

13 Information Technology for Business

Online Pirates Feast on Economic Downturn

“**S**tart a ‘work-at-home’ job as an ‘international sales representative’ or a ‘shipping manager,’ with excellent pay. Simply open a new bank account in your name, accept money transfers into the account, then forward the money to our customers at locations around the globe.” For out-of-work computer users, this e-mail message can be quite appealing. In reality, the victim is tricked into becoming a “mule” in a money-laundering racket. The new “employee” provides anonymous racketeers a safe way to launder stolen or otherwise illegal money. As Internet money transfers arrive, the mule relays them (illegally) to a global network of recipient racketeers. With rising unemployment, the volume of mule e-mails is growing; more job-seekers seem willing to take the risk of being arrested.

Financial fears are a boon to scammers, as businesses and consumers grasp at schemes that are ordinarily ignored. Fake websites, mobile devices, and Internet-based phones boast high-paying jobs, low-cost loans, and can’t-miss lotteries. Text messages, saying victims’ credit cards have been deactivated, lure bank customers into relaying account information. Internet-based phone users receive fake caller IDs of real hospitals, government agencies, banks, and other businesses in a new form of telephone phishing that talks victims into revealing personal information. Perhaps most impressive, cyber-thieves

After reading this chapter, you should be able to:

- 1** Discuss the impacts information technology has had on the business world.
- 2** Identify the IT resources businesses have at their disposal and how these resources are used.
- 3** Describe the role of information systems, the different types of information systems, and how businesses use such systems.
- 4** Identify the threats and risks information technology poses on businesses.
- 5** Describe the ways in which businesses protect themselves from the threats and risks information technology poses.

are using marketing techniques—most notably “targeting”—to reach specific audiences. Also known as “spear phishing,” with targeting, scammers do research to identify wealthy individuals, families, and professional money managers. Victims receive friendly-sounding e-mails containing contaminated attachments that, once opened, infect their computers, exposing bank account and other identity information to scammers. While computer security devices—spam filters, data encryption, firewalls, and anti-virus software—catch a vast number of intrusions, the threat remains.¹

Our opening story continues on page 350.

WHAT'S IN IT FOR ME?

Protecting against cyber-attacks is an extreme example of the way the Internet and related technologies are reshaping the business landscape. But even the most traditional businesses must change with the times, whether those times are defined by paper and pencil, telephone and fax machine, or digital language translators and smartphones. Indeed, it may seem like the times are changing more rapidly with each passing year, and it is in this context that our discussion of the various kinds of information technology, their functions, and the benefits and risks associated with each assumes particular importance. By understanding the material in this chapter, you'll have a clearer picture of how technology is used by and affects business, and how you can use it to your best advantage.

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1 Discuss the impacts information technology has had on the business world.

IT Impacts

The effect of **Information technology (IT)** on business has been immeasurable. In fact, IT—the various appliances and devices for creating, storing, exchanging, and using information in diverse modes, including visual images, voice, multimedia, and business data—has altered the very structure of business organizations, radically changing the way employees and customers interact. We see ads all the time for the latest cell phones, iPads, laptops, PDAs, and smartphones, and most of us connect daily to the Internet. E-mail has become a staple in business, and even such traditionally “low-tech” businesses as nail salons and garbage collection companies are becoming dependent on the Internet, computers, and networks. As consumers, we interact with databases every time we withdraw money from an ATM, order food at McDonalds, or check on the status of a package at UPS.com. Technology and its effects are evident everywhere.

E-commerce (short for *electronic commerce*)—the use of the Internet and other electronic means for retailing and business-to-business transactions—has created new market relationships around the globe. In this section, we’ll look at how businesses are using IT to bolster productivity, improve operations and processes, create new opportunities, and communicate and work in ways not possible before.

Creating Portable Offices: Providing Remote Access to Instant Information

IT appliances such as BlackBerry® smartphones, Nokia smartphones, and others feature wireless Internet access and PC-style office applications, saving businesses time and travel expenses by enabling employees, customers, and suppliers to communicate from any location. IT’s mobile messaging capabilities mean that a geographic separation between the workplace and headquarters is more common. Employees no longer work only at the office or the factory, nor are all of a company’s operations performed at one place; employees take the office with them. When using such devices, off-site employees have continuous access to information, instead of being forced to be at a desk to access their files and the Internet. Client project folders, e-mail, and voice messaging are accessible from any location. Such benefits have attracted 55 million enthusiastic subscribers to BlackBerry® smartphones, making it a leader in the handheld wireless industry until losing its top spot to the iPad.²

Enabling Better Service by Coordinating Remote Deliveries

Meanwhile, with access to the Internet, company activities may be geographically scattered but remain coordinated through a networked system that provides better service for customers. Many businesses, for example, coordinate activities from one centralized location, but their deliveries flow from several remote locations, often at lower cost. When you order furniture—for example, a chair, a sofa, a table, and two lamps—from an Internet storefront, the chair may come from a warehouse in Philadelphia and the lamps from a manufacturer in California; the sofa and table may be shipped direct from different suppliers in North Carolina. Beginning with the customer’s order, activities are coordinated through the company’s network, as if the whole order were being processed at one place. This avoids the expensive in-between step of first shipping all the items to a central location.

Creating Leaner, More Efficient Organizations

Networks and technology are also leading to leaner companies with fewer employees and simpler structures. Because networks enable firms to maintain information linkages among both employees and customers, more work and



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Gain hands-on experience through an interactive, real-world scenario. This chapter’s simulation entitled Technology Direction is located at www.mybizlab.com.

customer satisfaction can be accomplished with fewer people. Bank customers dial into a 24-hour information system and monitor their accounts without employee assistance. Instructions that once were given to assembly workers by supervisors are now delivered to workstations electronically. IT communications provide better use of employee skills and greater efficiencies from physical resources. For example, truck drivers used to return to a shipping terminal to receive instructions from supervisors on reloading freight for the next delivery. Today, one dispatcher using IT has replaced several supervisors. Instructions to the fleet arrive on electronic screens in trucks on the road so drivers know in advance the next delivery schedule, while satellite navigation services, such as the XM NavTraffic, alert drivers of traffic incidents ahead so they can reroute to avoid delivery delays.³



Barack Obama's Blackberry uses an encrypted system for secure messaging with advisors and colleagues.

Enabling Increased Collaboration

Collaboration among internal units and with outside firms is greater when firms use collaboration (collaborative) software and other IT communications devices, which we'll discuss later in this chapter. Companies are learning that complex problems can be better solved through IT-supported collaboration, either with formal teams or spontaneous interaction among people and departments. The design of new products, for example, was once an engineering responsibility. Now it is a shared activity using information from people in marketing, finance, production, engineering, and purchasing who, collectively, determine the best design. For example, the design of Boeing's 787 Dreamliner aircraft is the result of collaboration, not just among engineers, but also from passengers (who wanted electric outlets to recharge personal electronic devices), cabin crews (who wanted more bathrooms and wider aisles), and air-traffic controllers (who wanted larger, safer air brakes).

Enabling Global Exchange

The global reach of IT is enabling business collaboration on a scale that was unheard of before. Consider Lockheed Martin's contract for designing and supplying thousands of Joint Strike Fighters in different versions for the United States, Britain, Italy, Denmark, Canada, and Norway. Lockheed can't do the job alone—over the project's 20-year life, more than 1,500 firms will supply everything from radar systems to engines to bolts. In just the startup phase, Lockheed collaborated with Britain's BAE Systems along with more than 70 U.S. and 18 international subcontractors at some 190 locations, including an Australian manufacturer of aviation communications and a Turkish electronics supplier. In all, 40,000 remote computers are collaborating on the project using Lockheed's Internet-based system. Web collaboration on a massive scale is essential for coordinating design, testing, and construction while avoiding delays, holding down costs, and maintaining quality.⁴

Information Technology (IT) various appliances and devices for creating, storing, exchanging, and using information in diverse modes, including visual images, voice, multimedia, and business data

E-commerce use of the Internet and other electronic means for retailing and business-to-business transactions

Improving Management Processes

IT has also changed the nature of the management process. The activities and methods of today's manager differ significantly from those that were common just a few years ago. At one time, upper-level managers didn't concern themselves with all of the detailed information filtering upward from the workplace because it was expensive to gather, slow in coming, and quickly became out of date. Workplace management was delegated to middle and first-line managers.

With databases, specialized software, and networks, however, instantaneous information is accessible and useful to all levels of management. For example, consider *enterprise resource planning (ERP)*: an information system for organizing and managing a firm's activities across product lines, departments, and geographic locations. The ERP stores real-time information on work status and upcoming transactions and notifies employees when action is required if certain schedules are to be met. It coordinates internal operations with activities of outside suppliers and notifies customers of upcoming deliveries and billings. Consequently, more managers use it routinely for planning and controlling company-wide operations. Today, a manager at Hershey Foods, for example, uses ERP to check on the current status of any customer order for Kisses or strawberry Twizzlers, inspect productivity statistics for each workstation, and analyze the delivery performance on any shipment. Managers can better coordinate company-wide performance. They can identify departments that are working well together and those that are lagging behind schedule and creating bottlenecks.

