PART ONE

Organizations, Management, and the Networked Enterprise

Chapter 1
Information Systems in Global Business Today

Chapter 2
Global E-business and Collaboration

Chapter 3
Information Systems, Organizations, and Strategy

Chapter 4
Ethical and Social Issues in Information Systems

Part One introduces the major themes of this book, raising a series of important questions: What is an information system and what are its management, organization, and technology dimensions? Why are information systems so essential in businesses today? Why are systems for collaboration and social business so important? How can information systems help businesses become more competitive? What broader ethical and social issues are raised by widespread use of information

CHAPTER 1

Information Systems in Global Business Today

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

How are information systems transforming business, and why are they so essential for running and managing a business today?

What is an information system? How does it work? What are its management, organization, and technology components and why are complementary assets essential for ensuring that information systems provide genuine value for organizations?

What academic disciplines are used to study information systems and how does each contribute to an understanding of information systems?

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CHAPTER CASES

Rugby Football Union Tries Big Data
Meet the New Mobile Workers
UPS Competes Globally with Information Technology
Mashaweer: Online Personal Services in the Gulf

VIDEO CASES

UPS Competes Globally with the DIAD
Google Data Center Efficiency Best Practices

Instructional Videos:

Green Energy Efficiency in a Data Center Using Tivoli (IBM)
Tour IBM's Raleigh Data Center

RUGBY FOOTBALL UNION TRIES BIG DATA

In 1871, twenty-one English clubs decided that their sport, officially called rugby union but commonly referred to simply as rugby, needed an administrative body. The clubs formed The Rugby Football Union (RFU), which today manages the English national team (England Rugby) in partnership with Premier Rugby Limited. Responsible for the promotion of rugby at all levels, the RFU organizes the Six Nations Championship, the unofficial northern hemisphere championship featuring teams from England, Scotland, Wales, Italy, Ireland, and France, and the Heineken Cup, its club-level counterpart. Owned by its member clubs, the RFU's mission is to maximize profits from international ticket sales and vending so that it can support the more than 60,000 volunteers who organize matches and seminars, help secure loans and insurance policies, fundraise, write grant proposals, provide medical advice and support, and perform the clerical duties that keep the lower-level clubs operating.

To succeed in this complicated mission, the RFU entered into a five-year deal with IBM to capture and analyze Big Data that will be useful to both fans, and later—it is hoped—the players themselves. The system is called TryTracker. In rugby, a try, worth five points, is the highest scoring opportunity. Teams get possession of the ball through a scrum, a contest for the ball where eight players bind together and push against eight players from the other team. The outcome determines who can control the ball. To score a try, a team must break through the opposition's defenses, move into their in-goal area, and "ground" the ball. This is done in one of two ways. A player can either hold the ball in one or both hands or arms and then touch it to the ground in the in-goal area, or exert downward pressure on a ball already



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on the ground using one or both hands or arms or the upper front of the body (from the neck to the waistline).

The IBM TryTracker does not just track tries, however. It uses predictive analytics to track three categories of data: keys to the game, momentum, and key players. Traditional rugby statistics on team and individual performance as well as live text commentary complement the TryTracker data. The keys to the game are determined ahead of a specific contest by analyzing a historical database of past matchups between a pair. For example, factors that contributed to victory may have included achieving a certain percentage of successful kicks on goal or scrums won, a specific number of lineouts, or a particular conversion rate. Fans can use their mobile devices to keep track of how their favorite team is faring, concentrating on game elements that will increase its winning chances. Key players for each team are selected after the game by comparing a single score compiled using different criteria for each position. Goal scoring is currently excluded so as not to overvalue kickers and undervalue players who contribute to creating scoring opportunities.

Like the IBM SlamTracker used at the Grand Slam tennis tournaments, the goal of TryTracker is to provide data visualization and real-time statistics to draw in fans. To compete with more popular sports such as Premier League football and expand rugby's fan base before England hosts the 2015 Rugby World Cup, the RFU hopes that enhanced communication will increase fan engagement. As their understanding of game mechanics and emotional investment in what their team needs to do in order to prevail grows, casual fans will become dedicated fans who return again and again. Beyond marketing strategy, the long-term potential of predictive analysis is that it may provide tactical insights to players and coaches that will improve match play and thus the overall product offered to fans.

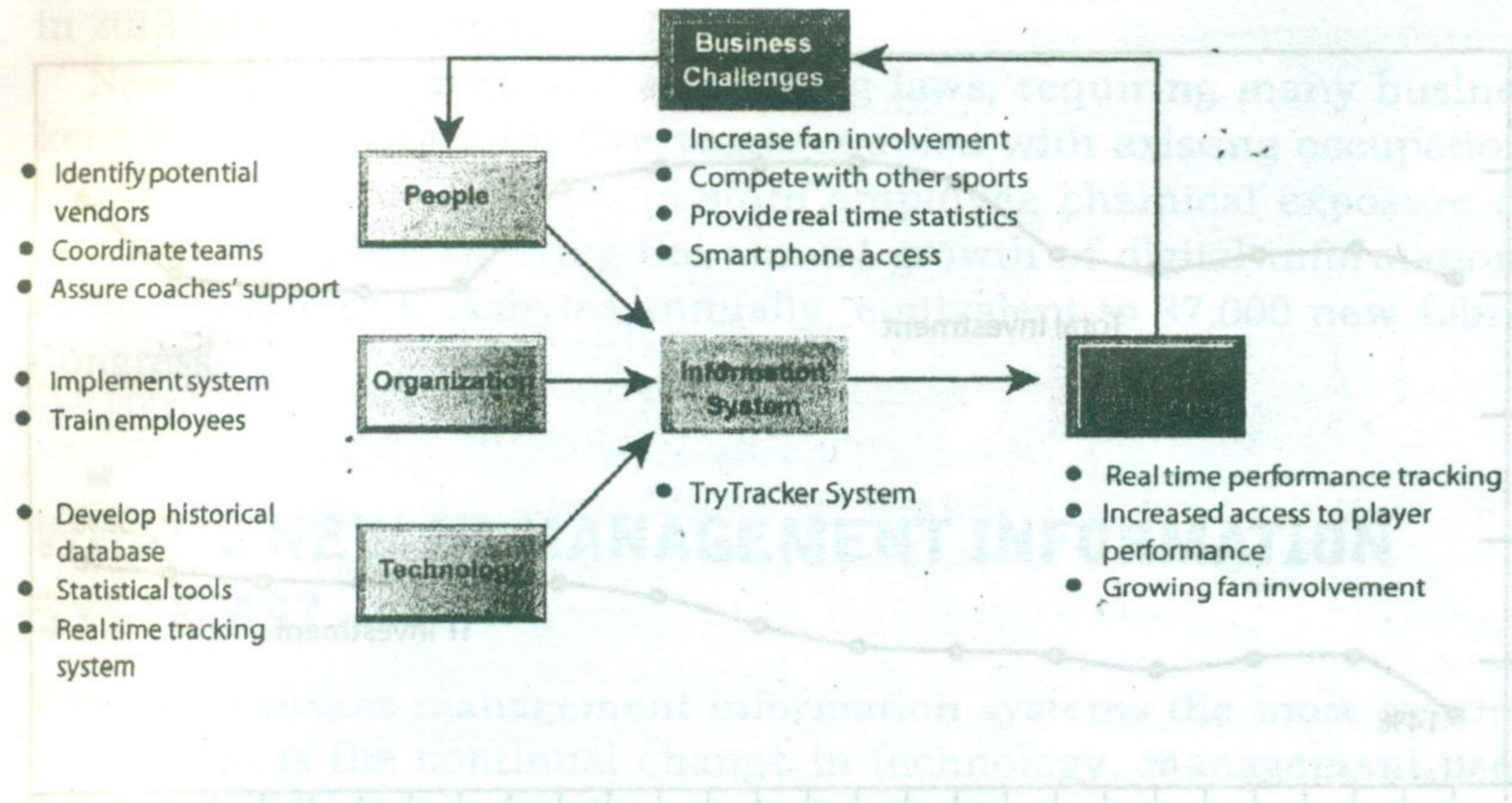
Sources: "IBM TryTracker Confirms Performance," www.englandrugby.com/ibmtrytracker/, November 29, 2014; IBM UK, "IBM TryTracker Rugby Insight: QBE Internationals 2014 England vs. Australia," *IBM Rugby Insight,* November 27, 2014; Oliver Pickup, "IBM TryTracker: How Does It Work?" *Telegraph*, October 31, 2013; "IBM's Live 'TryTracker' Is New RFU Online Insights Tool," activative.co.uk, February 5, 2013; "About Us," rfu.com, accessed December, 14, 2013; Simon Creasey, "Rugby Football Union Uses IBM Predictive Analytics for Six Nations," computerweekly.com, February, 2013; Steve McCaskill, "IBM TryTracker Brings Big Data To Rugby," techweekeurope.co.uk, February 11, 2013; Caroline Baldwin, "Rugby Football Union Uses Analytics to Educate and Engage with Users," computerweekly.com, October 8, 2013; "Rugby Tries," rugby-sidestep-central.com, accessed December 13, 2013.

The challenges facing the RFU demonstrate why information systems are so essential today. The RFU is classified as a "Friendly Society," somewhere between a true company and a charity. It receives both government support and corporate sponsorship money. But it must maximize revenues from ticket sales, hospitality and catering, television rights, and its travel company in order to support both grassroots and elite rugby in England.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. The RFU entered into a strategic partnership with IBM to educate and engage fans. Using the data collected by sports data company Opta and the analytics developed by IBM, it may also be able to improve coaching and game performance as an additional way of cultivating customers. IBM is also helping the RFU to develop a customer relationship management (CRM) system integrated with its Web site.

Here are some questions to think about: What role does technology play in the RFU's success as the administrative head of rugby union in England? Assess the contributions which these systems make to the future of RFU.

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1.1 HOW ARE INFORMATION SYSTEMS TRANSFORMING BUSINESS, AND WHY ARE THEY SO ESSENTIAL FOR RUNNING AND MANAGING A BUSINESS TODAY?

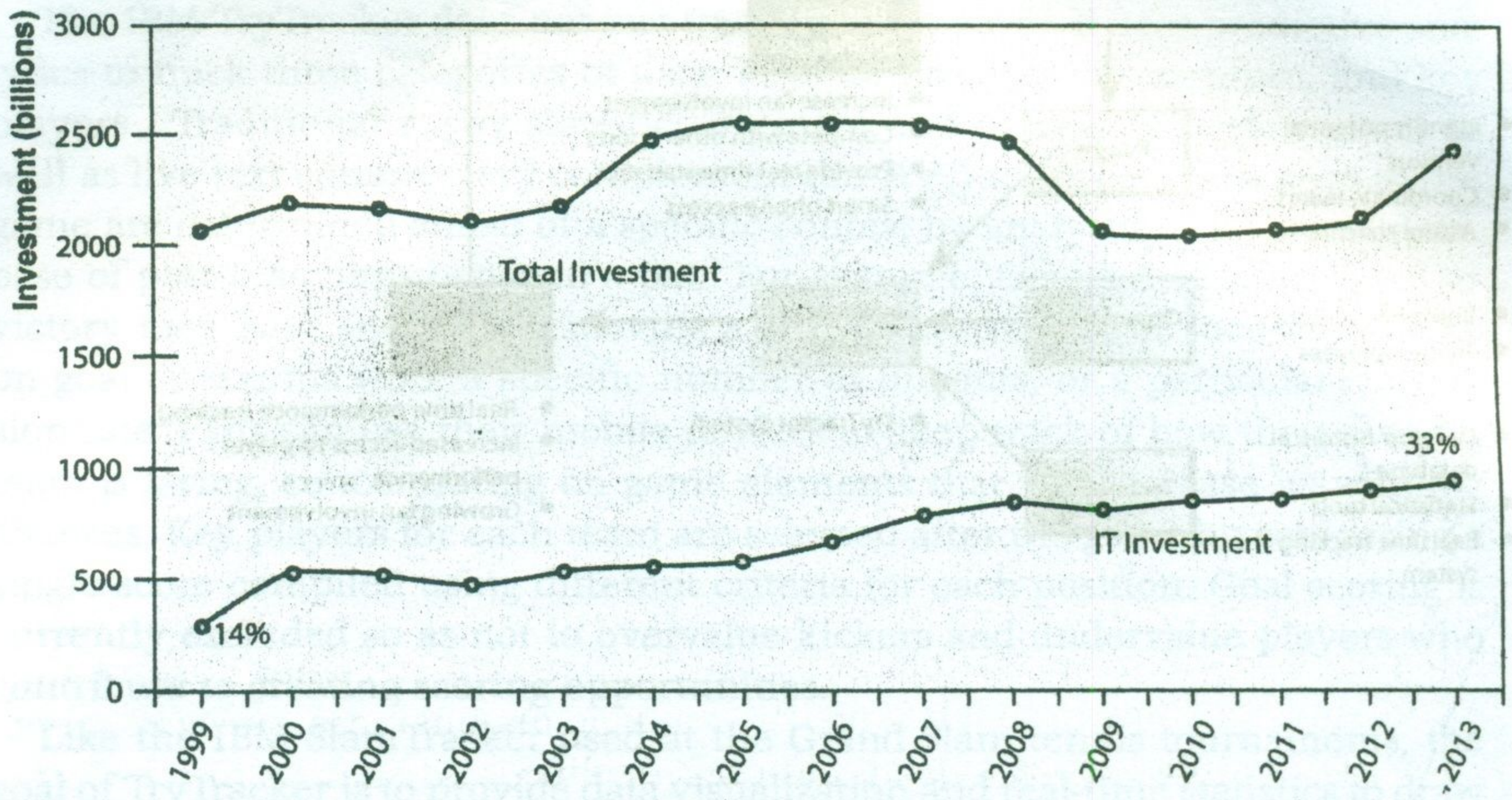
It's not business as usual in America anymore, or the rest of the global economy. In 2014, American businesses will spend an estimated $817 billion on information systems hardware, software, and telecommunications equipment. In addition, they will spend another $230 billion on business and management consulting and services—much of which involves redesigning firms' business operations to take advantage of these new technologies. Figure 1.1 shows that between 1999 and 2013, private business investment in information technology consisting of hardware, software, and communications equipment grew from 14 percent to 33 percent of all invested capital.

