressures on organizations. Organizations typically respond to these pressures with activities supported by IT. These responses are grouped into seven categories: strategic systems, customer focus, continuous improvement, restructuring, make-to-order and mass customization, business alliances, and e-business.

- 3. Describe strategic information systems (SISs) and explain their advantages.** Strategic information systems are systems that support or shape a business unit's competitive strategy. An SIS is characterized by its ability to significantly change the manner in which business is conducted, in order for the firm to gain a competitive advantage or reduce a competitive disadvantage.

- 4. Describe Porter's competitive forces model and how information technology helps companies improve their competitive positions.** Porter's competitive forces model is used to develop strategies for companies to gain competitive advantage. It also demonstrates how IT can enhance the competitiveness of corporations. The model recognizes five major forces that could endanger a company's position in a given industry: the threat of entry of new competitors, the bargaining power of suppliers, the bargaining power of customers (buyers), the threat of substitute products or services, and the rivalry among existing firms in the industry. However, the Internet has changed the nature of competition; Porter concludes that the *overall* impact of the Internet is to increase competition, which negatively impacts profitability.
- 5. Describe 12 strategies that companies can use to achieve competitive advantage in their industries.** The 12 strategies are as follows: (1) *cost leadership strategy*—produce products and/or services at the lowest cost in the industry; (2) *differentiation strategy*—offer different products, services, or product features;

(3) *niche strategy*—select a narrow-scope segment (niche market) and be the best in quality, speed, or cost in that market; (4) *growth strategy*—increase market share, acquire more customers, or sell more products; (5) *alliance strategy*—work with business partners in partnerships, alliances, joint ventures, or virtual companies; (6) *innovation strategy*—introduce new products and services, put new features in existing products and services, or develop new ways to produce them; (7) *operational effectiveness strategy*—improve the manner in which internal business processes are executed so that a firm performs similar activities better than rivals; (8) *customer-orientation strategy*—concentrate on making customers happy; (9) *time strategy*—treat time as a resource, then manage it and use it to the firm's advantage; (10) *entry-barriers strategy*—create barriers to entry for new competitors; (11) *lock in customers or suppliers strategy*—encourage customers or suppliers to stay with you rather than going to competitors; (12) *increase switching costs strategy*—discourage customers or suppliers from going to competitors for economic reasons.

## INTERACTIVE

## LEARNING

### How Does UPS Track Its Orders?

Go to the Interactivities section on the Student Website and access Chapter 1: The IT-Based Organization in the Digital Economy. There you will find an animated simulation of the UPS Tracking system, as well some hands-on activities that visually explain business concepts in this chapter.

### More Resources

More resources and study tools are located on the on the Student Website. You'll find additional chapter materials and links to organizations, people and technologies for each chapter. In addition, self-quizzes that provide individualized feedback are available for each chapter.

### Instructions for Accessing the Interactivities on the Student Website:

1. Go to (comp: add web icon [wiley.com/college/turban](http://wiley.com/college/turban))
2. Select Turban Rainer Potter's *Introduction to Information Technology, Third Edition*
3. Click on Student Resources site, in the toolbar on the left
4. Click on Interactivities Website
5. Click on Interactivities Website and use your password to enter the site (your password card is located in the inside cover of your textbook)

## DISCUSSION QUESTIONS

1. What has been the impact of the digital economy on competition?
2. Review the examples of the new versus old economy cases. In what way did IT make the difference in each case?
3. Is IT a strategic weapon or a survival tool? Discuss.
4. Why might it be difficult to justify a strategic information system?
5. List eight ways that IT can support corporate strategy.
6. Describe the five forces in Porter's competitive forces model and how the Internet has affected each one.

7. Why is the Internet said to be the creator of new business models?
8. Discuss the idea that an information system by itself

can rarely provide a sustainable competitive advantage.