Providing Flexibility for Customization

IT advances also create new manufacturing capabilities that enable businesses to offer customers greater variety, customizable options, and faster delivery cycles. Whether it's an iPhone app or a Rawlings baseball glove, today's design-it-yourself world is possible through fast, flexible manufacturing using IT networks. At Ponoko.com you can design and make just about anything, from electronics to furniture. Buyers and materials suppliers, meeting electronically, have rapidly generated thousands of product designs online. The designs can be altered to suit each buyer's tastes. Similarly, at San Francisco-based Timbuk2's website, you can "build your own" custom messenger bag at different price levels with your choice of size, fabric, color combination, accessories, liner material, strap, and even left- or right-hand access.⁵ This principle is called **mass-customization**: Although companies produce in large volumes, IT allows each item to feature the unique options the customer prefers. With IT, the old standardized assembly line has become quickly adaptable because workers have instantaneous access to assembly instructions for all the product options, and equipment can be changed quickly for each customer's order.

As shown in Figure 13.1, flexible production and speedy delivery depend on an integrated network of information to coordinate all the activities among customers, manufacturers, suppliers, and shippers.

Providing New Business Opportunities

Not only is IT improving existing businesses, it is creating entirely new businesses where none existed before. For big businesses, this means developing new products, offering new services, and reaching new clients. Only a few years ago, today's multibillion-dollar behemoth known as Google was a fledgling search engine. That company boasts not just a search engine but hundreds of services including virtual maps, YouTube video, instant messaging, e-mail, and online software services such as photo editing and document creation.

The IT landscape has also presented small-business owners with new e-business opportunities. Consider Richard Smith. His love for stamp collecting began at age seven. Now, some 50 years after saving that first stamp, he's turned his hobby into a profitable eBay business. Each day begins at the PC in his home office, scanning eBay's listings for items available and items wanted by sellers and buyers around the world. With more than 3,000 sales transactions to date, Richard maintains a perfect

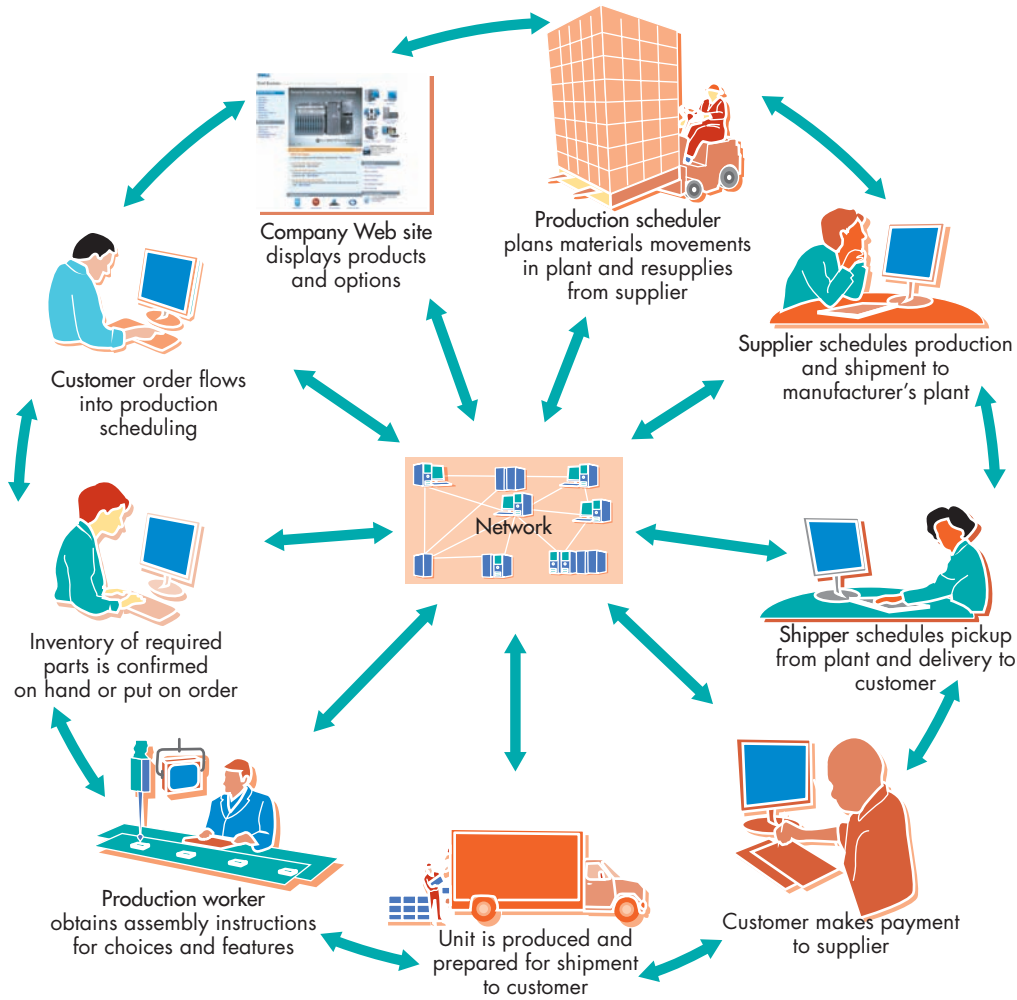


Figure 13.1 Networking for Mass Customization

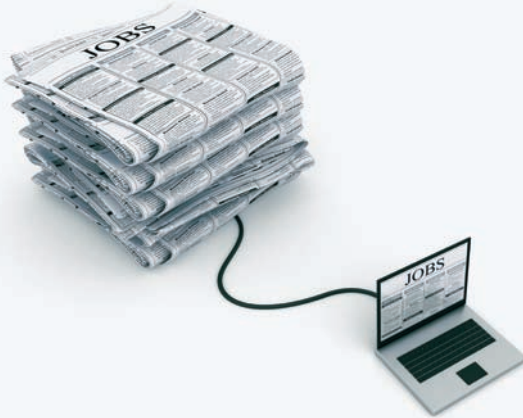
customer rating and recently earned more than \$4,000 on a single eBay transaction. More than 600 online marketplaces allow entrepreneurs to sell directly to consumers, bypassing conventional retail outlets, and enable B2B selling and trading with access to a worldwide customer base. To assist start-up businesses, eBay’s services network is a ready-made online business model, not just an auction market. Services range from credit financing to protection from fraud and misrepresentation, information security, international currency exchanges, and post-sales management. These features enable users to complete sales transactions, deliver merchandise, and get new merchandise for future resale, all from the comfort of their own homes. Many eBay users, like Richard Smith, have carved profitable new careers.

Improving the World and Our Lives

Can advancements in IT really make the world a better place? The development of smartphones and other electronic devices has certainly brought enjoyment and convenience to the everyday lives of millions of people around the globe. Extending technology beyond earlier cell phones and PCs, new technologies provide access to endless choices of *apps* (shorthand for *application software*), allowing each user to “build it your way,” depending on what you want your device to do and how you’ll be using it. Apps

Mass-Customization principle in which companies produce in large volumes, but each item features the unique options the customer prefers

Alex Slobodkin/Stockphoto.com



Social Networking as a Service The many forms of social media—blogs, chats, and networks such as LinkedIn, Twitter, and Facebook—are no longer just playthings for gossips and hobbyists. They're also active tools for getting a job. With the economic meltdown, millions of job seekers have turned to online networking—tapping leads from friends, colleagues, and acquaintances—for contacts with companies that may be hiring. Peers and recruiters are networking using electronic discussion forums and bulletin boards at websites of professional associations and trade groups, technical schools, and alumni organizations. Some social sites provide occupation-specific career coaching and job tips: Scientists are connecting with Epernicus, top managers use Meet the Boss, and graduate students are connecting with Graduate Junction.⁶

RED HUBER KRT/Newscom



After this capsule is swallowed, the camera inside it can transmit almost 50,000 images during its eight-hour journey through the digestive tract.

for computers and smartphones include *programs* for learning languages, music, work, games, traveling, art, and almost any other area of interest. Just two years after its opening, Apple's App Store had supplied over 10 billion app downloads worldwide to users of Macs, iPhones, iPads, and iPod touches.

Organizations, too, including hospitals and medical equipment companies are embracing IT advancements to provide better services. For example, when treating combat injuries, surgeons at Walter Reed Army Medical Center rely on high-tech imaging systems that convert two-dimensional photographs of their patients' anatomies into three-dimensional physical models for presurgical planning. These 3-D mockups of shoulders, femurs, and facial bones give doctors the opportunity to see and feel the anatomy as it will be seen in the operating room, before they even use their scalpels. Meanwhile, pill-sized cameras that patients swallow are providing doctors with images of the insides of the human body, helping them to make better diagnoses for such ailments as ulcers and cancer.⁷

IT Building Blocks: Business Resources

Businesses today have a wide variety of IT resources at their disposal. In addition to the Internet and e-mail, these include communications technologies, networks, hardware devices, and software, as shown at technology media sites such as Techweb.com.

2 Identify the IT resources businesses have at their disposal and how these resources are used.

The Internet and Other Communication Resources

The **Internet** is a gigantic system of interconnected computer networks belonging to millions of collaborating organizations and agencies—government, business, academic, and public—linked together by voice, electronic, and wireless technologies.⁸ Computers within the networks are connected by various communications protocols, or standardized coding systems, such as the **hypertext transfer protocol (HTTP)**—which is used for the **World Wide Web**, a branch of the Internet consisting of interlinked hypertext documents, or web pages. Other protocols serve a variety of purposes such as sending and receiving e-mail. The World Wide web and its protocols provide the common language that allows information sharing on the Internet. For thousands of businesses, the Internet has replaced the telephone, fax machine, and standard mail as the primary communications tool.



In this map of the Internet, from The Opte Project, each line represents a connection between computers or other network devices.