As managers, most of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital. This book is dedicated to helping you make wise decisions about information technology and information systems.

HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

You can see the results of this massive spending around you every day by observing how people conduct business. Changes in technology, and new innovative business models, have transformed social life and business practices. Over 247 million Americans have mobile phones (67% of the population), and 167 million of these people access the Internet using smartphones and tablets. 46% of the entire population now use tablet computers whose sales have soared. 172 million Americans use online social networks, 150 million

FIGURE 1.1 INFORMATION TECHNOLOGY CAPITAL INVESTMENT



Information technology capital investment, defined as hardware, software, and communications equipment, grew from 14 percent to 33 percent of all invested capital between 1999 and 2013.

Source: Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts*, 2014.

use Facebook, while 48 million use Twitter. Smartphones, social networking, texting, emailing, and Webinars have all become essential tools of business because that's where your customers, suppliers, and colleagues can be found. (eMarketer, 2014).

By June 2014, more than 114 million businesses worldwide had dot-com Internet sites registered (Domain Tools, 2014). Today, 196 million Americans shop online, and 163 million will purchase online. Every day about 90 million Americans go online to research a product or service. (eMarketer, 2014).

In 2013, FedEx moved about 3.5 million packages daily to 220 countries and territories around the world, mostly overnight, and the United Parcel Service (UPS) moved over 16 million packages daily worldwide. Businesses are using information technology to sense and respond to rapidly changing customer demand, reduce inventories to the lowest possible levels, and achieve higher levels of operational efficiency. Supply chains have become more fast-paced, with companies of all sizes depending on just-in-time inventory to reduce their overhead costs and get to market faster.

As newspaper print readership continues to decline, more than 168 million people read a newspaper online, and millions more read other news sites. About 83 million people watch a video online every day, 66 million read a blog, and 25 million post to blogs, creating an explosion of new writers and new forms of customer feedback that did not exist five years ago (eMarketer, 2014). Social networking site Facebook attracted 152 million monthly visitors in 2014 in the United States, and over 1 billion worldwide. Google+ has attracted over 130 million users in the United States. Businesses are starting to use social networking tools to connect their employees, customers, and managers worldwide. Many Fortune 500 companies now have Facebook pages, Twitter accounts, and Tumblr sites.

E-commerce and Internet advertising continue to expand. Google's online ad revenues surpassed $17 billion in 2013, and Internet advertising continues to

grow at more than 15 percent a year, reaching more than $43 billion in revenues in 2013 (eMarketer, 2014).

New federal security and accounting laws, requiring many businesses to keep e-mail messages for five years, coupled with existing occupational and health laws requiring firms to store employee chemical exposure data for up to 60 years, are spurring the annual growth of digital information at the estimated rate of 5 exabytes annually, equivalent to 37,000 new Libraries of Congress.

WHAT'S NEW IN MANAGEMENT INFORMATION SYSTEMS?

Lots! What makes management information systems the most exciting topic in business is the continual change in technology, management use of the technology, business models and the impact on business success. New businesses and industries appear, old ones decline, and successful firms are those that learn how to use the new technologies. Table 1.1 summarizes the major new themes in business uses of information systems. These themes will appear throughout the book in all the chapters, so it might be a good idea to take some time now and discuss these with your professor and other students.

There are three interrelated changes in the technology area: (1) the widespread adoption of the mobile computing platform, (2) the growing business use of "big data," and (3) the growth in "cloud computing," where more and more business software runs over the Internet.

IPhones, iPads, Android tablets, and smartphones are not just gadgets or entertainment outlets. They represent new emerging computing platforms based on an array of new hardware and software technologies. More and more business computing is moving from PCs and desktop machines to these mobile devices. Managers are increasingly using these devices to coordinate work, communicate with employees, and provide information for decision making. We call these developments the "mobile digital platform."

Managers routinely use online collaboration and social technologies in order to make better, faster decisions. As management behavior changes, how work gets organized, coordinated, and measured also changes. By connecting employees working on teams and projects, the social network is where works gets done, where plans are executed, and where managers manage. Collaboration spaces are where employees meet one another—even when they are separated by continents and time zones.

The strength of cloud computing and the growth of the mobile digital platform allow organizations to rely more on telework, remote work, and distributed decision making. This same platform means firms can outsource more work, and rely on markets (rather than employees) to build value. It also means that firms can collaborate with suppliers and customers to create new products, or make existing products more efficiently.

You can see some of these trends at work in the Interactive Session on Management. Millions of managers rely heavily on the mobile digital platform to coordinate suppliers and shipments, satisfy customers, and manage their employees. A business day without these mobile devices or Internet access would be unthinkable. As you read this case, note how the mobile platform greatly enhances the accuracy, speed, and richness of decision making.

TABLE 1.1 WHAT'S NEW IN MIS

CHANGE	BUSINESS IMPACT
TECHNOLOGY	
Cloud computing platform emerges as a major business area of innovation	A flexible collection of computers on the Internet begins to perform tasks traditionally performed on corporate computers. Major business applications are delivered online as an Internet service (Software as a Service, or SaaS).
Big data	Businesses look for insights from huge volumes of data from Web traffic, e-mail messages, social media content, and machines (sensors) that require new data management tools to capture, store, and analyze.
A mobile digital platform emerges to compete with the PC as a business system	The Apple iPhone and tablet computers and Android mobile devices are able to download hundreds of thousands of applications to support collaboration, location-based services, and communication with colleagues. Small tablet computers, including the iPad and Kindle Fire, challenge conventional laptops as platforms for consumer and corporate computing.
MANAGEMENT	
Managers adopt online collaboration and social networking software to improve coordination, collaboration, and knowledge sharing	Google Apps, Google Sites, Microsoft Windows SharePoint Services, and IBM Lotus Connections are used by over 100 million business professionals worldwide to support blogs, project management, online meetings, personal profiles, social bookmarks, and online communities.
Business intelligence applications accelerate	More powerful data analytics and interactive dashboards provide real-time performance information to managers to enhance decision making.
Virtual meetings proliferate	Managers adopt telepresence videoconferencing and Web conferencing technologies to reduce travel time, and cost, while improving collaboration and decision making.
ORGANIZATIONS	
Social business	Businesses use social networking platforms, including Facebook, Twitter, and internal corporate social tools, to deepen interactions with employees, customers, and suppliers. Employees use blogs, wikis, e-mail texting, and SMS messaging to interact in online communities.
Telework gains momentum in the workplace	The Internet, wireless laptops, smartphones, and tablet computers make it possible for growing numbers of people to work away from the traditional office. Fifty-five percent of U.S. businesses have some form of remote work program.
Co-creation of business value	Sources of business value shift from products to solutions and experiences, and from internal sources to networks of suppliers and collaboration with customers. Supply chains and product development become more global and collaborative; customer interactions help firms define new products and services.

GLOBALIZATION CHALLENGES AND OPPORTUNITIES: A FLATTENED WORLD

In 1492, Columbus reaffirmed what astronomers were long saying: the world was round and the seas could be safely sailed. As it turned out, the world was populated by peoples and languages living in isolation from one another, with

INTERACTIVE SESSION: MANAGEMENT

MEET THE NEW MOBILE WORKERS

How much of your job can you do from the palm of your hand? Probably more than you think. Today there are many job functions for both rank-and-file employees and their managers that can be performed using mobile phones and tablets, including the iPad, iPhone, and Android mobile devices.

Companies are enhancing their security systems so that mobile users can remotely access corporate systems with confidence. And they are developing more far-reaching applications to take advantage of the stunning mobile and graphic capabilities. Mobile technology is spreading to core work functions, such as marketing materials for pharmaceutical reps, customer account software for service technicians, and apps for farmers to test the quality of cow's milk.

McClendon's Select, a Peoria-based organic family-run farm, relies on iPad for each stage of its operation: planting fields, picking crops, filling orders, loading trucks, delivering to restaurants, and selling products at farmers' markets. Co-owner Sean McClendon uses a wireless camera on his tractor to ensure crop rows are as straight as possible. The mydlinkLite app on his iPad lets him watch the footage as he plows. The farm's planting manager no longer needs to leave the field to handle the careful record-keeping required to maintain an organic certification. Using her iPad connection to the 3G cellular network, she is able to access the Web-based COG Pro management system to update her records of seed types and where and when they're planted.

Before McClendon's went digital, orders were handwritten on a white board, a process that was too time-consuming, error-prone, and costly. Now each employee grabs an iPad when arriving for work in the morning and uses a proprietary app called Picker Entry to generate a list of products to collect in the field based on online orders placed by restaurants and consumers. Using AirPrint technology in the iPad, employees then wirelessly print their orders and head out to the field to pick product. After the employees return from the field, they add inventory that they picked using an iPad. They are able to see all of the restaurants on the screen, tap the restaurant name, and fill the orders right from the iPad.

When employees load those orders on trucks for deliveries, Picker Entry on the iPad replaces a manual process that used to take 30 to 45 minutes. A single tap to the iPad generates a report telling where each box goes on the truck for restaurant deliveries. One of the main reasons restaurants use McClendon's is because of its order accuracy.

Using handhelds to run the business is not limited to small companies. PepsiCo manufactures and sells brands including Pepsi, Gatorade, Mountain Dew, Tropicana, Quaker, and Frito-Lay worldwide and has nearly 280,000 employees. The company uses a complex web of interlocking distribution systems to move its products from its manufacturing and warehouse facilities onto trucks and then into stores in time to meet customer demand. PepsiCo runs about 17,000 distribution routes each day. The iPhone and iPad help employees of PepsiCo's North America Beverages division ensure that the right products arrive in the right locations as quickly and efficiently as possible.

In the past, PepsiCo drivers and merchandisers began each day by picking up printed schedules with order quantities and tasks to be performed at each outlet, from unloading cases of soda to setting up new product displays. It was difficult to accommodate last-minute changes in orders because communicating with the delivery drivers was difficult when they were on the road.

PepsiCo North America Beverages created a custom in-house app for the iPhone called Power4Merch, which immediately notifies merchandisers when a driver has arrived at a store. The merchandiser's iPhone has an electronic timecard, and he can see his schedule, the store details, the account profiles, and everything he needs to know to service the store.

PepsiCo managers use iPads with custom applications to monitor their teams' performance; pull up pricing, planograms and contracts; and help coordinate deliveries with merchandising. The Manager's Briefcase app provides territory sales managers with electronic versions of all the paperwork and resources they need to manage their teams, including store audits, employee coaching forms, and automated notifications to merchandisers. A manager can make manpower assignments directly on the iPad. The iPad automatically sends a notification to the merchandiser's iPhone informing him he has an additional stop to make, for example. In the past, managers had to spend much of their time on the phone, checking email in the office, and checking paperwork. With the iPad, the manager starts and ends his day with his team.

The second iPad app, called SPOTLight, gives managers instant access to their Web-based SharePoint content. They can pull out pricing, display planograms, customer development agreements, or new contracts.

PepsiCo's iPhone and iPad systems are integrated with its established corporate information systems. The company uses Mobile Device Management from AirWatch to securely deploy and manage its mobile applications and also takes advantage of the built-in security on iPhone and iPad to protect them from unauthorized access.

PepsiCo's main competitor, beverage-bottling company Coca-Cola Enterprises Inc. (CCE) is benefiting from mobile technology as well. CCE uses mobile field service software from ServiceMax Inc. to streamline the work activities of its technicians, who service restaurant soda fountains and fix vending machines. Previously, after a technician visited a customer on site, he would go back to his car, transfer information from paper notes into a database on his laptop, and transmit it to Coca-Cola's aging centralized software system. Many technicians spent an extra half hour at the end of each day polishing their paperwork.

In 2012, about 100 CCE employees started using ServiceMax apps on iPhones to dispatch technicians to a day's worth of service calls, provide detailed customer information, automatically update lists of service parts stored in their vans, and transfer information to the billing department. The new system cut administration time for service technicians by a third, and employees were freed up to service other companies' equipment in addition to CCE's own. ServiceMax charges about $1000 per person per year for a subscription.

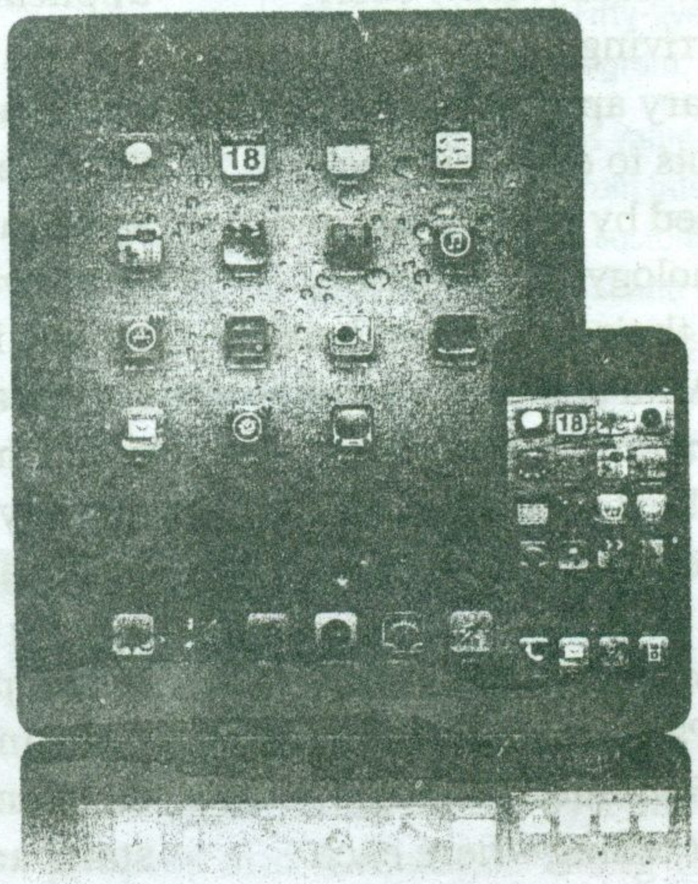
Sources: "Apple iPad in Business, www.apple.com, accessed January 29, 2014; Robert Bamforth, "Do You Need Tablets in Your Workplace? ComputerWeekly.com, January 27, 2014; and ShiraOvide, "Meet the New Mobile Workers," *The Wall Street Journal*, March 11, 2013.