9. Discuss why some information systems fail.

### PROBLEM-SOLVING ACTIVITIES

1. Visit some Web sites that offer employment opportunities in IT (such as *execunet.com* and *monster.com*). Compare the IT salaries to salaries offered to accountants, marketing personnel, financial personnel, operations personnel, and human resource personnel. For other information on IT salaries, check *Computerworld's* annual salary survey and *techjourney.com*.
2. Prepare a short report on the role of information technology in government. Start with *whitehouse.gov/omb/egov/*, *estategy.gov*, *ctg.albany.edu*, *e-government.govt.nz*, and *worldbank.org/publicsector/egov*. Find e-government plans in Hong Kong and in Singapore (*info.gov.hk/digital21/e-gov/eng/index.htm* and *egov.gov.sg*).
3. The market for optical copiers is shrinking rapidly. It is expected that by 2005, as much as 85 percent of all duplicated documents will be done on computer printers. Can a company such as Xerox survive?
  - a. Read about the problems of Xerox in 2002–2003 at *fortune.com*, *findarticles.com*, and *google.com*.
  - b. Identify the business pressures on Xerox.
  - c. Find some of Xerox's response strategies (see *xerox.com*, *fortune.com*, and *forbes.com*).
  - d. Identify the role of IT as a contributor to the business technology pressures.
  - e. Identify the role of IT as a facilitator of Xerox's responses.

### INTERNET ACTIVITIES

1. Access the Web site of Federal Express (*fedex.com*).
  - a. Find out what information is available to customers before they send a package.
  - b. Find out about the "package tracking" system; be specific.
  - c. Compute the cost of delivering a 15" × 20" × 10" box, weighing 35 pounds, from your hometown to Honolulu, Hawaii. Compare the fastest delivery against the least cost.
2. Surf the Internet (use *google.com*, *brint.com*, or a similar search engine) to find information about:
  - a. International virtual corporations (at least two examples).
  - b. Virtual corporations in general.
3. Access *digitalenterprise.org*. Prepare a report regarding the latest EC developments in the digital age.
4. Access *x-home.com* and find information about the easy life of the future.
5. Experience customization by designing your own shoes at *nike.com*, your car at *jaguar.com*, your CD at *musicmaker.com*, and your business card at *iprint.com*. Summarize your experiences.

### TEAM ASSIGNMENTS

1. Review the *Wall Street Journal*, *Fortune*, *Business Week*, and local newspapers of the last three months to find stories about the use of Web-based technologies in organizations. Each team will prepare a report describing five applications. The reports should emphasize the role of the Web and its benefit to the organizations. Cover issues such as productivity, quality, cycle time, and globalization. One of the groups should concentrate on mobile commerce (e-commerce transactions conducted in a wireless environment) and another on electronic marketplaces. Present and discuss your work.
2. Assign group members to each of the major car rental companies. Find out their latest strategies regarding customer service. Visit their Web sites, and compare the findings. Have each group prepare a presentation on why its company should get the title of "best customer service provider." Also, each group should use Porter's competitive forces model to help make its case.
3. Assign group members to UPS, FedEx, DHL, and the U.S. Postal Service. Have each group study the e-commerce strategies of one organization. Then have members present the organization, explaining why it is the best.

### REAL-WORLD CASE

### INFORMATION TECHNOLOGY PROBLEMS AT PEPSICO

**THE BUSINESS PROBLEM** With annual sales of \$25 billion, PepsiCo (*pepsico.com*) is one of the most successful consumer products firms in the world. PepsiCo

controls 55 brands of food and drink through its five business units, Frito-Lay, Pepsi-Cola, Tropicana, Quaker Foods, and Pepsi bottlers.

PepsiCo's corporate culture is to allow its business units autonomy. PepsiCo's CEO notes that the company has "big brands and big businesses" and cannot be run in a centralized fashion. As long as business units meet growth and profit targets, management does not want to interfere. However, the company's gross margin of profit is shrinking, and Pepsi-Cola is losing momentum to Coca-Cola in the beverage business. In the snack business, private-label competitors are undercutting Frito-Lays' pricing, which is squeezing margins. Therefore, PepsiCo is looking to cut costs wherever possible.