The Internet has spawned a number of other business communications technologies, including *intranets*, *extranets*, *electronic conferencing*, and *VSAT satellite communications*.

Intranets Many companies have extended Internet technology by maintaining internal websites linked throughout the firm. These private networks, or **intranets**, are accessible only to employees and may contain confidential information on benefits programs, a learning library, production management tools, or product design resources. The Ford Motor Company's intranet is accessible to 200,000 people daily at workstations in Asia, Europe, and the United States. It contains private information on Ford's employee benefits, production management tools, and product design resources. Sharing information on engineering, distribution, and marketing has reduced the lead time for getting new models into production and has shortened customer delivery times.⁹

Extranets **Extranets** allow outsiders limited access to a firm's internal information network. The most common application allows buyers to enter a system to see which products are available for sale and delivery, thus providing convenient product-availability information. Industrial suppliers are often linked into customers' information networks so that they can see planned production schedules and prepare supplies for customers' upcoming operations. The extranet at Chaparral

Internet gigantic system of interconnected computer networks linked together by voice, electronic, and wireless technologies

Hypertext Transfer Protocol (HTTP) communications protocol used for the World Wide Web, in which related pieces of information on separate web pages are connected using hyperlinks

World Wide Web branch of the Internet consisting of interlinked hypertext documents, or web pages

Intranet organization's private network of internally linked websites accessible only to employees

Extranet system that allows outsiders limited access to a firm's internal information network

Steel Company, for example, lets customers shop electronically through its storage yards and gives them electronic access to Chaparral's planned inventory of industrial steel products.

Electronic Conferencing Electronic conferencing allows groups of people to communicate simultaneously from various locations via e-mail, phone, or video, thereby eliminating travel time and saving money. One form, called *dataconferencing*, allows people in remote locations to work simultaneously on one document. *Videoconferencing* allows participants to see one another on video screens while the conference is in progress. For example, Lockheed Martin's Joint Strike Fighter project, discussed earlier, uses Internet collaboration systems with both voice and video capabilities. Although separated by oceans, partners can communicate as if they were in the same room for redesigning components and production schedules. Electronic conferencing is attractive to many businesses because it eliminates travel and saves money.

VSAT Satellite Communications Another Internet technology businesses use to communicate is **VSAT satellite communications**. VSAT (short for *very small aperture terminal*) systems have a transmitter-receiver (*transceiver*) that sits outdoors with a direct line of sight to a satellite. The hub—a ground-station computer at the company's headquarters—sends signals to and receives signals from the satellite, exchanging voice, video, and data transmissions. An advantage of VSAT is privacy. A company that operates its own VSAT system has total control over communications among its facilities, no matter their location, without dependence on other companies. A firm might use VSAT to exchange sales and inventory information, advertising messages, and visual presentations between headquarters and store managers at remote sites. For example, stores in Minneapolis, London, and Boston might communicate with headquarters in New York, sending and receiving information via a satellite, as shown in Figure 13.2.

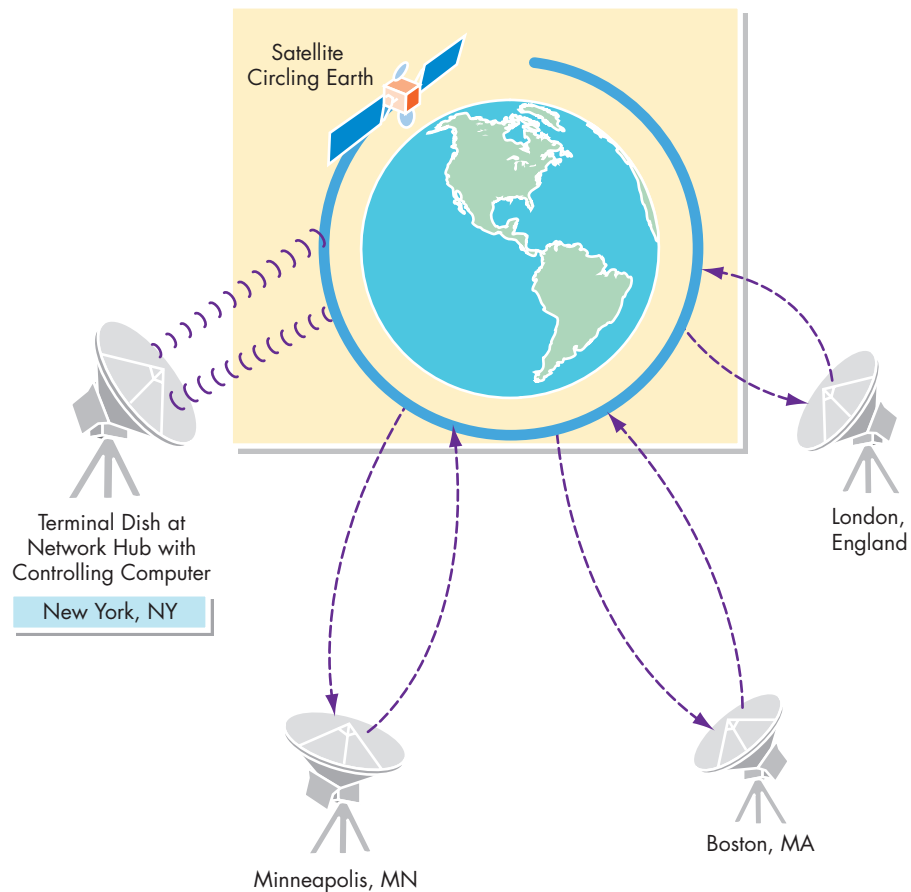


Figure 13.2 A VSAT Satellite Communication Network

Networks: System Architecture

A **computer network** is a group of two or more computers linked together, either hard-wired or wirelessly, to share data or resources, such as a printer. The most common type of network used in businesses is a **client-server network**. In client-server networks, *clients* are usually the laptop or desktop computers through which users make requests for information or resources. *Servers* are the computers that provide the services shared by users. In big organizations, servers are usually assigned a specific task. For example, in a local university or college network, an *application server* stores the word-processing, spreadsheet, and other programs used by all computers connected to the network. A *print server* controls the printers, stores printing requests from client computers, and routes jobs as the printers become available. An *e-mail server* handles all incoming and outgoing e-mail. With a client-server system, users can share resources and Internet connections—and avoid costly duplication.

Networks can be classified according to geographic scope and means of connection (either wired or wireless).

Wide Area Networks (WANs) Computers that are linked over long distances—statewide or even nationwide—through telephone lines, microwave signals, or satellite communications make up what are called **wide area networks (WANs)**. Firms can lease lines from communications vendors or maintain private WANs. Walmart, for example, depends heavily on a private satellite network that links thousands of U.S. and international retail stores to its Bentonville, Arkansas, headquarters.

Local Area Networks (LANs) In **local area networks (LANs)**, computers are linked in a smaller area such as an office or a building. For example, a LAN unites hundreds of operators who enter call-in orders at TV's Home Shopping Network facility. The arrangement requires only one computer system with one database and one software system.

Wireless Networks Wireless networks use airborne electronic signals to link network computers and devices. Like wired networks, wireless networks can reach across long distances or exist within a single building or small area. For example, the BlackBerry® smartphones system shown in Figure 13.3 consists of devices that send and receive transmissions on the **wireless wide area networks (WWANs)** of more than 100 service providers—such as Cellular One (United States), T-Mobile (United Kingdom and United States), and Vodafone Italia (Italy)—in countries throughout the world. The wireless format that the system relies on to control wireless messaging is supplied by Research In Motion® (RIM®), the company that makes the BlackBerry® smartphone, and is installed on the user-company's computer. A *firewall* provides privacy protection. We'll discuss firewalls in more detail later in the chapter.

Wi-Fi You've no doubt heard of "hotspots"—nearly 1 million locations worldwide, such as coffee shops, hotels, airports, and cities that provide wireless Internet connections for people on the go. Each hotspot, or **Wi-Fi** (a play on audio recording term Hi-Fi) access point, uses its own small network, called a **wireless local area network (wireless LAN or WLAN)**. Although wireless service is free at some hotspots, others charge a fee—a daily or hourly rate—for the convenience of Wi-Fi service.