CASE STUDY QUESTIONS

1. What kinds of applications are described here? What business functions do they support? How do they improve operational efficiency and decision making?
2. Identify the problems that businesses in this case study solved by using mobile digital devices.
3. What kinds of businesses are most likely to benefit from equipping their employees with mobile digital devices such as iPhones and iPads?
4. One company deploying iPhones has said, "The iPhone is not a game changer, it's an industry changer. It changes the way that you can interact with your customers" and "with your suppliers." Discuss the implications of this statement.

iPhone and iPad Applications for Business

1. Salesforce1
2. Cisco WebEx
3. SAP Business ByDesign
4. iWork
5. Evernote
6. Adobe Reader
7. Oracle Business Intelligence
8. Dropbox



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Whether it's attending an online meeting, checking orders, working with files and documents, or obtaining business intelligence, Apple's iPhone and iPad offer unlimited possibilities for business users. A stunning multitouch display, full Internet browsing, and capabilities for messaging, video and audio transmission, and document management, make each an all-purpose platform for mobile computing.

great disparities in economic and scientific development. The world trade that ensued after Columbus's voyages has brought these peoples and cultures closer. The "industrial revolution" was really a world-wide phenomenon energized by expansion of trade among nations and the emergence of the first global economy.

In 2005, journalist Thomas Friedman wrote an influential book declaring the world was now "flat," by which he meant that the Internet and global communications had greatly reduced the economic and cultural advantages of developed countries. Friedman argued that the U.S. and European countries were in a fight for their economic lives, competing for jobs, markets, resources, and even ideas with highly educated, motivated populations in low-wage areas in the less developed world (Friedman, 2007). This "globalization" presents both challenges and opportunities for business firms

A growing percentage of the economy of the United States and other advanced industrial countries in Europe and Asia depends on imports and exports. In 2013, more than 33 percent of the U.S. economy resulted from foreign trade, both imports and exports. In Europe and Asia, the number exceeded 50 percent. Many Fortune 500 U.S. firms derive half their revenues from foreign operations. For instance, 85 percent of Intel's revenues in 2013 came from overseas sales of its microprocessors. Eighty percent of the toys sold in the United States are manufactured in China, while about 90 percent of the PCs manufactured in China use American-made Intel or Advanced Micro Design (AMD) chips. The microprocessor chips are shipped from the United States to China for assembly into devices. In the severe recession of 2008-2011, all the world's economies were negatively impacted.

It's not just goods that move across borders. So too do jobs, some of them high-level jobs that pay well and require a college degree. In the past decade, the United States lost several million manufacturing jobs to offshore, low-wage producers. But manufacturing is now a very small part of U.S. employment (less than 12 percent and declining). In a normal year, about 300,000 service jobs move offshore to lower wage countries. Many of the jobs are in less-skilled information system occupations, but some are "tradable service" jobs in architecture, financial services, customer call centers, consulting, engineering, and even radiology.

On the plus side, the U.S. economy creates over 3.5 million new jobs in a normal, non-recessionary year. However, only 1.1 million private sector jobs were created due to slow recovery in 2011, but by 2014 2.5 million jobs were added. Employment in information systems and the other service occupations is expanding, and wages are stable. Outsourcing has actually accelerated the development of new systems in the United States and worldwide.

The challenge for you as a business student is to develop high-level skills through education and on-the-job experience that cannot be outsourced. The challenge for your business is to avoid markets for goods and services that can be produced offshore much less expensively. The opportunities are equally immense. Throughout this book, you will find examples of companies and individuals who either failed or succeeded in using information systems to adapt to this new global environment.

What does globalization have to do with management information systems? That's simple: everything. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating and transacting on a global scale. Communication between a factory floor in Shanghai and a distribution center in Rapid City, South Dakota, is now instant and virtually free. Customers can now shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day.

Firms producing goods and services on a global scale achieve extraordinary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Internet service firms, such as Google and eBay, are able to replicate their business models and services in multiple countries without having to redesign their expensive fixed-cost information systems infrastructure. Half of the revenue of eBay (as well as General Motors) originates outside the United States. Briefly, information systems enable globalization.

THE EMERGING DIGITAL FIRM

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. A digital firm can be defined along several dimensions. A **digital firm** is one in which nearly all of the organization's *significant business relationships* with customers, suppliers, and employees are digitally enabled and mediated. *Core business processes* are accomplished through digital networks spanning the entire organization or linking multiple organizations.

Business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength. (A detailed discussion of business processes can be found in Chapter 2.)

Key corporate assets—intellectual property, core competencies, and financial and human assets—are managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm.

Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital firms offer extraordinary opportunities for more flexible global organization and management. In digital firms, both time shifting and space shifting are the norm. *Time shifting* refers to business being conducted continuously, 24/7, rather than in narrow "work day" time bands of 9 a.m. to 5 p.m. *Space shifting* means that work takes place in a global workshop, as well as within national boundaries. Work is accomplished physically wherever in the world it is best accomplished.

Many firms, such as Cisco Systems, 3M, and IBM, are close to becoming digital firms, using the Internet to drive every aspect of their business. Most other companies are not fully digital, but they are moving toward close digital integration with suppliers, customers, and employees.

STRATEGIC BUSINESS OBJECTIVES OF INFORMATION SYSTEMS

What makes information systems so essential today? Why are businesses investing so much in information systems and technologies? In the United States, more than 21 million managers and 154 million workers in the information and knowledge sectors in the labor force rely on information systems to conduct business. Information systems are essential for conducting day-to-day business in the United States and most other advanced countries, as well as achieving strategic business objectives.

Entire sectors of the economy are nearly inconceivable without substantial investments in information systems. E-commerce firms such as Amazon, eBay, Google, and E*Trade simply would not exist. Today's service industries—finance, insurance, and real estate, as well as personal services such as travel, medicine, and education—could not operate without information systems. Similarly, retail firms such as Walmart and Sears and manufacturing firms such as General Motors and General Electric require information systems to survive and prosper. Just as offices, telephones, filing cabinets, and efficient tall buildings with elevators were once the foundations of business in the twentieth century, information technology is a foundation for business in the twenty-first century.

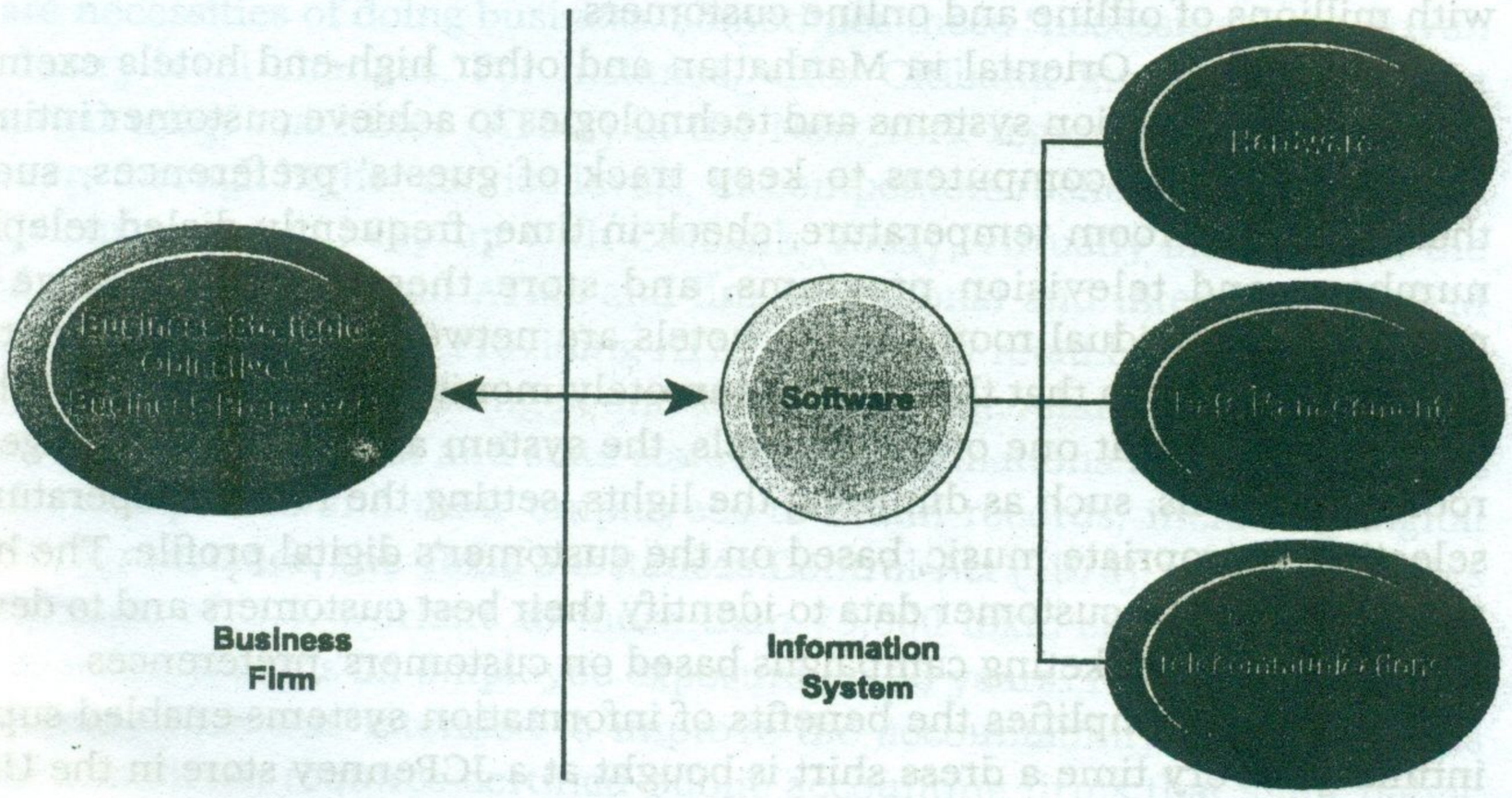
There is a growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve corporate goals (see Figure 1.2). What a business would like to do in five years often depends on what its systems will be able to do. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity depend more and more on the kinds and quality of information systems in the organization. The more you understand about this relationship, the more valuable you will be as a manager.

Specifically, business firms invest heavily in information systems to achieve six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival.

Operational Excellence

Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher

FIGURE 1.2 THE INTERDEPENDENCE BETWEEN ORGANIZATIONS AND INFORMATION SYSTEMS



In contemporary systems, there is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.

levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior.

Walmart, the largest retailer on earth, exemplifies the power of information systems coupled with brilliant business practices and supportive management to achieve world-class operational efficiency. In fiscal year 2014, Walmart achieved $473 billion in sales—nearly one-tenth of retail sales in the United States—in large part because of its Retail Link system, which digitally links its suppliers to every one of Walmart's stores. As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the shelf. Walmart is the most efficient retail store in the industry, achieving sales of more than $428 per square foot, compared to its closest competitor, Target, at $295 a square foot. Other less efficient general merchandise stores generate from $150 to $200 a square foot.

New Products, Services, and Business Models

Information systems and technologies are a major enabling tool for firms to create new products and services, as well as entirely new business models. A **business model** describes how a company produces, delivers, and sells a product or service to create wealth.

Today's music industry is vastly different from the industry a decade ago. Apple Inc. transformed an old business model of music distribution based on vinyl records, tapes, and CDs into an online, legal distribution model based on its own iPod technology platform. Apple has prospered from a continuing stream of iPod innovations, including the iTunes music service, the iPad, and the iPhone.

Customer and Supplier Intimacy

When a business really knows its customers, and serves them well, the customers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers: the more a business engages its suppliers, the better the suppliers can provide vital inputs. This lowers costs. How to really know your customers, or suppliers, is a central problem for businesses with millions of offline and online customers.

The Mandarin Oriental in Manhattan and other high-end hotels exemplify the use of information systems and technologies to achieve customer intimacy. These hotels use computers to keep track of guests' preferences, such as their preferred room temperature, check-in time, frequently dialed telephone numbers, and television programs, and store these data in a large data repository. Individual rooms in the hotels are networked to a central network server computer so that they can be remotely monitored or controlled. When a customer arrives at one of these hotels, the system automatically changes the room conditions, such as dimming the lights, setting the room temperature, or selecting appropriate music, based on the customer's digital profile. The hotels also analyze their customer data to identify their best customers and to develop individualized marketing campaigns based on customers' preferences.

JCPenney exemplifies the benefits of information systems-enabled supplier intimacy. Every time a dress shirt is bought at a JCPenney store in the United States, the record of the sale appears immediately on computers in Hong Kong at the TAL Apparel Ltd. supplier, a contract manufacturer that produces one in eight dress shirts sold in the United States. TAL runs the numbers through a computer model it developed and then decides how many replacement shirts to make, and in what styles, colors, and sizes. TAL then sends the shirts to

each JCPenney store, bypassing completely the retailer's warehouses. In other words, JCPenney's shirt inventory is near zero, as is the cost of storing it.