Information technology would seem to be a logical solution for cost-cutting, but PepsiCo has problems with its IT as well. The company has no central, unified IT infrastructure, IT architecture, nor IT services. As a result, the business units have different IT infrastructures, enterprise software, databases, human resources systems, financial applications, distribution hardware, and distribution software.

For example, drivers for PepsiCo's three major bottlers each use different handheld appliances to track the products they deliver. All the handhelds can send information over Bluetooth, Wi-Fi, and wireless area networks, but all use different software. Frito-Lay runs Oracle software for financials and human resources and i2 Technologies software for managing its supply chain. But Quaker had to recently stop an SAP software project and revert to older custom-built applications while preparing to move to Oracle applications.

In another example, PepsiCo has always wanted to have its products delivered to customers on one or two trucks. Frito-Lay chips, Quaker granola bars, Tropicana juices, Aquafina water, and Pepsi-Cola could be packed together to arrive at a supermarket. But today, four or

more trucks with items from the different business units drive up to stores' loading docks on different schedules. Indeed, the company operates separate distribution centers for the business units, even though they all deliver to the same grocery and convenience stores.

**THE IT SOLUTION** To address these problems, PepsiCo set up a central information technology group (called its Business Solutions Group) to adopt software for human resources, finance, procurement, and sales and marketing, for use across all business units. Its goals are to create a central data warehouse; set IT infrastructure standards (e.g., network infrastructure); develop a set of IT services to be shared across the business units; and manage the corporate data center.

**THE RESULTS** In fact, PepsiCo's Business Solutions Group has not been able to successfully unify information systems across PepsiCo's businesses. When PepsiCo created the Business Solutions Group, it did not dismantle the technology management group in each of the business units. Unit managers are compensated and rewarded for meeting financial goals of their divisions, not for how well they cooperate with each other or with the Business Solutions Group.

The idea of a central IT group was a good one, but failed, largely because it required major cultural changes at PepsiCo. The idea required that business unit executives give up authority, and none of them embraced that idea. If PepsiCo had been able to achieve a unified, centralized IT strategy, analysts estimate that the company would have saved \$1.7 billion a year.

*Source:* K. S. Nash and M. Duvall, "PepsiCo: No Deposit, No Return," *Baseline Magazine*, May 1, 2003.



Welcome to your internship at Club IT! This downtown music venue is managed and owned by Ruben Keys and Lisa Tejada. They both graduated with Business Administration degrees in 1998, and decided to follow their dream to open a nightclub. During college, they supported themselves by working as musicians, Lisa playing bass and Ruben playing drums, so they learned quite a bit about nightclub operations from experience. In addition, they learned business principles from their studies. Lisa and Ruben have just completed extensive remodeling of the interior of Club IT and are pleased with the results. Its high ceilings and colorful lighting creates a hip, fun atmosphere. They hire live bands on Fridays and Saturdays and have a live DJ Tuesdays through Thursdays (closed on Sundays). The DJ uses a collection of

MP3's, playing hip-hop, techno, and electronic music with some Pop thrown in.

Lisa and Ruben run the office and maintain all financial and business-related records. They realize that while the resources they spent on remodeling are paying off well, their information management is lagging behind. They decided to hire you to analyze of their information needs.

To prepare for your first day of work, you and a few friends decide to spend a Friday night at Club IT. Your visit is a lot of fun—you meet some interesting people, and enjoy hearing a new band. Reporting to work on Monday afternoon, you wonder how much information technology a nightclub can possibly need, and if there will be enough information and technology analysis opportunities to justify your internship.

Sitting in the empty club a few hours before opening, you have your initial meeting with Ruben and Lisa. They give you background on the club and tell you about their need to boost their information technology, data management, and decision-making capabilities. Your first task is to get acquainted with the club and its operations, so Lisa has you log in to their website from her desk in their tiny back office.


1. Visit the Club IT website, and answer the following questions:

- a. What is Club IT's mission?
- b. Who is Club IT's primary clientele?

- c. What are the current employment opportunities at Club IT?
- d. What is your boss' email address?
- e. What information is available to employees only (password is clubit)

2. Find another nightclub on the Web and describe the information it provides via its web site.



Go to  to access the Club IT website on the Student Website