Electronic Conferencing IT that allows groups of people to communicate simultaneously from various locations via e-mail, phone, or video

VSAT Satellite Communications network of geographically dispersed transmitter-receivers (transceivers) that send signals to and receive signals from a satellite, exchanging voice, video, and data transmissions

Computer Network group of two or more computers linked together by some form of cabling or by wireless technology to share data or resources, such as a printer

Client-Server Network common business network in which **clients** make requests for information or resources and **servers** provide the services

Wide Area Network (WAN) computers that are linked over long distances through telephone lines, microwave signals, or satellite communications

Local Area Network (LAN) computers that are linked in a small area, such as all of a firm's computers within a single building

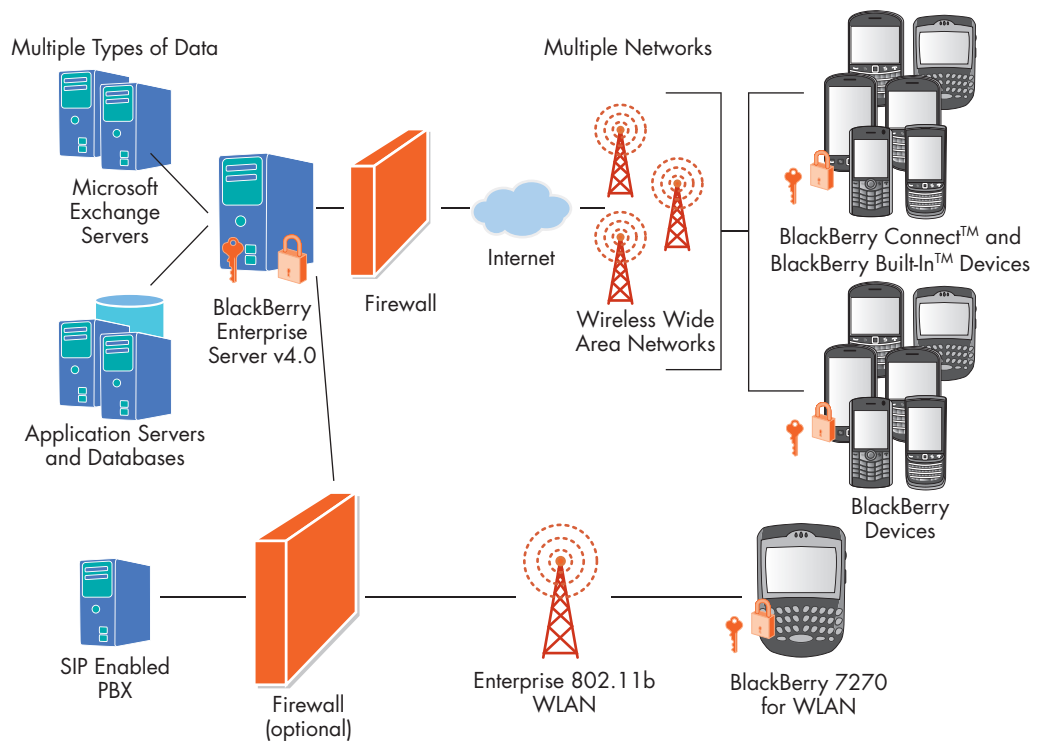
Wireless Wide Area Network (WWAN) network that uses airborne electronic signals instead of wires to link computers and electronic devices over long distances

Wi-Fi technology using a wireless local area network

Wireless Local Area Network (Wireless Lan or Wlan) local area network with wireless access points for PC users

Figure 13.3 Core Components in BlackBerry Wireless Internet Architecture

Source: Major modifications of diagrams at the BlackBerry Web site, modified from Research in Motion, Limited, technical images, at http://www.blackberry.com/images/technical/bes_exchange_architecture.gif. BlackBerry®, RIM®, Research In Motion® y las marcas comerciales, los nombres y los logos relacionados son propiedad de Research In Motion Limited y están registrados y/o se utilizan en los Estados Unidos y en otros países. Uso bajo licencia de Research In Motion Limited.



The benefit of Wi-Fi is that its millions of users are not tethered to a wire for accessing the Internet. Employees can wait for a delayed plane in the airport and still be connected to the Internet through their wireless-enabled laptops or other devices. However, as with every technology, Wi-Fi has limitations, including a short range of distance. This means that your laptop's Internet connection can be severed if you move farther than about 300 feet from the hotspot. In addition, thick walls, construction beams, and other obstacles can interfere with the signals sent out by the network. So, while a city may have hundreds of hotspots, your laptop must remain near one to stay connected. *WiMAX* (*Worldwide Interoperability for Microwave Access*), the next step in wireless advancements, improves this distance limitation with its wireless range of up to 30 miles.

Hardware and Software

Any computer network or system needs **hardware**—the physical components, such as keyboards, monitors, system units, and printers. In addition to the laptops, desktop computers, and BlackBerry® smartphones mentioned earlier, *handheld computers* and smartphones are also used often in businesses. For example, Target employees roam the store aisles using handhelds to identify, count, and order items; track deliveries; and update backup stock at distribution centers to keep store shelves replenished with merchandise.

The other essential in any computer system is **software**: programs that tell the computer how to function. Software includes *system software*, such as Microsoft Windows 7 for PCs, which tells the computer's hardware how to interact with the software, what resources to use, and how to use them. It also includes *application software* (apps) such as Microsoft's Live Messenger and Photo Gallery, which are programs that meet the needs of specific users. Some application programs are used to address such common, long-standing needs as database management and inventory control, whereas others have been developed for a variety of specialized tasks ranging from mapping the oceans' depths to analyzing the anatomical structure of the human body. For example, IBM's Visualization Data Explorer software uses data from field samples to model the underground structure of an oil field. The imagery in Figure 13.4, for example, provides engineers with better information on oil location and reduces the risk of their hitting less productive holes.



Figure 13.4 3-D computer modeling software gives engineers a better idea of where oil might be located

Finally *groupware*—software that connects group members for e-mail distribution, electronic meetings, message storing, appointments and schedules, and group writing—allows people to collaborate from their own desktop PCs, even if they’re remotely located. It is especially useful when people work together regularly and rely heavily on information sharing. Groupware systems include IBM Lotus Sametime and Novell GroupWise.

Information Systems: Harnessing the Competitive Power of IT

3 Describe the role of information systems, the different types of information systems, and how businesses use such systems.

Business today relies on information management in ways that no one could foresee a decade ago. Managers now treat IT as a basic organizational resource for conducting daily business. At major firms, every activity—designing services, ensuring product delivery and cash flow, and evaluating personnel—is linked to *information systems*. An **information system (IS)** uses IT resources that enable managers to take **data**—raw facts and figures that, by themselves, may not have much meaning—and turn those data into **information**—the meaningful, useful interpretation of data. Information systems also enable managers to collect, process, and transmit that information for use in decision making.

One company well-known for its strategic use of information systems is Walmart. The nerve center for company operations is a centralized IS in Bentonville, Arkansas. The IS drives costs down and raises efficiency because the same methods and systems are applied for all 9,000-plus stores in 15 countries. Data on the billions of

Hardware physical components of a computer network, such as keyboards, monitors, system units, and printers

Software programs that tell the computer how to function, what resources to use, how to use them, and application programs for specific activities

Information System (IS) system that uses IT resources to convert data into information and to collect, process, and transmit that information for use in decision making

Data raw facts and figures that, by themselves, may not have much meaning

Information meaningful, useful interpretation of data

MANAGING IN TURBULENT TIMES

When Cash Gets Scarce, Businesses Switch to Internet Bartering

For many companies, the economic downturn involves tighter credit, a drop in sales revenues, and a shortage of cash for doing business. Without cash and credit, companies can't buy the materials, services, and supplies needed to produce products for customers, so business prospects grow even dimmer. Or do they? Enter an unexpected liberator—bartering. This ancient trade practice survives even today, but in an Internet-enhanced form with global reach and instantaneous access to a vast network of swap agreements. And best of all, it can be done without cash: For example, Firm A provides an advertising program for Firm B that, in return, has vacant building space needed by Firm A. Thus, the needs of both are met, and a cashless swap is born. As the recession has deepened, the popularity of bartering is booming. In 2010, BarterQuest.com had more than 50,000 monthly visitors from Australia, USA, and elsewhere. Activity has tripled at U-Exchange.com, where its “Barter 101” gets you started, and you can barter as much as you like at no cost. Overall, the electronically based barter business has grown to a \$600 billion industry.¹⁰

Whether it's B2B or business-to-consumer, online bartering is an efficient way around the recession's credit crunch because it enables companies and individuals to get goods and services without using cash. Restaurants, for example, can trade meals or catering for advertising or for cooking equipment. Bartering can also be a good way to move excessive inventory and get needed benefits in return. An unemployed electrician bartered with homeowners who needed electrical wiring; in return, the homeowners gave up unneeded furniture and laptops that the electrician later sold to make mortgage payments.



Yuri Arcurs/Shutterstock

For avid swappers of services, websites such as PeopleTrading Services.com make it easy for small business owners to find barter matchups with hundreds of kinds of services, ranging from gardeners to songwriters to clergy. As a barter matchmaker, PeopleTradingServices.com posts members' profiles, lists services they trade, and provides a convenient way to contact member professionals online. Along with endless trading possibilities, the cash conservation can be a life-saver for any cash-strapped small business during troubled times.¹¹

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sales transactions—time, date, and place—flow to Bentonville. The information system tracks millions of stock-keeping units (SKUs) weekly, enforces uniform reordering and delivery procedures on its suppliers, including 57,000 in the U.S. and 22,000 in China, and regulates the flow of merchandise through its distribution centers and stores.

Beyond the firm's daily operations, information systems are also crucial in planning. Managers routinely use the IS to decide on products and markets for the next 5 to 10 years. The company's vast database enables marketing managers to analyze demographics, and it is also used for financial planning, materials handling, and electronic funds transfers with suppliers and customers.

Walmart, like most businesses, regards its information as a private resource—an asset that's planned, developed, and protected. Therefore, it's not surprising that they have **information systems managers** who operate the systems used for gathering, organizing, and distributing information, just as they have production, marketing, and finance managers. These managers use many of the IT resources

we discussed earlier—the Internet, communications technologies, networks, hardware, and software—to sift through information and apply it to their jobs.

Leveraging Information Resources: Data Warehousing and Data Mining

Almost everything you do leaves a trail of information about you. Your preferences in movie rentals, television viewing, Internet sites, and groceries; the destinations of your phone calls, your credit card charges, your financial status; personal information about age, gender, marital status, and even your health are just a few of the items about each of us that are stored in scattered databases. The behavior patterns of millions of users can be traced by analyzing files of information gathered over time from their Internet usage and in-store purchases.