Improved Decision Making

Many business managers operate in an information fog bank, never really having the right information at the right time to make an informed decision. Instead, managers rely on forecasts, best guesses, and luck. The result is over- or underproduction of goods and services, misallocation of resources, and poor response times. These poor outcomes raise costs and lose customers. In the past decade, information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions.

For instance, Verizon Corporation, one of the largest telecommunication companies in the United States, uses a Web-based digital dashboard to provide managers with precise real-time information on customer complaints, network performance for each locality served, and line outages or storm-damaged lines. Using this information, managers can immediately allocate repair resources to affected areas, inform consumers of repair efforts, and restore service fast.

Competitive Advantage

When firms achieve one or more of these business objectives—operational excellence; new products, services, and business models; customer/supplier intimacy; and improved decision making—chances are they have already achieved a competitive advantage. Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match. Apple Inc., Walmart, and UPS, described later in this chapter, are industry leaders because they know how to use information systems for this purpose.

Survival

Business firms also invest in information systems and technologies because they are necessities of doing business. Sometimes these "necessities" are driven by industry-level changes. For instance, after Citibank introduced the first automated teller machines (ATMs) in the New York region in 1977 to attract customers through higher service levels, its competitors rushed to provide ATMs to their customers to keep up with Citibank. Today, virtually all banks in the United States have regional ATMs and link to national and international ATM networks, such as CIRRUS. Providing ATM services to retail banking customers is simply a requirement of being in and surviving in the retail banking business.

There are many federal and state statutes and regulations that create a legal duty for companies and their employees to retain records, including digital records. For instance, the Toxic Substances Control Act (1976), which regulates the exposure of U.S. workers to more than 75,000 toxic chemicals, requires firms to retain records on employee exposure for 30 years. The Sarbanes-Oxley Act (2002), which was intended to improve the accountability of public firms and their auditors, requires certified public accounting firms that audit public companies to retain audit working papers and records, including all e-mails, for five years. The Dodd-Frank Wall Street Reform and Consumer Protection Act (2010) which was intended to strengthen regulation of the banking industry requires firms to retain all records for ten years. Many other pieces of federal

and state legislation in health care, financial services, education, and privacy protection impose significant information retention and reporting requirements on U.S. businesses. Firms turn to information systems and technologies to provide the capability to respond to these challenges.

1.2 WHAT IS AN INFORMATION SYSTEM? HOW DOES IT WORK? WHAT ARE ITS MANAGEMENT, ORGANIZATION, AND TECHNOLOGY COMPONENTS AND WHY ARE COMPLEMENTARY ASSETS ESSENTIAL FOR ENSURING THAT INFORMATION SYSTEMS PROVIDE GENUINE VALUE FOR AN ORGANIZATION?

So far we've used *information systems* and *technologies* informally without defining the terms. **Information technology (IT)** consists of all the hardware and software that a firm needs to use in order to achieve its business objectives. This includes not only computer machines, storage devices, and handheld mobile devices, but also software, such as the Windows or Linux operating systems, the Microsoft Office desktop productivity suite, and the many thousands of computer programs that can be found in a typical large firm. "Information systems" are more complex and can be best understood by looking at them from both a technology and a business perspective.

WHAT IS AN INFORMATION SYSTEM?

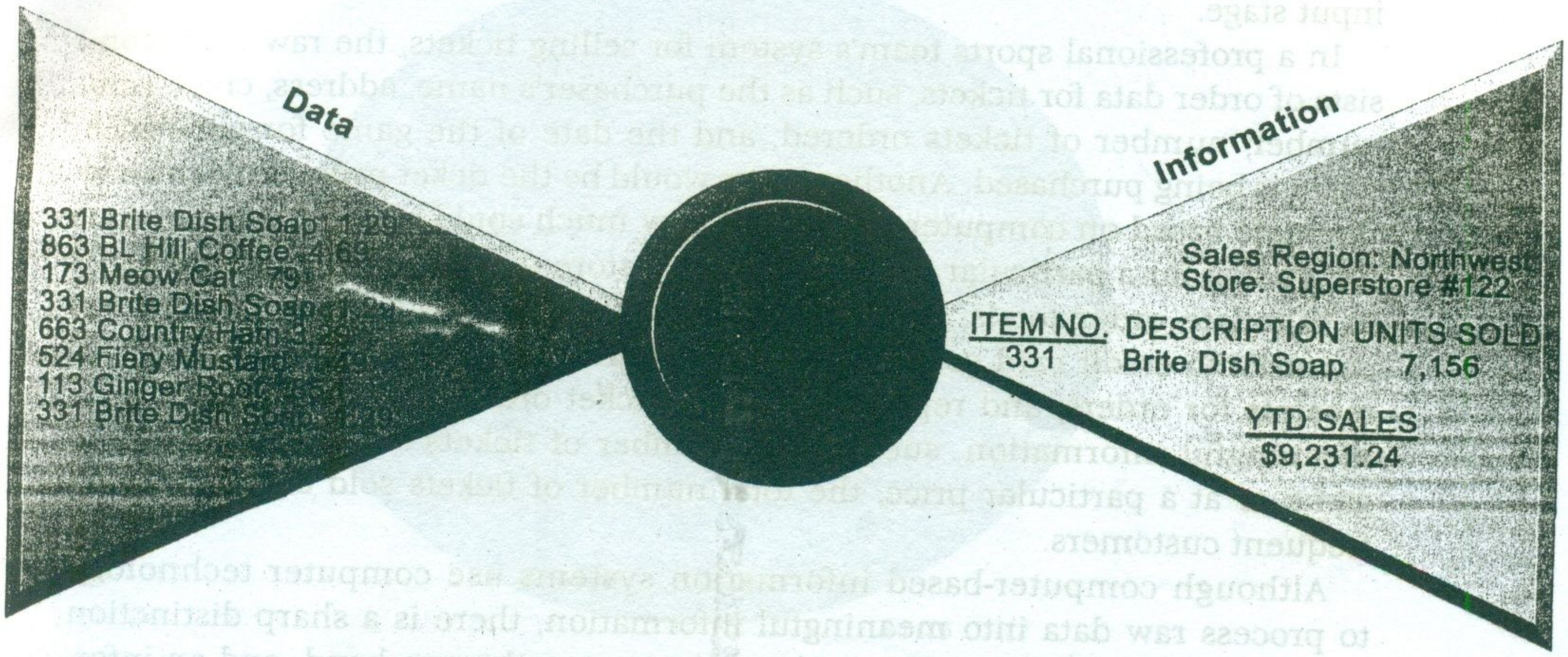
An **information system** can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By **information** we mean data that have been shaped into a form that is meaningful and useful to human beings. **Data**, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

A brief example contrasting information and data may prove useful. Supermarket checkout counters scan millions of pieces of data from bar codes, which describe each product. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of dish detergent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region (see Figure 1.3).

Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output (see Figure 1.4). **Input** captures or collects raw data from within

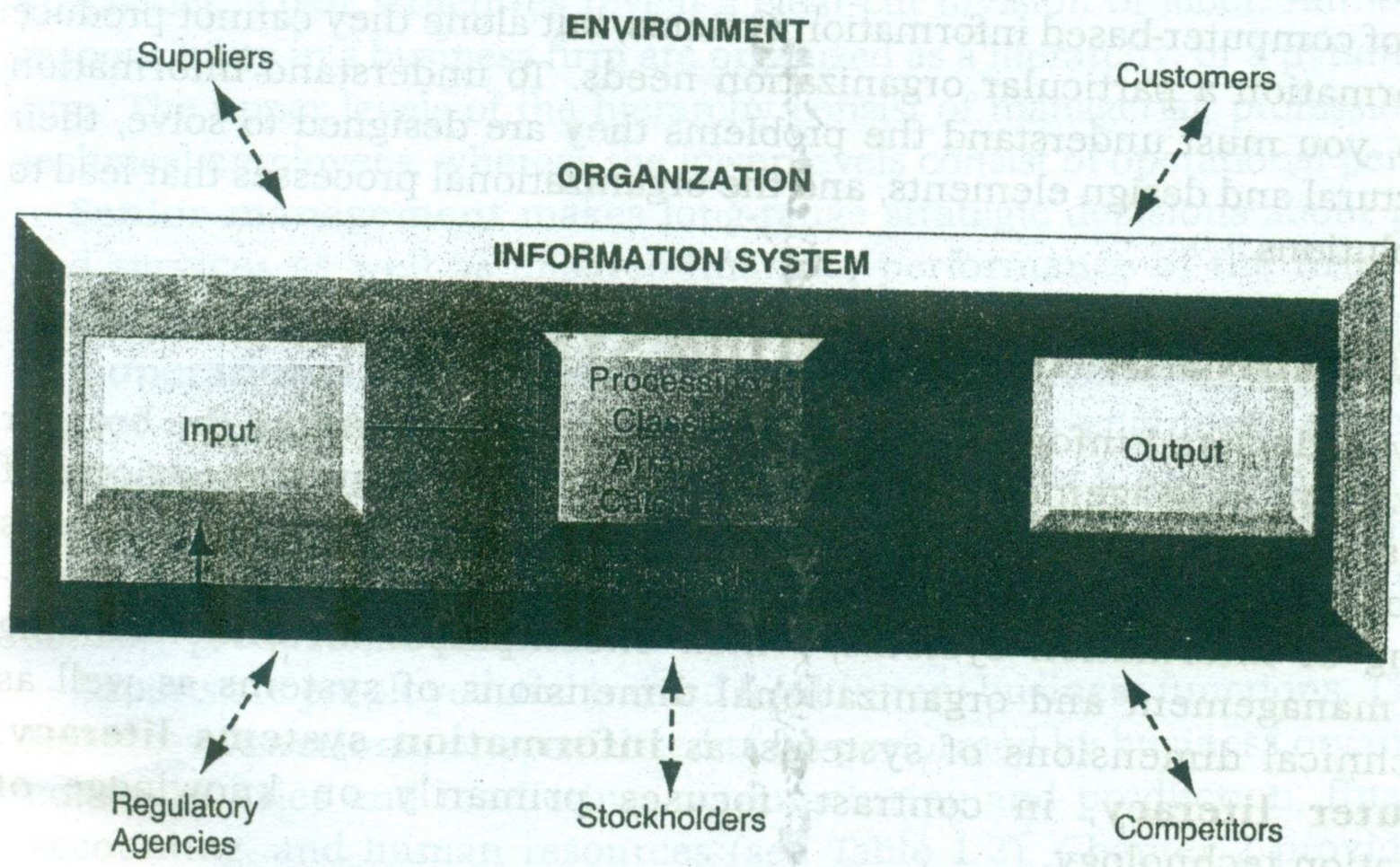
FIGURE 1.3 DATA AND INFORMATION



Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.

the organization or from its external environment. **Processing** converts this raw input into a meaningful form. **Output** transfers the processed information to the people who will use it or to the activities for which it will be used.

FIGURE 1.4 FUNCTIONS OF AN INFORMATION SYSTEM



An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.

Information systems also require **feedback**, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

In a professional sports team's system for selling tickets, the raw input consists of order data for tickets, such as the purchaser's name, address, credit card number, number of tickets ordered, and the date of the game for which the ticket is being purchased. Another input would be the ticket price, which would fluctuate based on computer analysis of how much could optimally be charged for a ticket for a particular game. Computers store these data and process them to calculate order totals, to track ticket purchases, and to send requests for payment to credit card companies. The output consists of tickets to print out, receipts for orders, and reports on online ticket orders. The system provides meaningful information, such as the number of tickets sold for a particular game or at a particular price, the total number of tickets sold each year, and frequent customers.

Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program on the one hand, and an information system on the other. Electronic computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operating instructions that direct and control computer processing. Knowing how computers and computer programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

A house is an appropriate analogy. Houses are built with hammers, nails, and wood, but these do not make a house. The architecture, design, setting, landscaping, and all of the decisions that lead to the creation of these features are part of the house and are crucial for solving the problem of putting a roof over one's head. Computers and programs are the hammers, nails, and lumber of computer-based information systems, but alone they cannot produce the information a particular organization needs. To understand information systems, you must understand the problems they are designed to solve, their architectural and design elements, and the organizational processes that lead to these solutions.

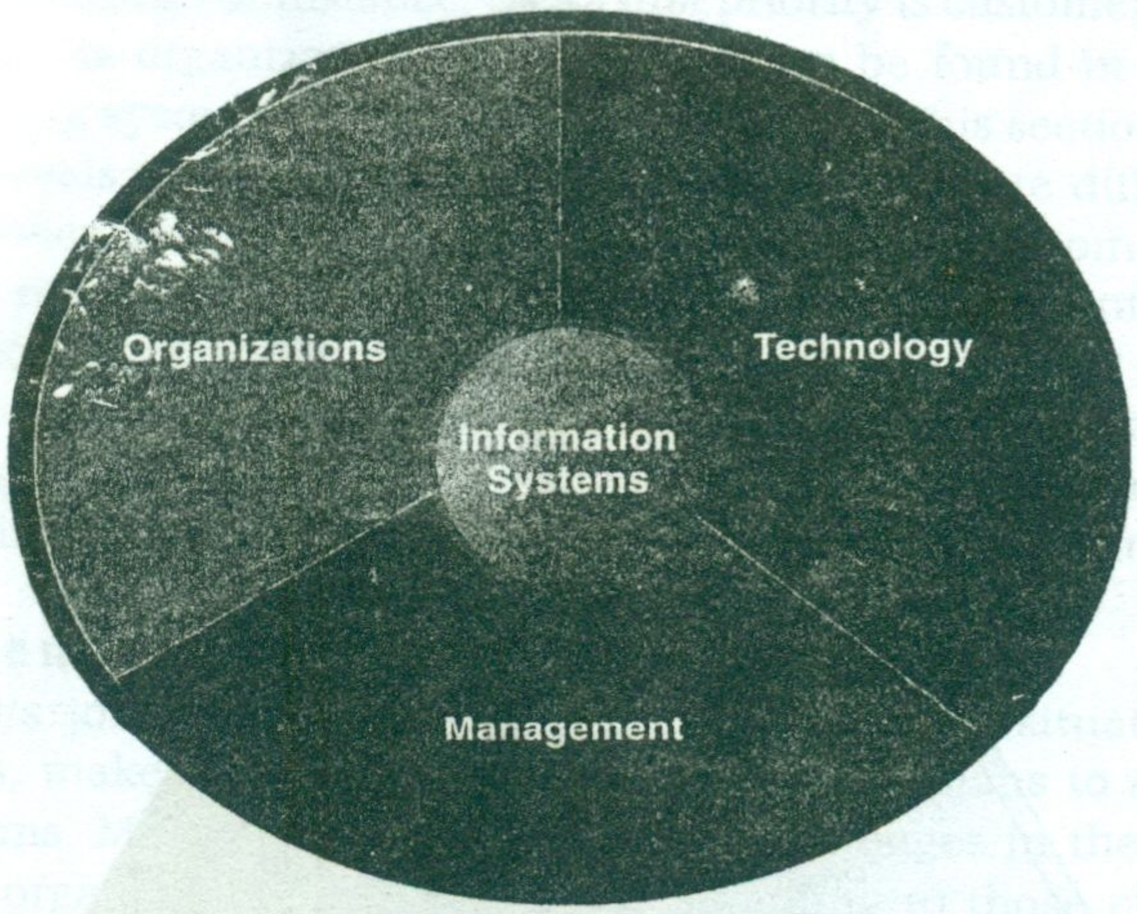
DIMENSIONS OF INFORMATION SYSTEMS

To fully understand information systems, you must understand the broader organization, management, and information technology dimensions of systems (see Figure 1.5) and their power to provide solutions to challenges and problems in the business environment. We refer to this broader understanding of information systems, which encompasses an understanding of the management and organizational dimensions of systems as well as the technical dimensions of systems, as **information systems literacy**. **Computer literacy**, in contrast, focuses primarily on knowledge of information technology.

The field of **management information systems (MIS)** tries to achieve this broader information systems literacy. MIS deals with behavioral issues as well as technical issues surrounding the development, use, and impact of information systems used by managers and employees in the firm.

Let's examine each of the dimensions of information systems—organizations, management, and information technology.

FIGURE 1.5 INFORMATION SYSTEMS ARE MORE THAN COMPUTERS



Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

Organizations

Information systems are an integral part of organizations. Indeed, for some companies, such as credit reporting firms, there would be no business without an information system. The key elements of an organization are its people, structure, business processes, politics, and culture. We introduce these components of organizations here and describe them in greater detail in Chapters 2 and 3.

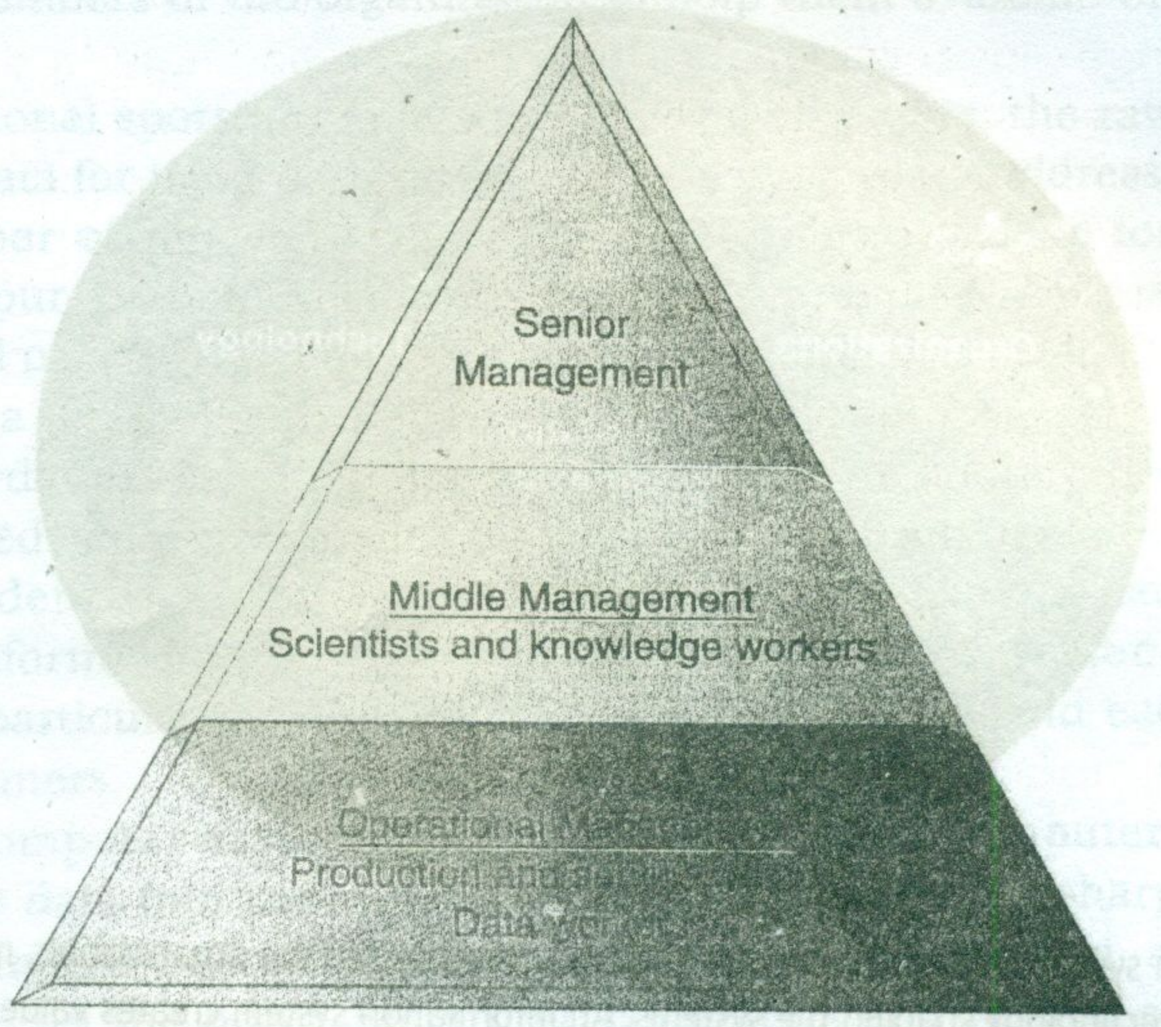
Organizations have a structure that is composed of different levels and specialties. Their structures reveal a clear-cut division of labor. Authority and responsibility in a business firm are organized as a hierarchy, or a pyramid structure. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel.

Senior management makes long-range strategic decisions about products and services as well as ensures financial performance of the firm. **Middle management** carries out the programs and plans of senior management, and **operational management** is responsible for monitoring the daily activities of the business. **Knowledge workers**, such as engineers, scientists, or architects, design products or services and create new knowledge for the firm, whereas **data workers**, such as secretaries or clerks, assist with scheduling and communications at all levels of the firm. **Production or service workers** actually produce the product and deliver the service (see Figure 1.6).

Experts are employed and trained for different business functions. The major **business functions**, or specialized tasks performed by business organizations, consist of sales and marketing, manufacturing and production, finance and accounting, and human resources (see Table 1.2). Chapter 2 provides more detail on these business functions and the ways in which they are supported by information systems.

An organization coordinates work through its hierarchy and through its **business processes**, which are logically related tasks and behaviors for accomplishing work. Developing a new product, fulfilling an order, and hiring a new employee are examples of business processes.

FIGURE 1.6 LEVELS IN A FIRM



Business organizations are hierarchies consisting of three principal levels: senior management, middle management, and operational management. Information systems serve each of these levels. Scientists and knowledge workers often work with middle management.

Most organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. These rules guide employees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these business processes have been written down, but others are informal work practices, such as a requirement to return telephone calls from coworkers or customers, that are not formally documented. Information systems automate many business processes. For instance, how a customer receives credit or how a customer is billed is often determined by an information system that incorporates a set of formal business processes.

Each organization has a unique **culture**, or fundamental set of assumptions, values, and ways of doing things, that has been accepted by most of its members. You can see organizational culture at work by looking around your university or college. Some bedrock assumptions of university life are that professors know more than students, the reasons students attend college is to learn, and that classes follow a regular schedule.

TABLE 1.2 MAJOR BUSINESS FUNCTIONS

FUNCTION	PURPOSE
Sales and marketing	Selling the organization's products and services
Manufacturing and production	Producing and delivering products and services
Finance and accounting	Managing the organization's financial assets and maintaining the organization's financial records
Human resources	Attracting, developing, and maintaining the organization's labor force; maintaining employee records

Parts of an organization's culture can always be found embedded in its information systems. For instance, UPS's first priority is customer service, which is an aspect of its organizational culture that can be found in the company's package tracking systems, which we describe later in this section.

Different levels and specialties in an organization create different interests and points of view. These views often conflict over how the company should be run and how resources and rewards should be distributed. Conflict is the basis for organizational politics. Information systems come out of this cauldron of differing perspectives, conflicts, compromises, and agreements that are a natural part of all organizations. In Chapter 3, we examine these features of organizations and their role in the development of information systems in greater detail.

Management

Management's job is to make sense out of the many situations faced by organizations, make decisions, and formulate action plans to solve organizational problems. Managers perceive business challenges in the environment; they set the organizational strategy for responding to those challenges; and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership. The business information systems described in this book reflect the hopes, dreams, and realities of real-world managers.

But managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management responsibility is creative work driven by new knowledge and information. Information technology can play a powerful role in helping managers design and deliver new products and services and redirecting and redesigning their organizations. Chapter 12 treats management decision making in detail.

Information Technology

Information technology is one of many tools managers use to cope with change. **Computer hardware** is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: computers of various sizes and shapes (including mobile handheld devices); various input, output, and storage devices; and telecommunications devices that link computers together.

Computer software consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system. Chapter 5 describes the contemporary software and hardware platforms used by firms today in greater detail.

Data management technology consists of the software governing the organization of data on physical storage media. More detail on data organization and access methods can be found in Chapter 6.

Networking and telecommunications technology, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, images, sound, and video. A **network** links two or more computers to share data or resources, such as a printer.

The world's largest and most widely used network is the **Internet**. The Internet is a global "network of networks" that uses universal standards (described in Chapter 7) to connect millions of different networks with nearly 3 billion users in over 230 countries around the world.

The Internet has created a new "universal" technology platform on which to build new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link different systems and networks within the firm. Internal corporate networks based on Internet technology are called **intranets**. Private intranets extended to authorized users outside the organization are called **extranets**, and firms use such networks to coordinate their activities with other firms for making purchases, collaborating on design, and other interorganizational work. For most business firms today, using Internet technology is both a business necessity and a competitive advantage.

The **World Wide Web** is a service provided by the Internet that uses universally accepted standards for storing, retrieving, formatting, and displaying information in a page format on the Internet. Web pages contain text, graphics, animations, sound, and video and are linked to other Web pages. By clicking on highlighted words or buttons on a Web page, you can link to related pages to find additional information and links to other locations on the Web. The Web can serve as the foundation for new kinds of information systems such as UPS's Web-based package tracking system described in the following Interactive Session.

All of these technologies, along with the people required to run and manage them, represent resources that can be shared throughout the organization and constitute the firm's **information technology (IT) infrastructure**. The IT infrastructure provides the foundation, or *platform*, on which the firm can build its specific information systems. Each organization must carefully design and manage its IT infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with information systems. Chapters 5 through 8 of this book examine each major technology component of information technology infrastructure and show how they all work together to create the technology platform for the organization.

The Interactive Session on Technology describes some of the typical technologies used in computer-based information systems today. UPS invests heavily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies, including bar code scanning systems, wireless networks, large mainframe computers, handheld computers, the Internet, and many different pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics.

Let's identify the organization, management, and technology elements in the UPS package tracking system we have just described. The organization element anchors the package tracking system in UPS's sales and production functions (the main product of UPS is a service—package delivery). It specifies the required procedures for identifying packages with both sender and recipient information, taking inventory, tracking the packages en route, and providing package status reports for UPS customers and customer service representatives.

The system must also provide information to satisfy the needs of managers and workers. UPS drivers need to be trained in both package pickup and delivery procedures and in how to use the package tracking system so that they can work efficiently and effectively. UPS customers may need some training to use UPS in-house package tracking software or the UPS Web site.

UPS's management is responsible for monitoring service levels and costs and for promoting the company's strategy of combining low cost and superior service. Management decided to use computer systems to increase the ease of sending a package using UPS and of checking its delivery status, thereby

INTERACTIVE SESSION: TECHNOLOGY

UPS COMPETES GLOBALLY WITH INFORMATION TECHNOLOGY

United Parcel Service (UPS) started out in 1907 in a closet-sized basement office. Jim Casey and Claude Ryan—two teenagers from Seattle with two bicycles and one phone—promised the "best service and lowest rates." UPS has used this formula successfully for more than a century to become the world's largest ground and air package-delivery company. It's a global enterprise with nearly 400,000 employees, 96,000 vehicles, and the world's ninth largest airline.

Today UPS delivers 16.3 million packages and documents each day in the United States and more than 220 other countries and territories. The firm has been able to maintain leadership in small-package delivery services despite stiff competition from FedEx and Airborne Express by investing heavily in advanced information technology. UPS spends more than $1 billion each year to maintain a high level of customer service while keeping costs low and streamlining its overall operations.

It all starts with the scannable bar-coded label attached to a package, which contains detailed information about the sender, the destination, and when the package should arrive. Customers can download and print their own labels using special software provided by UPS or by accessing the UPS Web site. Before the package is even picked up, information from the "smart" label is transmitted to one of UPS's computer centers in Mahwah, New Jersey, or Alpharetta, Georgia and sent to the distribution center nearest its final destination.