The collection, storage, and retrieval of such data in electronic files is called **data warehousing**. For managers, the data warehouse is a goldmine of information about their business. Indeed, Kroger Co., the Ohio-based grocery chain, collects data on customer shopping habits to find ways to gain greater customer loyalty. As part owner of a data-mining firm, Kroger accumulates information from its shopper cards, analyzes the data to uncover shopping patterns, and sends money-saving coupons to regular customers for the specific products they usually buy. Kroger's precision targeting pays off, especially in the recession economy. With a rate of coupon usage up to as much as 50 times the industry average, it's a money-saver for Kroger customers and boosts the company's sales, too.¹²

Data Mining After collecting information, managers use **data mining**—the application of electronic technologies for searching, sifting, and reorganizing pools of data to uncover useful information. Data mining helps managers plan for new products, set prices, and identify trends and shopping patterns. By analyzing what consumers actually do, businesses can determine what subsequent purchases they are likely to make and then send them tailor-made ads. The *Washington Post*, for example, uses data-mining software to analyze census data and target households likely to respond to sales efforts.¹³

Information Linkages with Suppliers The top priority for Walmart's IS—improving in-stock reliability—requires integration of Walmart's and suppliers' activities with store sales. That's why P&G, Johnson & Johnson, and other suppliers connect into Walmart's information system to observe up-to-the-minute sales data on individual items, by store. They can use the system's computer-based tools—spreadsheets, sales forecasting, and weather information—to forecast sales demand and plan delivery schedules. Coordinated planning avoids excessive inventories, speeds up deliveries, and holds down costs throughout the supply chain while keeping shelves stocked for retail customers.



Marc F. Hemming/Alamy

Retailers such as Wal-Mart and Sam's Club rely on data warehousing and mining to keep shelves stocked with in-demand merchandise.

Information Systems Managers managers who operate the systems used for gathering, organizing, and distributing information

Data Warehousing the collection, storage, and retrieval of data in electronic files

Data Mining the application of electronic technologies for searching, sifting, and reorganizing pools of data to uncover useful information

ENTREPRENEURSHIP AND NEW VENTURES

Speaking Loud and Clear: A New Voice Technology

IT users for years have sought a natural-sounding voice interface to enhance IT systems with vocal output, beyond traditional print or visual output. Vocal technologies, however, were less than effective, that is until 2005 when Matthew Aylett and Nick Wright formed CereProc (short for Cerebral Processing) in Edinburgh, Scotland.¹⁴ From the outset, the firm has been dedicated to creating better synthetic voices with character and emotion that stimulates listeners with natural-sounding messages. Before CereProc, these lofty goals were prohibitive. Speech experts couldn't create text-to-voice software that sounds realistically conversational, varying tone-of-voice and providing various vocal inflections for different situations. Previous software couldn't adapt incoming text (from word processing or from text messages) into natural voice formats. To attack these challenges CereProc brought together a team of leading speech experts. It also partnered with leading universities and research programs in speech science technology, and in developing new applications and markets for voice output.

The company's main product is CereVoice, an advanced text-to-voice technology available on mobile devices, PCs, servers, and headsets, and that has applications in most any company's products for better synthetic voices. Any computer's existing voice system can be replaced with more natural-sounding speech in a choice of accents, including Southern British English, Scottish, and American that can be sampled with live voice demos at the firm's web-site.¹⁵ Potential applications are endless—kitchen appliances, alarm systems, traffic controllers, automobile appliances, radio broadcasting, telephone messaging, and movies, to name a few. Although consumers may not see the CereVoice label, they will be hearing its various voices often in their everyday lives.

CereProc's Voice Creation service can create a synthesized imitation of a person's voice, including its tones and inflections. That's how noted film critic Roger Ebert got

his voice back, four years after losing the ability to speak following cancer-related surgery. CereProc's voice engineers used recordings of Ebert's voice from 40 years of past television broadcasts, capturing individual sounds and identifying various voice characteristics. With meticulous care, specialists then pieced them back together into software that mimics the Pulitzer-Prize winner's earlier voice. Ebert types his comments into a computer that, in turn, converts the text into words that are spoken in his voice. This first-of-its-kind application made a memorable public appearance on the Oprah show, as Roger enthusiastically demonstrated his voice coming from the computer.¹⁶ Beyond its technical success, this project vividly displays a compassionate side in CereProc's business.

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ABS WENN Photos/Newscom

Types of Information Systems

Employees have a variety of responsibilities and decision-making needs, and a firm's *information system* may actually be a set of several systems that share information while serving different levels of the organization, different departments, or different operations. Because they work on different kinds of problems, managers and their employees have access to the specialized information systems that satisfy their different information needs.

In addition to different types of users, each business *function*—marketing, human resources, accounting, production, or finance—has its own information needs, as do groups working on major projects. Each user group and department, therefore, may need a special IS.

Information Systems for Knowledge Workers As we discussed in Chapter 10, *knowledge workers* are employees for whom information and knowledge are the raw materials of their work, such as engineers, scientists, and IT specialists who rely on IT to design new products or create new processes. These workers require **knowledge information systems**, which provide resources to create, store, use, and transmit new knowledge for useful applications—for instance, databases to organize and retrieve information, and computational power for data analysis.

Specialized support systems have also increased the productivity of knowledge workers. **Computer-aided design (CAD)** helps knowledge workers—and now ordinary people too, as we saw at the beginning of this chapter—design products ranging from cell phones to jewelry to auto parts by simulating them and displaying them in 3-D graphics. In a more advanced version, known as *rapid prototyping*, the CAD system electronically transfers instructions to a computer-controlled machine that quickly builds a prototype—a physical model—of the newly designed product. The older method—making handcrafted prototypes from wood, plastic, or clay—is replaced with faster, cheaper prototyping.

In archaeology, CAD is helping scientists uncover secrets hidden in fossils using 3-D computer models of skeletons, organs, and tissues constructed with digital data from CT (computed tomography) scans of dinosaur fossils. From these models, scientists have learned, for example, that the giant apatosaurus's neck curved downward, instead of high in the air as once thought. By seeing how the animals' bones fit together with cartilage, ligaments, and vertebrae, scientists are discovering more about how these prehistoric creatures interacted with their environment.¹⁷

In a direct offshoot of computer-aided design, **computer-aided manufacturing (CAM)** uses computers to design and control the equipment needed in a manufacturing process. For example, CAM systems can produce digital instructions to control all the machines and robots on a production line. CAD and CAM coupled together (CAD/CAM) is useful to engineers in a manufacturing environment for designing and testing new products and then designing the machines and tools to manufacture the new product.

Information Systems for Managers Each manager's information activities and IS needs vary according to his or her functional area (accounting or marketing and so forth) and management level. The following are some popular information systems used by managers for different purposes.

Management Information Systems **Management information systems (MIS)** support managers by providing reports, schedules, plans, and budgets that can then be used for making decisions, both short- and long-term. For example, at Walsworth Publishing Company, managers rely on detailed information—current customer orders, staffing schedules, employee attendance, production schedules, equipment status, and materials availability—for moment-to-moment decisions during the day. They require similar information to plan such mid-range activities as personnel



Roger Harris/Photo Researchers, Inc.

The 3-D computer model of this dinosaur is constructed from digital scans of fossilized tissue.

Knowledge Information System information system that supports knowledge workers by providing resources to create, store, use, and transmit new knowledge for useful applications

Computer-Aided Design (CAD) IS with software that helps knowledge workers design products by simulating them and displaying them in three-dimensional graphics

Computer-Aided Manufacturing (CAM) IS that uses computers to design and control equipment in a manufacturing process

Management Information System (MIS) computer system that supports managers by providing information—reports, schedules, plans, and budgets—that can be used for making decisions

training, materials movements, and cash flows. They also need to anticipate the status of the jobs and projects assigned to their departments. Many MIS—cash flow, sales, production scheduling, and shipping—are indispensable for helping managers complete these tasks.

For longer-range decisions involving business strategy, Walsworth managers need information to analyze trends in the publishing industry and overall company performance. They need both external and internal information, current and future, to compare current performance data to data from previous years and to analyze consumer trends and economic forecasts.

Decision Support Systems Managers who face a particular kind of decision repeatedly can get assistance from **decision support systems (DSS)**—interactive systems that create virtual business models and test them with different data to see how they respond. When faced with decisions on plant capacity, for example, Walsworth managers can use a capacity DSS. The manager inputs data on anticipated sales, working capital, and customer-delivery requirements. The data flow into the DSS processor, which then simulates the plant's performance under the proposed data conditions. After experimenting with various data conditions, the DSS makes recommendations on the best levels of plant capacity for each future time period.

4 Identify the threats and risks information technology poses on businesses.

IT Risks and Threats

As with other technologies throughout history, IT has attracted abusers set on doing mischief, with severity ranging from mere nuisance to outright destruction. Eager IT users everywhere are finding that even social networking and cell phones have a “dark side”—privacy invasion. Facebook postings of personal information about users can be intercepted and misused by intruders. Beacon caused a public uproar when it published peoples’ online purchases publicly on their Facebook newsfeeds. And with cellular technology, some features of Bluetooth connections allow savvy intruders to read a victim’s text messages, listen in on live conversations, and even view unwary users’ photos.¹⁸

Businesses, too, are troubled with IT’s “dark side.” Hackers break into computers, stealing personal information and company secrets, and launching attacks on other computers. Meanwhile, the ease of information sharing on the Internet has proven costly for companies who are having an increasingly difficult time protecting their intellectual property, and viruses that crash computers have cost companies many billions annually. In this section, we’ll look at these and other IT risks. In the next section, we’ll discuss ways in which businesses are protecting themselves from these risks.