Dispatchers at this center download the label data and use special software to create the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. In 2009, UPS began installing sensors in its delivery vehicles that can capture the truck's speed and location, the number of times it's placed in reverse and whether the driver's seat belt is buckled. At the end of each day, these data are uploaded to a UPS central computer and analyzed. By combining GPS information and data from fuel-efficiency sensors installed on more than 46,000 vehicles in 2011, UPS reduced fuel consumption by 8.4 million gallons and cut 85 million miles off its routes. UPS estimates that saving only one daily mile driven per driver saves the company $30 million.

The first thing a UPS driver picks up each day is a handheld computer called a Delivery Information Acquisition Device (DIAD), which can access a wireless cell phone network. As soon as the driver logs on, his or her day's route is downloaded onto the handheld. The DIAD also automatically captures customers' signatures along with pickup and delivery information. Package tracking information is then transmitted to UPS's computer network for storage and processing. From there, the information can be accessed worldwide to provide proof of delivery to customers or to respond to customer queries. It usually takes less than 60 seconds from the time a driver presses "complete" on a the DIAD for the new information to be available on the Web.

Through its automated package tracking system, UPS can monitor and even re-route packages throughout the delivery process. At various points along the route from sender to receiver, bar code devices scan shipping information on the package label and feed data about the progress of the package into the central computer. Customer service representatives are able to check the status of any package from desktop computers linked to the central computers and respond immediately to inquiries from customers. UPS customers can also access this information from the company's Web site using their own computers or mobile phones. UPS now has mobile apps and a mobile Web site for iPhone, BlackBerry, and Android smartphone users.

Anyone with a package to ship can access the UPS Web site to track packages, check delivery routes, calculate shipping rates, determine time in transit, print labels, and schedule a pickup. The data collected at the UPS Web site are transmitted to the UPS central computer and then back to the customer after processing. UPS also provides tools that enable customers, such Cisco Systems, to embed UPS functions, such as tracking and cost calculations, into their own Web sites so that they can track shipments without visiting the UPS site.

A Web-based Post Sales Order Management System (OMS) manages global service orders and inventory for critical parts fulfillment. The system enables high-tech electronics, aerospace, medical equipment, and other companies anywhere in the world that ship critical parts to quickly assess their critical parts inventory, determine the most optimal routing strategy to meet customer needs, place orders online, and track parts from the warehouse to the end user.

An automated e-mail or fax feature keeps customers informed of each shipping milestone and can provide notification of any changes to flight schedules for commercial airlines carrying their parts.

UPS is now leveraging its decades of expertise managing its own global delivery network to manage logistics and supply chain activities for other companies. It created a UPS Supply Chain Solutions division that provides a complete bundle of standardized services to subscribing companies at a fraction of what it would cost to build their own systems and infrastructure. These services include supply-chain design and management, freight forwarding, customs brokerage, mail services, multimodal transportation, and financial services, in addition to logistics services.

For example, UPS handles logistics for Lighting Science Group, the world's leading maker of advanced light products such as energy-efficient light-emitting diode (LED) lamps and custom design lighting systems. The company has manufacturing operations in Satellite Beach, Florida and China. UPS conducted a warehouse/distribution analysis to shape the manufacturer's distribution strategy, in which finished goods from China are brought to a UPS warehouse in Fort Worth, Texas, for distribution. The UPS warehouse repackages finished goods, handles returns and conducts daily cycle counts as well as annual inventory. Lighting Science uses UPS Trade Management Services and UPS Customs Brokerage to help manage import and export compliance to ensure timely, reliable delivery and reduce customs delays. UPS also helps Lighting Science reduce customer inventory and improve order fulfillment.

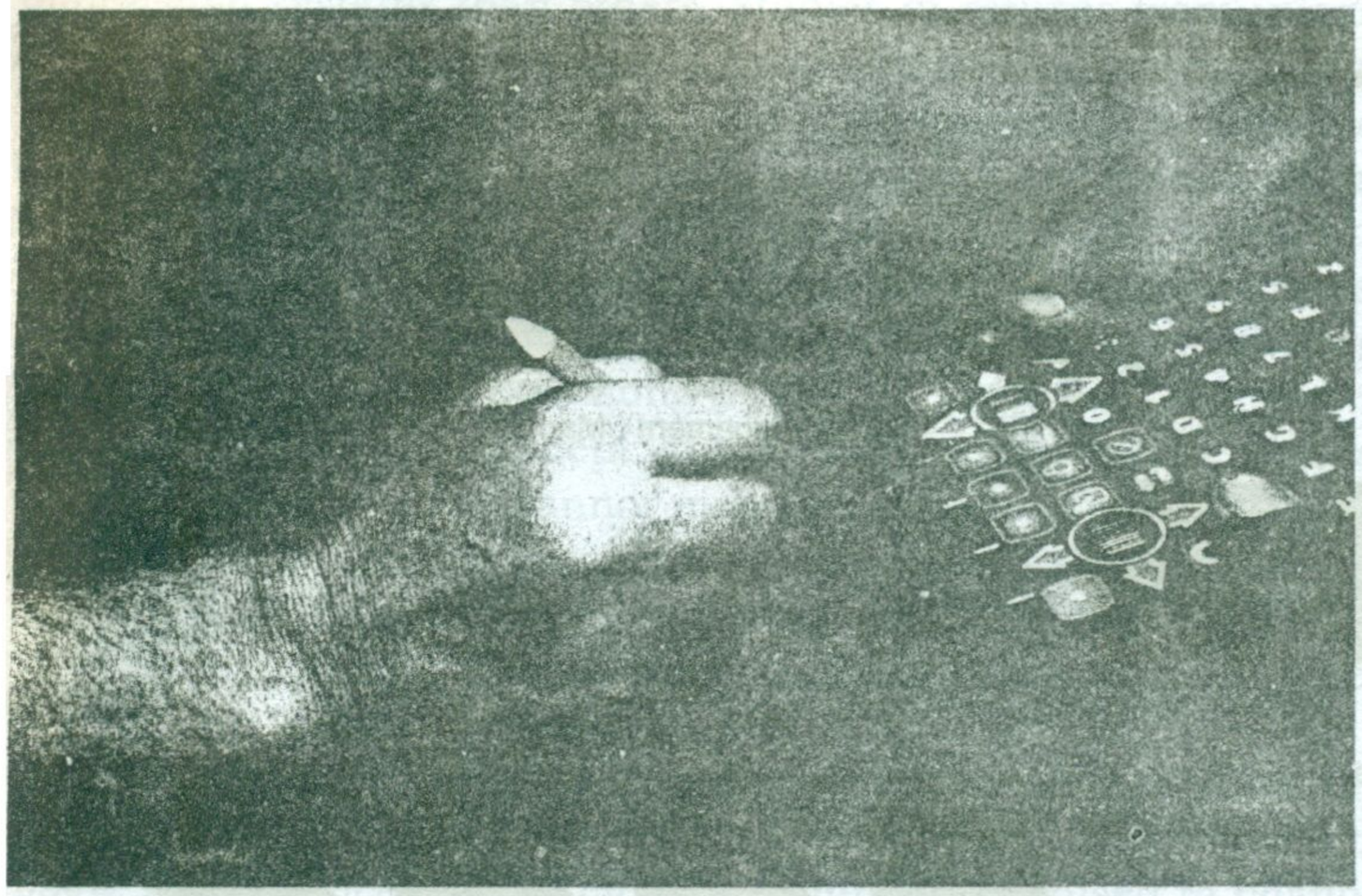
UPS manages logistics and international shipping for Celaris, the world's largest wireless accessory vendor, selling mobile phone cases, headphones, screen protectors, and chargers. Cellaris has nearly 1,000 franchises in the United States, Canada and the United Kingdom. The company's supply chain is complex, with products developed in Georgia, manufactured at more than 25 locations in Asia and 10 locations in the U.S., warehoused in a Georgia distribution center, and shipped to franchisees and customers worldwide. UPS redesigned Celaris's inbound/outbound supply chain and introduced new services to create a more efficient shipping model. UPS Buyer Consolidation for International Air Freight reduces complexity in dealing with multiple international manufacturing sources. UPS Worldwide Express Freight guarantees on-time service for critical freight pallet shipments and UPS Customs Brokerage enables single-source clearance for multiple transportation modes. These changes have saved Celaris more than 5,000 hours and $500,000 annually, and the supply chain redesign alone has saved more than 15 percent on shipments.

Sources: "A Good Call Becomes a Thriving Business," UPS Compass, February 2014;"High-Tech Manufacturer Masters Logistics, 'UPS Compass, January 2014; www.ups.com, accessed April 17, 2014; Steve Rosenbush and Michael Totty, "How Big Data Is Transforming Business," *The Wall Street Journal*, March 10, 2013; Thomas H. Davenport, "Analytics That Tell You What to Do," *The Wall Street Journal*, April 3, 2013; Elana Varon, "How UPS Trains Front-Line Workers to Use Predictive Analytics," DataInformed, January 31, 2013; and Jennifer Levitz and Timothy W. Martin, "UPS, Other Big Shippers, Carve Health Care Niches," *The Wall Street Journal*, June 27, 2012.

CASE STUDY QUESTIONS

1. What are the inputs, processing, and outputs of UPS's package tracking system?
2. What technologies are used by UPS? How are these technologies related to UPS's business strategy?
3. What strategic business objectives do UPS's information systems address?
4. What would happen if UPS's information systems were not available?

The technology supporting this system consists of handheld computers, bar code scanners, desktop computers, wired and wireless communications networks, UPS's data center, storage technology for the package delivery data, UPS in-house package tracking software, and software to access the World Wide Web. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.



© Bill Aron/PhotoEdit

Using a handheld computer called a Delivery Information Acquisition Device (DIAD), UPS drivers automatically capture customers' signatures along with pickup, delivery, and time card information. UPS information systems use these data to track packages while they are being transported.

IT ISN'T JUST TECHNOLOGY: A BUSINESS PERSPECTIVE ON INFORMATION SYSTEMS

Managers and business firms invest in information technology and systems because they provide real economic value to the business. The decision to build or maintain an information system assumes that the returns on this investment will be superior to other investments in buildings, machines, or other assets. These superior returns will be expressed as increases in productivity, as increases in revenues (which will increase the firm's stock market value), or perhaps as superior long-term strategic positioning of the firm in certain markets (which produce superior revenues in the future).

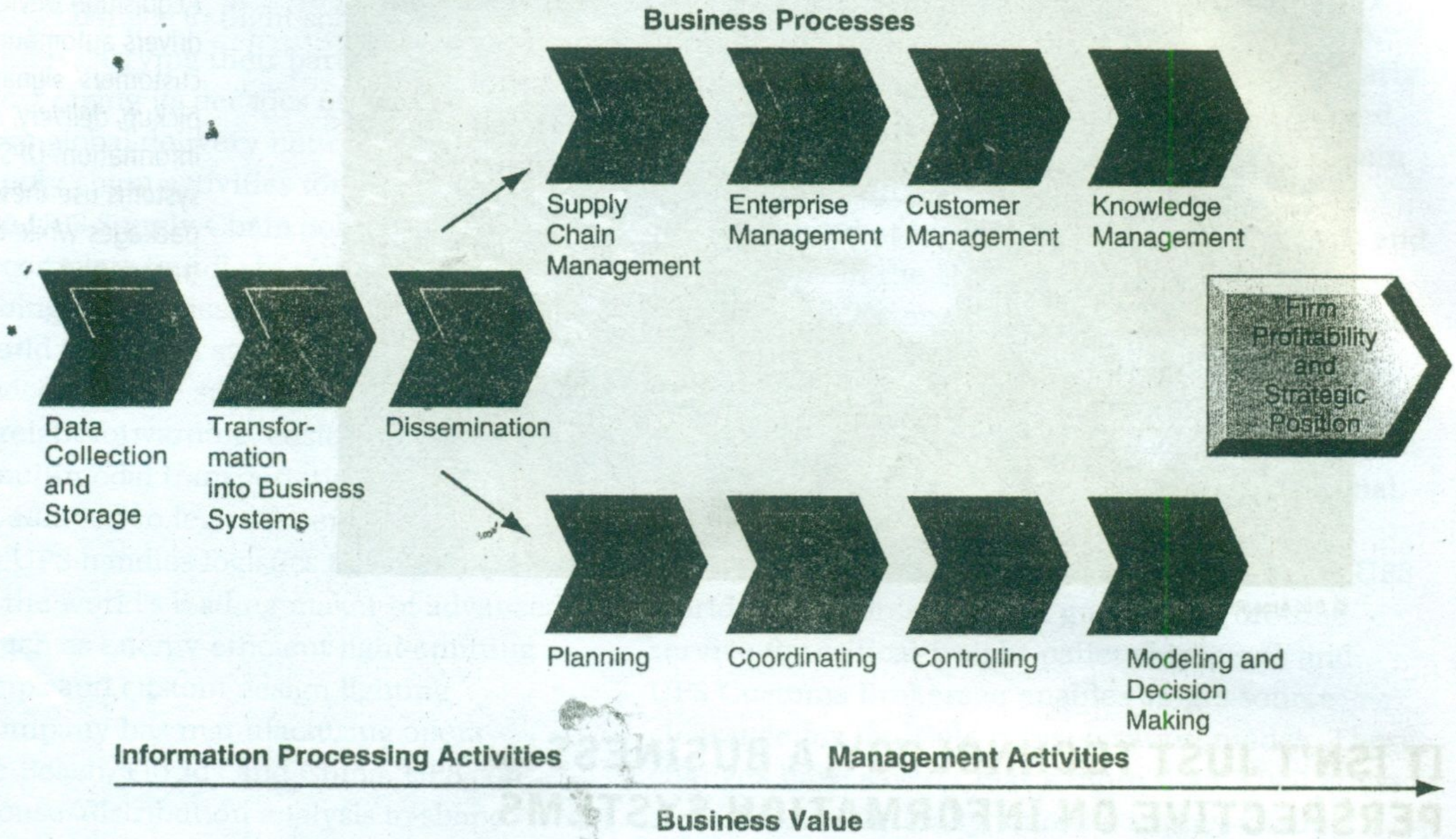
We can see that from a business perspective, an information system is an important instrument for creating value for the firm. Information systems enable the firm to increase its revenue or decrease its costs by providing information that helps managers make better decisions or that improves the execution of business processes. For example, the information system for analyzing supermarket checkout data illustrated in Figure 1.3 can increase firm profitability by helping managers make better decisions as to which products to stock and promote in retail supermarkets.

Every business has an information value chain, illustrated in Figure 1.7, in which raw information is systematically acquired and then transformed through various stages that add value to that information. The value of an information system to a business, as well as the decision to invest in any new information system, is, in large part, determined by the extent to which the system will lead to better management decisions, more efficient business processes, and higher firm profitability. Although there are other reasons why systems are built, their primary purpose is to contribute to corporate value.

From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming, and distributing information that managers can use to improve decision making, enhance organizational performance, and, ultimately, increase firm profitability.

The business perspective calls attention to the organizational and managerial nature of information systems. An information system represents

FIGURE 1.7 THE BUSINESS INFORMATION VALUE CHAIN



From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming, and distributing information that managers can use to improve decision making, enhance organizational performance, and, ultimately, increase firm profitability.

an organizational and management solution, based on information technology, to a challenge or problem posed by the environment. Every chapter in this book begins with a short case study that illustrates this concept. A diagram at the beginning of each chapter illustrates the relationship between a business challenge and resulting management and organizational decisions to use IT as a solution to challenges generated by the business environment. You can use this diagram as a starting point for analyzing any information system or information system problem you encounter.

Review the diagram at the beginning of this chapter. The diagram shows how the Rugby Football Union's systems solved the business problem presented by the need to generate revenue in a highly competitive industry. These systems provide a solution that takes advantage of opportunities provided by new digital technology and the Internet. They opened up new channels for selling tickets and interacting with customers, optimized ticket pricing, and used new tools to analyze player performance. These systems were essential in improving the Union's overall business performance. The diagram also illustrates how management, technology, and organizational elements work together to create the systems.

COMPLEMENTARY ASSETS: ORGANIZATIONAL CAPITAL AND THE RIGHT BUSINESS MODEL

Awareness of the organizational and managerial dimensions of information systems can help us understand why some firms achieve better results from

their information systems than others. Studies of returns from information technology investments show that there is considerable variation in the returns firms receive (see Figure 1.8). Some firms invest a great deal and receive a great deal (quadrant 2); others invest an equal amount and receive few returns (quadrant 4). Still other firms invest little and receive much (quadrant 1), whereas others invest little and receive little (quadrant 3). This suggests that investing in information technology does not by itself guarantee good returns. What accounts for this variation among firms?

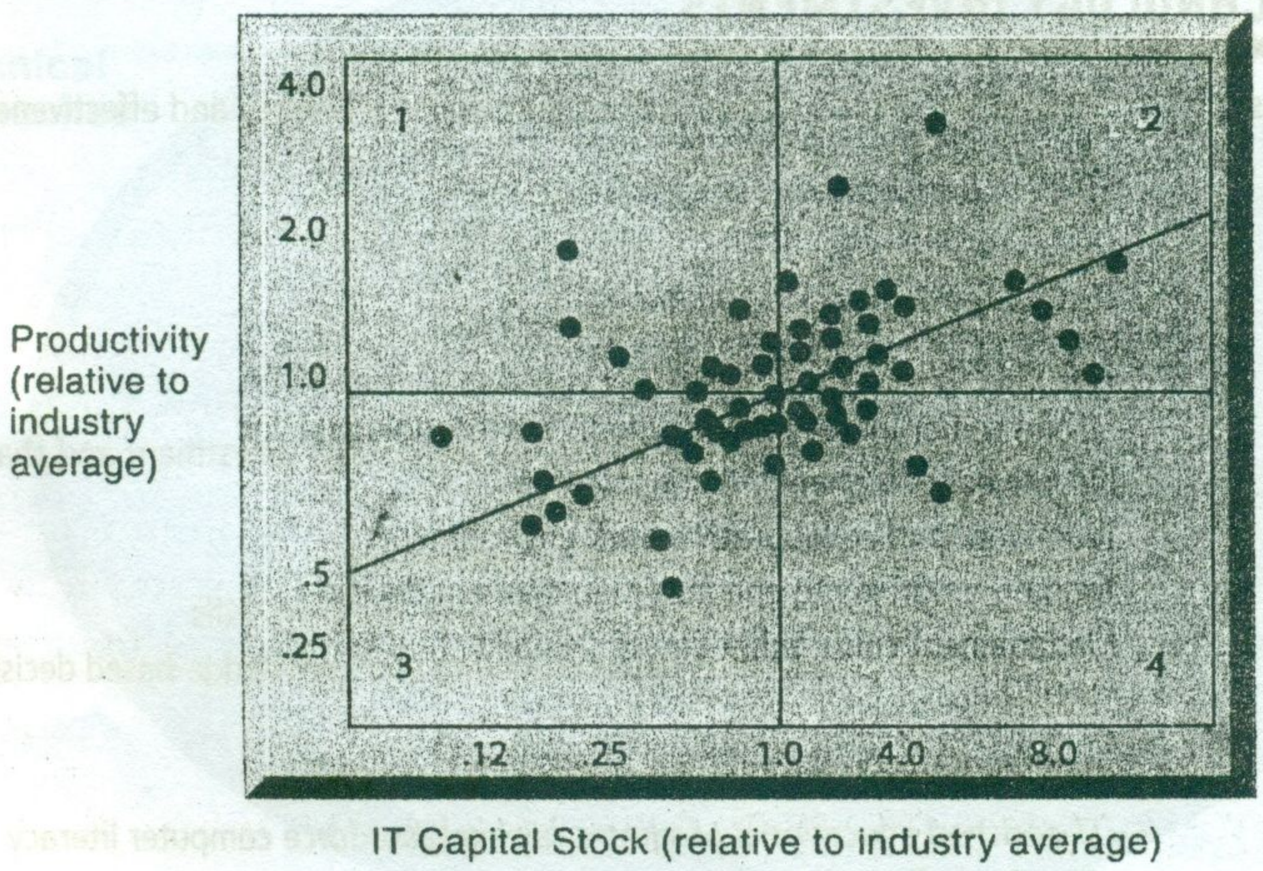
The answer lies in the concept of complementary assets. Information technology investments alone cannot make organizations and managers more effective unless they are accompanied by supportive values, structures, and behavior patterns in the organization and other complementary assets. Business firms need to change how they do business before they can really reap the advantages of new information technologies.

Some firms fail to adopt the right business model that suits the new technology, or seek to preserve an old business model that is doomed by new technology. For instance, recording label companies refused to change their old business model, which was based on physical music stores for distribution rather than adopt a new online distribution model. As a result, online legal music sales are dominated not by record companies but by a technology company called Apple Computer.

Complementary assets are those assets required to derive value from a primary investment (Teece, 1988). For instance, to realize value from automobiles requires substantial complementary investments in highways, roads, gasoline stations, repair facilities, and a legal regulatory structure to set standards and control drivers.

Research indicates that firms that support their technology investments with investments in complementary assets, such as new business models, new business processes, management behavior, organizational culture, or

FIGURE 1.8 VARIATION IN RETURNS ON INFORMATION TECHNOLOGY INVESTMENT



Although, on average, investments in information technology produce returns far above those returned by other investments, there is considerable variation across firms.

Source: Based on Brynjolfsson and Hitt (2000).

training, receive superior returns, whereas those firms failing to make these complementary investments receive less or no returns on their information technology investments (Brynjolfsson, 2003; Brynjolfsson and Hitt, 2000; Laudon, 1974). These investments in organization and management are also known as **organizational and management capital**.

Table 1.3 lists the major complementary investments that firms need to make to realize value from their information technology investments. Some of this investment involves tangible assets, such as buildings, machinery, and tools. However, the value of investments in information technology depends to a large extent on complementary investments in management and organization.

Key organizational complementary investments are a supportive business culture that values efficiency and effectiveness, an appropriate business model, efficient business processes, decentralization of authority, highly distributed decision rights, and a strong information system (IS) development team.

Important managerial complementary assets are strong senior management support for change, incentive systems that monitor and reward individual innovation, an emphasis on teamwork and collaboration, training programs, and a management culture that values flexibility and knowledge.

Important social investments (not made by the firm but by the society at large, other firms, governments, and other key market actors) are the Internet and the supporting Internet culture, educational systems, network and computing standards, regulations and laws, and the presence of technology and service firms.

Throughout the book we emphasize a framework of analysis that considers technology, management, and organizational assets and their interactions. Perhaps the single most important theme in the book, reflected in case studies and exercises, is that managers need to consider the broader organization and

TABLE 1.3 COMPLEMENTARY SOCIAL, MANAGERIAL, AND ORGANIZATIONAL ASSETS REQUIRED TO OPTIMIZE RETURNS FROM INFORMATION TECHNOLOGY INVESTMENTS

Organizational assets	Supportive organizational culture that values efficiency and effectiveness
	Appropriate business model
	Efficient business processes
	Decentralized authority
	Distributed decision-making rights
	Strong IS development team
Managerial assets	Strong senior management support for technology investment and change
	Incentives for management innovation
	Teamwork and collaborative work environments
	Training programs to enhance management decision skills
	Management culture that values flexibility and knowledge-based decision making.
Social assets	The Internet and telecommunications infrastructure
	IT-enriched educational programs raising labor force computer literacy
	Standards (both government and private sector)
	Laws and regulations creating fair, stable market environments
	Technology and service firms in adjacent markets to assist implementation

management dimensions of information systems to understand current problems as well as to derive substantial above-average returns from their information technology investments. As you will see throughout the text, firms that can address these related dimensions of the IT investment are, on average, richly rewarded.

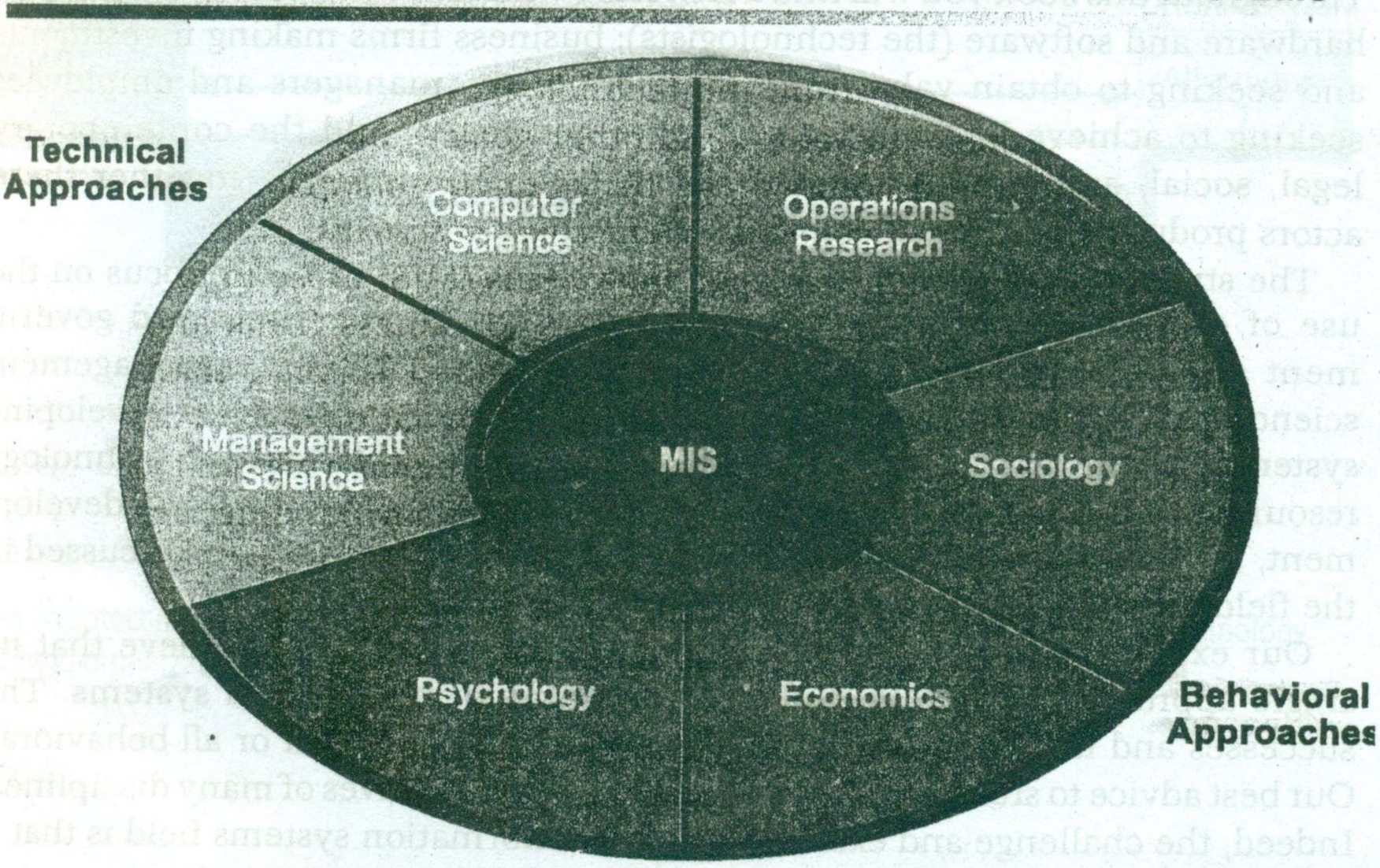
1.3 WHAT ACADEMIC DISCIPLINES ARE USED TO STUDY INFORMATION SYSTEMS AND HOW DOES EACH CONTRIBUTE TO AN UNDERSTANDING OF INFORMATION SYSTEMS?