Hackers

Breaking and entering no longer refers merely to physical intrusion. Today, it applies to IT intrusions as well. **Hackers** are cybercriminals who gain unauthorized access to a computer or network, either to steal information, money, or property or to tamper with data. Another common hacker activity is to launch *denial of service (DoS) attacks*. DoS attacks flood networks or websites with bogus requests for information and resources, thereby shutting the networks or websites down and preventing legitimate users from accessing them.

Wireless mooching is a profitable industry for cybercriminals. In just five minutes, a *St. Petersburg Times* (Florida) reporter using a laptop found six unprotected wireless networks that were wide open to outside users.¹⁹ Once inside an unsecured wireless network, hackers can use it to conduct illegal business, such as child pornography or money laundering. When police officers try to track down these criminals, they’re long gone, leaving you, the network host, exposed to criminal prosecution.

Of Pirates and Profits Hackers often break into company networks to steal company or trade secrets. But it's not just hackers who are doing the stealing. Because the chances of getting caught seem slim, home users continue, illegally, to download unpaid-for movies, music, and other resources from file-swapping networks. A recent study shows that sound piracy costs the United States \$12.5 billion and 71,060 jobs annually. However, these losses also showcase what can happen to businesses who fail to adapt to changes in technology. The recording industry has been reluctant to embrace the Internet as a path for distribution, preferring to prosecute pirates rather than offer them legal online alternatives. On the other hand, Apple has benefitted immensely from its online distribution models, with over 10 billion songs sold—some analysts predict that by 2012 Apple's iTunes music store will account for 28 percent of all music sold throughout the world.²⁰

Identity Theft

Once inside a computer network, hackers are able to commit **identity theft**, the unauthorized stealing of personal information (such as Social Security number and address) to get loans, credit cards, or other monetary benefits by impersonating the victim. With up to 10 million victims each year, identity theft is the fastest growing crime in the United States.

Clever crooks get information on unsuspecting victims by digging in trash, stealing mail, or using *phishing* or *pharming* schemes to lure Internet users to bogus web-sites. For instance, a cybercriminal might send an America Online subscriber an e-mail notifying him or her of a billing problem with his or her account. When the customer clicks on the AOL Billing Center link, he or she is transferred to a spoofed (falsified) web page, modeled after AOL's. The customer then submits the requested information—credit card number, Social Security number, and PIN—into the hands of the thief. Her accounts are soon empty.

Intellectual Property Theft

Nearly every company faces the dilemma of protecting product plans, new inventions, industrial processes, and other **intellectual property**: something produced by the intellect or mind that has commercial value. Its ownership and right to its use may be protected by patent, copyright, trademark, and other means.

Hackers often break into company networks to steal company or trade secrets. But it's not just hackers who are doing the stealing. Because the chances of getting caught seem slim, home users continue, illegally, to download or copy unpaid-for movies, music, and other resources. The Commerce Department estimates that illegal product usage in the global market is costing U.S. companies hundreds of billions annually.

Computer Viruses, Worms, and Trojan Horses

Another IT risk facing businesses is rogue programmers who disrupt IT operations by contaminating and destroying software, hardware, or data files. Viruses, worms, and Trojan horses are three kinds of malicious programs that, once installed, can

Decision Support System (DSS) interactive system that creates virtual business models for a particular kind of decision and tests them with different data to see how they respond

Hacker cybercriminal who gains unauthorized access to a computer or network, either to steal information, money, or property or to tamper with data

Identity Theft unauthorized use of personal information (such as Social Security number and address) to get loans, credit cards, or other monetary benefits by impersonating the victim

Intellectual Property something produced by the intellect or mind that has commercial value

shut down any computer system. A *computer virus* exists in a file that attaches itself to a program and migrates from computer to computer as a shared program or as an e-mail attachment. It does not infect the system unless the user opens the contaminated file, and users typically are unaware they are spreading the virus by file sharing. It can, for example, quickly copy itself over and over again, using up all available memory and effectively shutting down the computer.

Worms are a particular kind of virus that travel from computer to computer within networked computer systems, without your needing to open any software to spread the contaminated file. In a matter of days, the notorious Blaster worm infected some 400,000 computer networks, destroying files and even allowing outsiders to take over computers remotely. The worm replicates itself rapidly, sending out thousands of copies to other computers in the network. Traveling through Internet connections and e-mail address books in the network's computers, it absorbs system memory and shuts down network servers, web servers, and individual computers.

Unlike viruses, a *Trojan horse* does not replicate itself. Instead, it most often comes into the computer, at your request, masquerading as a harmless, legitimate software product or data file. Once installed, the damage begins. For instance, it may simply redesign desktop icons or, more maliciously, delete files and destroy information.

Spyware

As if forced intrusion isn't bad enough, Internet users unwittingly invite spies—masquerading as a friendly file available as a giveaway or shared among individual users on their PCs. This so-called **spyware** is downloaded by users that are lured by “free” software. Once installed, it crawls around to monitor the host's computer activities, gathering e-mail addresses, credit card numbers, passwords, and other inside information that it transmits back to someone outside the host system. Spyware authors assemble incoming stolen information to create their own “intellectual property” that they then sell to other parties to use for marketing and advertising purposes or for identity theft.²¹

Spam

Spam—junk e-mail sent to a mailing list or a newsgroup (an online discussion group)—is a greater nuisance than postal junk mail because the Internet is open to the public, e-mail costs are negligible, and massive mailing lists are accessible through file sharing or by theft. Spam operators send unwanted messages ranging from explicit pornography to hate mail to advertisements, and even destructive computer viruses. In addition to wasting users' time, spam also consumes a network's bandwidth, thereby reducing the amount of data that can be transmitted in a fixed amount of time for useful purposes. U.S. industry experts estimate spam's damage in lost time and productivity at more than \$140 billion worldwide in 2008 alone.²²

5 Describe the ways in which businesses protect themselves from the threats and risks information technology poses.

IT Protection Measures

Security measures against intrusion and viruses are a constant challenge. Most systems guard against unauthorized access by requiring users to have protected passwords. Other measures include firewalls, special software, and encryption.

Preventing Unauthorized Access: Firewalls

Firewalls are security systems with special software or hardware devices designed to keep computers safe from hackers. A firewall is located where two networks—for example, the Internet and a company's internal network—meet. It contains two components for filtering incoming data:

- The company's *security policy*—Access rules that identify every type of data that the company doesn't want to pass through the firewall.

- A *router*—A table of available routes or paths; a “traffic switch” that determines which route or path on the network to send each piece of data after it is tested against the security policy.

Only that information that meets the conditions of the user’s security policy is routed through the firewall and permitted to flow between the two networks. Data that fail the access test are blocked and cannot flow between the two networks.

Preventing Identity Theft

While foolproof prevention is impossible, steps can be taken to avoid being victimized. A visit to the Identity Theft Resource Center (<http://www.idtheftcenter.org>) is a valuable first step to get information on everything from scam alerts to victim issues to legislation such as the Fair and Accurate Credit Transactions Act (FACTA). FACTA strengthens identity-theft protections by specifying how organizations must destroy information instead of dropping it in a dumpster. When a company disposes of documents that contain credit or Social Security information, they must be shredded, pulverized, or burned, and all electronic records (in computers and databases) must be permanently removed to keep them out of the hands of intruders.²³

Preventing Infectious Intrusions: Anti-Virus Software

Combating viruses, worms, Trojan horses, and any other infectious software (collectively known as *malware*) has become a major industry for systems designers and software developers. Installation of any of hundreds of **anti-virus software** products protects systems by searching incoming e-mail and data files for “signatures” of known viruses and virus-like characteristics. Contaminated files are discarded or placed in quarantine for safekeeping.

Many viruses take advantage of weaknesses in operating systems, such as Microsoft Windows, in order to spread and propagate. Network administrators must make sure that the computers on their systems are using the most up-to-date operating system that includes the latest security protection.

Protecting Electronic Communications: Encryption Software

Security for electronic communications is another concern for businesses. Unprotected e-mail can be intercepted, diverted to unintended computers, and opened, revealing the contents to intruders. Protective software is available to guard against those intrusions, adding a layer of security by encoding e-mails so that only intended recipients can open them. An **encryption system** works by scrambling an e-mail message so that it looks like garbled nonsense to anyone who doesn’t possess the key.

Spyware program unknowingly downloaded by users that monitors their computer activities, gathering e-mail addresses, credit card numbers, and other information that it transmits to someone outside the host system

Spam junk e-mail sent to a mailing list or a newsgroup

Firewall security system with special software or hardware devices designed to keep computers safe from hackers

Anti-Virus Software product that protects systems by searching incoming e-mails and data files for “signatures” of known viruses and virus-like characteristics

Encryption System software that assigns an e-mail message to a unique code number (digital fingerprint) for each computer so only that computer, not others, can open and read the message

Avoiding Spam and Spyware

To help their employees avoid privacy invasion and to improve productivity, businesses often install anti-spyware and spam-filtering software on their systems. While dozens of anti-spyware products provide protection—software such as Webroot Spy Sweeper and Microsoft Windows Defender—they must be continually updated to keep pace with new spyware techniques.

The federal CAN-SPAM Act of 2003 requires the Federal Trade Commission to shield the public from falsified header information, sexually explicit e-mails that are not so labeled, Internet spoofing (using trickery to make a message appear as if it came from a trusted source), and hijacking of computers through worms or Trojan horses. While it cannot be prevented entirely, spam is abated by many Internet service providers (ISPs) that ban the spamming of ISP subscribers. In a now-classic punishment, an ISP in Iowa was awarded \$1 billion in a lawsuit against 300 spammers that jammed the ISP system with an astounding 10 million e-mails a day. Anti-spam groups, too, promote the public's awareness of known spammers. The Spamhaus Project (<http://www.spamhaus.org>), for example, maintains a list—the Register of Known Spam Operators (ROKSO)—of around 100 professional spammers that are responsible for over 80 percent of spam traffic in North America and Europe.

Ethical Concerns in IT

It is apparent that IT developments and usage are progressing faster than society's appreciation for the potential consequences, including new ethical concerns. Along with IT's many benefits, its usage is creating previously unanticipated problems for which solutions are needed, yet they don't exist. Ease of access to computers, mobile devices, and the Internet, together with messaging capabilities and social networking, promote widespread public exposure about people's private lives, including personal information about how they think and feel. Just how this information should be used, by whom, under what conditions, and with what restrictions, if any, are issues teeming with ethical considerations. Several real-life episodes with ethical implications are shown in Table 13.1. See if you can identify significant ethical issues among the episodes in the table.

TABLE 13.1 Areas for Ethical Concerns in Information Technology and Its Uses

- In a now-classic case of cyber-bullying, a 13-year-old girl hanged herself after being taunted by a hoax message on her MySpace page.
- Secret webcasts of other people's behavior have resulted in embarrassment and even death: A university student, leaving a final message on his Facebook page, jumped from a bridge to his death after other students covertly webcast his sexual activities with another student.
- IT is used increasingly for sending out cries for help. Many college students have posted public messages requesting physical and emotional support. Others, having read those messages, are unsure if they should respond, or not.
- Employers and employees struggle about the extent of personal use of the company's IT. Many employees admit they use social networking and personal e-mailing at work, but should they? Many company's say "no," adding that employees should know that the company has access to all e-mails sent, received, and stored on its IT system.
- States are forming database pools, sharing information to check on suspicious prescription drug activities. Data are gathered on purchases at pharmacies, physicians' prescriptions, and police records to identify drug abuse by individuals and companies within states, and are being shared across state lines.
- Using drug prescription records for marketing purposes, companies collect data from pharmacies that keep track of physicians' histories in prescribing drugs. The companies then use data mining to uncover patterns of physician prescriptions, including the names of drugs and manufacturers. The data-mining companies then sell the resulting information to pharmaceutical manufacturers that can use it for selling their drugs to physicians who are prescribing competitors' drugs.

TABLE 13.1 *Continued*

- A Google engineer created a program that recorded personal information obtained from unsecured wireless networks by dispatching cars in several countries to identify wireless networks and to take photos for use in online mapping. The recordings captured unauthorized personal passwords, e-mails, and website addresses.
- A University of Iowa student flunked out of school due to his uncontrollable addiction to a video game that consumed all his attention.
- The Department of Homeland Security abandoned one of its major data-mining tools for combating terrorism after questions about its compliance with privacy rules. It was discovered that DHS had tested the data-mining program using information about real people, without ensuring the privacy of that information.
- To save money, IT users retrieve and share intellectual property—movies, articles, books, music, industrial information—with others, ignoring copyright, trademark, and patent protections. Written content is often taken from the Internet, inserted into the user's written work and is represented as the user's own original creation without citing its true source.



Dave Pilibosian/iStockphoto.com

Continued from page 329

Online Piracy Means Tougher Economic Times

Cyber cheating in many forms continues its upsurge during economic downturns. In one popular “work-at-home” scam, the unsuspecting victim (the new online “employee”) cashes checks sent from the “employer” in a foreign country and gets to keep 10 percent of the cash as a payment for service. The remaining 90 percent is sent via Western Union back to the employer. Because the checks are bogus, they bounce, and the victim must repay the full amounts to the bank. Alerting the public to another scam, SC Johnson, the company that makes household products such as Raid, Windex, and Pledge furniture cleaner, warns of phony online job offers for work-at-home customer service jobs, falsely using the Johnson name. The scammers say the job pays trainees \$20 an hour initially, advancing to \$25 after training, but employees must first buy some training software—which, of course, they pay for but never receive.

Organizations, too, are victims of cyber con-jobs: Why did U.S. DVD sales fall from \$20 billion in 2006 to \$14 billion in 2010? One reason is piracy, including simple tactics such as focusing a video camera at the computer screen that’s showing the movie. How are international industrial firms gaining competitive advantage in today’s tight world economy? Security consultants say that global cyber-attacks originating in China, and known as Night Dragon, are invading computers of oil companies, stealing information on competitive bidding, financing, and operations practices. Some governments, to save money, are actively scamming others, using hackers to steal technology secrets for leading-edge military equipment, including defense systems of other countries. Organizations of all kinds are finding cyber security more difficult as more and more employees use their personal phones and computers for conducting business. Organizational information, then, is more widely dispersed and increasingly susceptible to intrusion via mobile-phone malware, virus-contaminated applications, and links containing spyware sent from text messages.²⁴

QUESTIONS FOR DISCUSSION

- 1 Think about recent spam e-mails you’ve seen on PCs, and scam messages received via cell phone or smartphone. What kinds of information were the intruders seeking?
- 2 Continuing with the above question, were you able to identify the e-mails and messages to be “scams” before opening them, or was it later after they were opened that you discovered their real contents?
- 3 In what ways might the “opened” message from a scammer be harmful to you? To your IT devices and systems?
- 4 What steps can you take (or have you taken) to protect against such intrusions? What costs would be involved for gaining that protection?
- 5 Consider the various IT systems you use daily. What kinds of protective devices do they have to protect against invasion by cyber pirates?

SUMMARY OF LEARNING OBJECTIVES MyBizLab

1. Discuss the impacts information technology has had on the business world. (pp. 330–334)

The growth of IT has changed the very structure of business organizations. Its adoption provides new modes of communication, including portable offices, resulting in the geographic separation of the workplace from headquarters for many employees. By providing instantaneous access to company information, IT has altered the workforces in many companies, enabling them to streamline with fewer employees and simpler structures. It also contributes to greater flexibility in serving customers and enables closer coordination with suppliers. IT's global reach facilitates project collaboration with remote business partners and the formation of new market relationships around the globe. Just as electronic collaboration has changed the way employees interact with each other, IT networks have created new manufacturing flexibility for mass customization, and Internet access has brought new opportunities for small businesses.

2. Identify the IT resources businesses have at their disposal and how these resources are used. (pp. 334–339)

The Internet and the World Wide Web serve computers with information and provide communication flows among networks around the world. For many businesses, the Internet has replaced the telephone, fax machine, and standard mail as the primary communications tool. To support internal communications, many companies maintain internal websites—*intranets*—accessible only to employees. Some firms give limited network access to outsiders via *extranets* for coordination with suppliers and customers. Electronic conferencing allows simultaneous communication among groups from various locations, saving travel time and expenses. *VSAT satellite networks* provide private remote communications for voice, video, and data transmissions. *Computer networks* (wide area networks, local area networks) enable the sharing of information, hardware, software, and other resources over wired or wireless connections. *Hardware* refers to the computer's physical components. *System software* tells computer components and resources what to do. *Application software* includes programs to meet specific user needs, such as groupware with voice and video connections for remote collaboration.

3. Describe the role of information systems, the different types of information systems, and how businesses use such systems. (pp. 339–344)

An *information system (IS)* enables users to create, process, and transmit information for use in decision making. *Knowledge information systems* support knowledge workers by providing resources to create, store, use, and transmit new knowledge for useful applications. *Management information systems (MIS)* support managers

by providing reports, schedules, plans, and budgets that can then be used for making decisions at all levels ranging from detailed daily activities to long-range business strategies. The many uses of information systems include experimenting with *decision support systems* to test the effectiveness of potential decisions, data mining to identify shopping trends and to plan for new products, and planning for delivery schedules from suppliers and to customers.

4. Identify the threats and risks information technology poses on businesses. (pp. 344–346)

IT has attracted abusers that do mischief, with severity ranging from mere nuisance to outright destruction, costing companies millions. *Wireless moochers* use victims' networks for illegal activities, exposing the host to criminal prosecution. *Hackers* break into computers, stealing personal information and company secrets, tampering with data, and launching attacks on other computers. Once inside a computer network, hackers are able to commit *identity theft*, the unauthorized stealing of personal information to get loans, credit cards, or other monetary benefits by impersonating the victim. Even the ease of information sharing on the Internet poses a threat: It has proven costly for companies who are having a difficult time protecting their *intellectual property*, such as software products, movies, and music. Another IT risk facing businesses is system shutdown and destruction of software, hardware, or data files by *viruses*, *worms*, and *Trojan horses*. After invading a victim's computer, *spyware* gathers inside information and transmits it to outside spies. *Spam's* damage, too, is costly in terms of lost time and productivity.

5. Describe the ways in which businesses protect themselves from the threats and risks information technology poses. (pp. 346–349)

Most systems guard against unauthorized access by requiring users to have protected passwords. In addition, many firms rely on *firewalls*, so that only messages that meet the conditions of the company's security policy are permitted to flow through the network. Firms can protect against identity theft by using assistance from advisory sources, such as the Identity Theft Resource Center, and by implementing the identity-theft protection provisions of the federal FACTA rule for maintaining and destroying personal information records. To combat viruses, worms, and Trojan horses, *anti-virus software* products search incoming e-mail and data files for "signatures" of known viruses and virus-like characteristics. Contaminated files are discarded or placed in quarantine for safe-keeping. Additional intrusion protection is available by installing *anti-spyware* and *spam filtering software*. *Encryption* adds security by encoding messages that can be read only by intended recipients.

KEY TERMS MyBizLab

anti-virus software (p. 347)
 client-server network (p. 337)
 computer network (p. 337)
 computer-aided design (CAD) (p. 343)
 computer-aided manufacturing (CAM) (p. 343)
 data (p. 339)
 data mining (p. 341)
 data warehousing (p. 341)
 decision support system (DSS) (p. 344)
 e-commerce (p. 330)
 electronic conferencing (p. 336)
 encryption system (p. 347)
 extranet (p. 335)

firewall (p. 346)
 hacker (p. 344)
 hardware (p. 338)
 hypertext transfer protocol (HTTP) (p. 334)
 identity theft (p. 345)
 information (p. 337)
 information system (IS) (p. 339)
 information systems managers (p. 340)
 information technology (IT) (p. 330)
 intellectual property (p. 345)
 Internet (p. 334)
 intranet (p. 335)
 knowledge information system (p. 343)

local area network (LAN) (p. 337)
 management information system (MIS) (p. 343)
 mass-customization (p. 332)
 software (p. 338)
 spam (p. 346)
 spyware (p. 346)
 VSAT satellite communications (p. 336)
 wide area network (WAN) (p. 337)
 Wi-Fi (p. 337)
 wireless local area network (p. 337)
 wireless wide area network (WWAN) (p. 337)
 World Wide Web (p. 334)

QUESTIONS AND EXERCISES

QUESTIONS FOR REVIEW

1. Why must a business manage information as a resource?
2. How can electronic conferencing increase a company's productivity and efficiency?
3. Why do different users in an organization need different kinds of information from the information system?
4. Why have the BlackBerry® smartphones become a popular tool among business people?
5. What is the definition of *intellectual property*? List three examples of intellectual property.

QUESTIONS FOR ANALYSIS

6. Describe how a company might use data warehousing and data mining in its information system to better plan for new products.
7. Aside from the eBay example in this chapter, describe one or more ways that IT presents new business opportunities for small businesses.

8. Give three examples (other than those in this chapter) of how a company can become leaner and more efficient by adopting IT.

APPLICATION EXERCISES

9. Consider your daily activities—as a consumer, student, parent, friend, homeowner or renter, car driver, employee, etc.—and think about the ways that you are involved with IT systems. Make a list of your recent IT encounters and then recall instances in those encounters that you revealed personal information that could be used to steal your identity. Are some encounters on your list riskier than others? Why or why not?
10. Describe the computer network at your school. Identify its components and system architecture. What features either promote or inhibit intrusions from hackers? What features either promote or inhibit intellectual property theft? What features either promote or inhibit computer viruses and spam?

BUILDING YOUR BUSINESS SKILLS

The Art and Science of Point-and-Click Research

Goal

To learn how to use the web to conduct research more effectively.

Background Information

In a survey of nearly 2,000 web users, two-thirds said they used the web to obtain work-related information. With billions of pages of information on the web, the challenge for business users is: how best to find what they're seeking.

Method

You'll need a computer and access to the web to complete this exercise.

Step 1

Get together with three classmates and decide on a business-related research topic. Choose a topic that interests you—for example, "Business Implications of the War in Afghanistan," "Labor Disputes in Professional Sports," or "Marketing Music Lessons to Parents of Young Children."

Step 2

Search the following sites for information on your topic (dividing sites among group members to speed the process):

- Dogpile (www.dogpile.com)
- Excite (www.excite.com)
- Google (www.google.com)
- Yahoo! (www.yahoo.com)

Take notes as you search so that you can explain your findings to other group members.

Step 3

Working as a group, answer the following questions about your collective search:

Which sites were the easiest to use?

Which sites offered the most helpful results? What specific factors made these sites better than the others?

Which sites offered the least helpful results? What were the problems?

Why is it important to learn the special code words or symbols, called *operators*, that target a search? (Operators are words such as *AND*, *OR*, and *NOT* that narrow search queries. For example, using *AND* in a search tells most search engines to

look only for sites in which all words appear in the results—American *AND* Management *AND* Association.)

FOLLOW-UP QUESTIONS

Research the differences between *search engines* and *subject directories*. Given your topic, would a search engine or a subject directory be more helpful for your research?

1. Why is it important to learn how to use a search site's Help function?
2. Look into some of the sites' Advanced Search pages. How do these pages affect your searches?
3. How has the web changed the nature of business research?

EXERCISING YOUR ETHICS: INDIVIDUAL EXERCISE**Caught in a Cyber Bind****The Situation**

Time pressures to complete project assignments, coupled with easy access to the Internet, can present interesting temptations. This exercise illustrates how ethical issues may arise in using information from the Internet.

The Dilemma

Suppose you are assigned to write a report that requires research into a business problem. In searching the Internet, you find mounds of published articles that discuss the problem, but most of them are complicated write-ups using technical terms that you don't completely understand. As the deadline approaches, you realize that you can't figure out a logical, sensible format for writing the

report. You then recall, from conversations with colleagues, two possible solutions for your problem: (1) From the many articles found on the Internet, you can select the best-sounding phrases, sentences, and paragraphs, arrange them into a logical sequence, and piece them together as your final report, or (2) you can hire an Internet report-writing service at \$20 per page to write your report. Chances of being detected are slim.

QUESTIONS TO ADDRESS

1. Given the factors in this situation, what, if any, ethical issues exist?
2. Would you adopt either of the two "possible solutions" listed above? Why or Why not?
3. If a friend was confronted with this same situation and asked your opinion, what advice would you offer?

EXERCISING YOUR ETHICS: TEAM EXERCISE**This Game Is Getting Serious****The Situation**

Interactive games have become big-time entertainment for millions of enthusiasts playing side by side or among contestants anywhere on the Internet. Amidst the fun, questions can arise about the use of intellectual property and the ownership obligations of gamers. This exercise encourages you to examine some of the ethical issues that can surface in gaming.

The Dilemma

Tracy was enamored with a new adventure-and-strategy game from the moment she bought it. Her favorite character—Goddess Diaphanese—had accumulated overwhelming powers, thanks to Tracy's gaming skills and lots of trial and error, during two months of intense competition. Opponents were consistently overwhelmed by Diaphanese's mystical powers, and her ability to foresee the future, ward off attacks with invincible armor, and elevate her intellect to outsmart opponents in this virtual universe. Tracy's Diaphanese was, in effect, an invincible game character.

Another gamer wanted to buy Tracy's personal version of the game, but she decided instead to list it for sale on a popular Internet auction site. The bid price rose to over 10 times the original game price when Tracy got an e-mail from the manufacturer objecting to her sale of the game, stating that both the game name and the character itself are intellectual properties of the firm. The message insisted that she withdraw the product from auction.

Tracy's response to the company stated that her game cartridge—including the unique version of the powerful Goddess Diaphanese—was not the same product she purchased months earlier but, instead, was entirely different due to months of thoughtful game playing. Accordingly, she was selling her creation—a one-of-a-kind, new product.

Team Activity

Assemble a group of four students and assign each group member to one of the following roles:

- Tracy
- auction winner buying Tracy's version of the game
- manufacturer of the game
- investor/owner of the company that manufactures the game

ACTION STEPS

- 1 Before hearing any of your group's comments, and from the perspective of your assigned role, write down the ethical issues, if any, that you see in this situation.
- 2 Before hearing any of your group's comments, what actions do you think your assigned role should have taken in this situation? Write down your recommended actions.
- 3 Gather your group together and reveal, in turn, each member's comments and recommendations.
- 4 Appoint someone to record main points of agreement and disagreement within the group. How do you explain the results? What accounts for any disagreement?
- 5 From an ethical standpoint, what does your group recommend Tracy do?

VIDEO EXERCISE MyBizLab**ZIPCAR****Learning Objectives**

The purpose of this video is to help you:

- 1 Understand how information technology has influenced business.
- 2 Describe how businesses use information technology to meet the needs of customers and support profitable operations.
- 3 Explain the risks, threats, and ethical concerns related to information technology.

Synopsis

ZipCar's business model is built on the European concept of car sharing. From their first location in Cambridge, Massachusetts, ZipCar has expanded to over fifty cities in the United States and United Kingdom and over one hundred college campuses. ZipCar's business model allows members to have the convenience of having a car at their disposal, without the attendant costs of car ownership, such as car payments, insurance, or even gasoline. To become a member, or Zipster, the applicant pays a one-time fee. A variety of plans are available, with the Zipster paying a daily or hourly rate when they use a car. For those with only occasional use, there is also an annual fee. The member can reserve a car through

a smart phone application or on their computer. Once the reservation is complete, Zipsters gain access to the cars with a swipe of their ZipCard. Technology allows the company to remotely enable and track the car and even allows the company to disable a car when there is unauthorized access.

DISCUSSION QUESTIONS

- 1 The text discusses a number of ways that information technology has influenced business. Discuss how at least three of these relate to ZipCar.
- 2 What technologies allow ZipCar to operate?
- 3 What type of consumers do you think are most likely to use ZipCar?
- 4 How is ZipCar especially well suited to college students?
- 5 What are the ethical concerns related to ZipCar's use of technology?

Online Exploration

ZipCar's website (www.zipcar.com) provides information about how ZipCar meets the needs of individual consumers, businesses, and college students. To find out more about how the technology works, click on "how it works", then "our technology". Briefly describe the steps involved in becoming a Zipster and using a car for the first time.

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