The study of information systems is a multidisciplinary field. No single theory or perspective dominates. Figure 1.9 illustrates the major disciplines that contribute problems, issues, and solutions in the study of information systems. In general, the field can be divided into technical and behavioral approaches. Information systems are sociotechnical systems. Though they are composed of machines, devices, and "hard" physical technology, they require substantial social, organizational, and intellectual investments to make them work properly.

TECHNICAL APPROACH

The technical approach to information systems emphasizes mathematically based models to study information systems, as well as the physical technology and formal capabilities of these systems. The disciplines that contribute to the technical approach are computer science, management science, and operations research.

FIGURE 1.9 CONTEMPORARY APPROACHES TO INFORMATION SYSTEMS



The study of information systems deals with issues and insights contributed from technical and behavioral disciplines.

Computer science is concerned with establishing theories of computability, methods of computation, and methods of efficient data storage and access. Management science emphasizes the development of models for decision-making and management practices. Operations research focuses on mathematical techniques for optimizing selected parameters of organizations, such as transportation, inventory control, and transaction costs.

BEHAVIORAL APPROACH

An important part of the information systems field is concerned with behavioral issues that arise in the development and long-term maintenance of information systems. Issues such as strategic business integration, design, implementation, utilization, and management cannot be explored usefully with the models used in the technical approach. Other behavioral disciplines contribute important concepts and methods.

For instance, sociologists study information systems with an eye toward how groups and organizations shape the development of systems and also how systems affect individuals, groups, and organizations. Psychologists study information systems with an interest in how human decision makers perceive and use formal information. Economists study information systems with an interest in understanding the production of digital goods, the dynamics of digital markets, and how new information systems change the control and cost structures within the firm.

The behavioral approach does not ignore technology. Indeed, information systems technology is often the stimulus for a behavioral problem or issue. But the focus of this approach is generally not on technical solutions. Instead, it concentrates on changes in attitudes, management and organizational policy, and behavior.

APPROACH OF THIS TEXT: SOCIOTECHNICAL SYSTEMS

Throughout this book you will find a rich story with four main actors: suppliers of hardware and software (the technologists); business firms making investments and seeking to obtain value from the technology; managers and employees seeking to achieve business value (and other goals); and the contemporary legal, social, and cultural context (the firm's environment). Together these actors produce what we call *management information systems*.

The study of management information systems (MIS) arose to focus on the use of computer-based information systems in business firms and government agencies. MIS combines the work of computer science, management science, and operations research with a practical orientation toward developing system solutions to real-world problems and managing information technology resources. It is also concerned with behavioral issues surrounding the development, use, and impact of information systems, which are typically discussed in the fields of sociology, economics, and psychology.

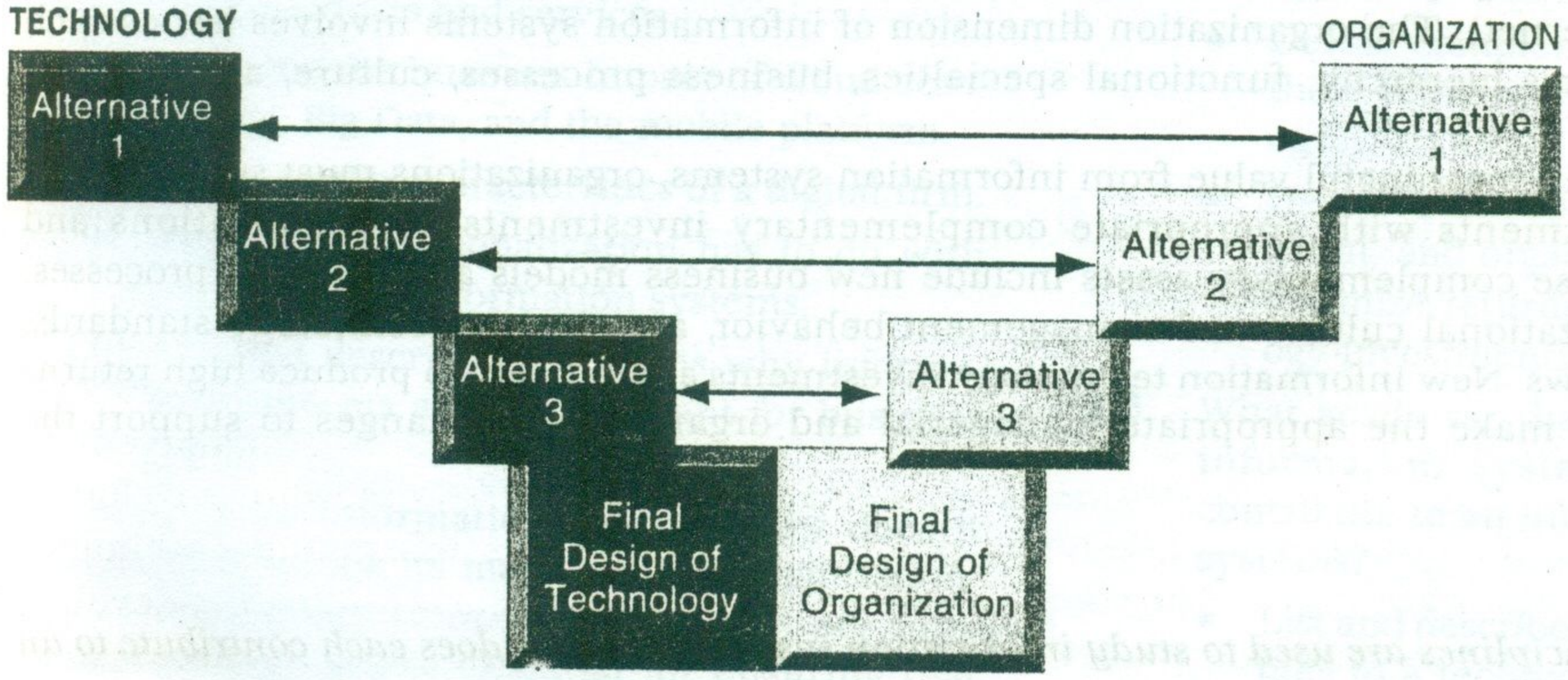
Our experience as academics and practitioners leads us to believe that no single approach effectively captures the reality of information systems. The successes and failures of information are rarely all technical or all behavioral. Our best advice to students is to understand the perspectives of many disciplines. Indeed, the challenge and excitement of the information systems field is that it requires an appreciation and tolerance of many different approaches.

The view we adopt in this book is best characterized as the **sociotechnical view** of systems. In this view, optimal organizational performance is achieved by jointly optimizing both the social and technical systems used in production.

Adopting a sociotechnical systems perspective helps to avoid a purely technological approach to information systems. For instance, the fact that information technology is rapidly declining in cost and growing in power does not necessarily or easily translate into productivity enhancement or bottom-line profits. The fact that a firm has recently installed an enterprise-wide financial reporting system does not necessarily mean that it will be used, or used effectively. Likewise, the fact that a firm has recently introduced new business procedures and processes does not necessarily mean employees will be more productive in the absence of investments in new information systems to enable those processes.

In this book, we stress the need to optimize the firm's performance as a whole. Both the technical and behavioral components need attention. This means that technology must be changed and designed in such a way as to fit organizational and individual needs. Sometimes, the technology may have to be "de-optimized" to accomplish this fit. For instance, mobile phone users adapt this technology to their personal needs, and as a result manufacturers quickly seek to adjust the technology to conform with user expectations. Organizations and individuals must also be changed through training, learning, and planned organizational change to allow the technology to operate and prosper. Figure 1.10 illustrates this process of mutual adjustment in a sociotechnical system.

FIGURE 1.10 A SOCIOTECHNICAL PERSPECTIVE ON INFORMATION SYSTEMS



In a sociotechnical perspective, the performance of a system is optimized when both the technology and the organization mutually adjust to one another until a satisfactory fit is obtained.

Review Summary

1. *How are information systems transforming business, and why are they essential for running and managing a business today?*

E-mail, online conferencing, smartphones, and tablet computers have become essential tools for conducting business. Information systems are the foundation of fast-paced supply chains. The Internet allows many businesses to buy, sell, advertise, and solicit customer feedback online. Organizations are trying to become more competitive and efficient by digitally enabling their core business processes and evolving into digital firms. The Internet has stimulated globalization by dramatically reducing the costs of producing, buying, and selling goods on a global scale. New information system trends include the emerging mobile digital platform, online software as a service, and cloud computing.

Information systems are a foundation for conducting business today. In many industries, survival and the ability to achieve strategic business goals are difficult without extensive use of information technology. Businesses today use information systems to achieve six major objectives: operational excellence; new products, services, and business models; customer/supplier intimacy; improved decision making; competitive advantage; and day-to-day survival.

2. *What is an information system? How does it work? What are its management, organization, and technology components and why are complementary assets essential for ensuring that information systems provide genuine value for organizations?*

From a technical perspective, an information system collects, stores, and disseminates information from an organization's environment and internal operations to support organizational functions and decision making, communication, coordination, control, analysis, and visualization. Information systems transform raw data into useful information through three basic activities: input, processing, and output.

From a business perspective, an information system provides a solution to a problem or challenge facing a firm and represents a combination of management, organization, and technology elements. The management dimension of information systems involves issues such as leadership, strategy, and management behavior. The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology (including the Internet). The organization dimension of information systems involves issues such as the organization's hierarchy, functional specialties, business processes, culture, and political interest groups.

In order to obtain meaningful value from information systems, organizations must support their technology investments with appropriate complementary investments in organizations and management. These complementary assets include new business models and business processes, supportive organizational culture and management behavior, appropriate technology standards, regulations, and laws. New information technology investments are unlikely to produce high returns unless businesses make the appropriate managerial and organizational changes to support the technology.

3. *What academic disciplines are used to study information systems and how does each contribute to an understanding of information systems?*

The study of information systems deals with issues and insights contributed from technical and behavioral disciplines. The disciplines that contribute to the technical approach focusing on formal models and capabilities of systems are computer science, management science, and operations research. The disciplines contributing to the behavioral approach focusing on the design, implementation, management, and business impact of systems are psychology, sociology, and economics. A sociotechnical view of systems considers both technical and social features of systems and solutions that represent the best fit between them.

Key Terms

Business functions, 51
Business model, 46
Business processes, 51
Complementary assets, 59
Computer hardware, 53
Computer literacy, 50
Computer software, 53
Culture, 52
Data, 48
Data management technology, 53
Data workers, 51
Digital firm, 44
Extranets, 54
Feedback, 50
Information, 48
Information system, 48
Information systems literacy, 50
Information technology (IT), 48
Information technology (IT) infrastructure, 54
Input, 48
Internet, 53
Intranets, 54
Knowledge workers, 53
Management information systems (MIS), 50
Middle management, 51
Network, 53
Networking and telecommunications technology, 53
Operational management, 51
Organizational and management capital, 60
Output, 49
Processing, 49
Production or service workers, 53
Senior management, 53
Sociotechnical view, 63
World Wide Web, 54

MyMISLab

Go to **mymislab.com** to complete the problems marked with this icon ✪.

Review Questions

1-1 How are information systems transforming business, and why are they so essential for running and managing a business today?

- Describe how information systems have changed the way businesses operate and their products and services.
- Describe the business impact of cloud computing, Big Data, and the mobile platform.
- Describe the characteristics of a digital firm.
- Explain what globalization has to do with management information systems.
- List and describe six reasons why information systems are so important for business today.

1-2 What is an information system? How does it work? What are its management, organization, and technology components and why are complementary assets essential for ensuring that information systems provide genuine value for organizations?

- Define an information system and describe the activities it performs.
- List and describe the organizational, management, and technology dimensions of information systems.
- Distinguish between information technology and an information system.
- Explain how the Internet and the World Wide Web are related to the other technology components of information systems.
- Define complementary assets and describe their relationship to information technology.
- Describe the complementary social, managerial, and organizational assets required to optimize returns from information technology investments.

1-3 What academic disciplines are used to study information systems and how does each contribute to an understanding of information systems?

- List and describe each discipline that contributes to a technical approach to information systems.
- List and describe each discipline that contributes to a behavioral approach to information systems.
- Describe the sociotechnical perspective on information systems.

Discussion Questions

✪ **1-4** Information systems are too important to be left to computer specialists. Do you agree? Why or why not?

✪ **1-5** If you were setting up the Web site for a rugby team, what management, organization, and technology issues might you encounter?

✪ **1-6** How have federal and state statutes and regulations impacted the use of information systems?

Hands-On MIS Projects

The projects in this section give you hands-on experience in analyzing financial reporting and inventory management problems, using data management software to improve management decision making about increasing sales, and using Internet software for researching job requirements.

Management Decision Problems

1-7 Warbenton Snack Foods is a manufacturer of potato crisps and savoury snacks in the U.K. Warbenton's financial department uses spreadsheets and manual processes for much of its data gathering and reporting. Warbenton's financial analyst would spend the entire final week of every month collecting spreadsheets from the heads of various departments. She would then consolidate and re-enter all the data into another spreadsheet, which would serve as the company's monthly profit and-loss statement. If a department needed to update its data after submitting the spreadsheet to the main office, the analyst had to return the original spreadsheet and then wait for the department to resubmit its data before finally submitting the updated data in the consolidated document. Assess the impact of this situation on business performance and management decision making.

1-8 Rabatt operates deep-discount stores offering housewares, cleaning supplies, clothing, health and beauty aids, and packaged food throughout Germany, with most items selling for 1 euro. Its business model calls for keeping costs as low as possible. The company has no automated method for keeping track of inventory at each store. Managers know approximately how many cases of a particular product the store is supposed to receive when a delivery truck arrives, but the stores lack technology for scanning the cases or verifying the item count inside the cases. Merchandise losses from theft or other mishaps have been rising and now represent over 3 percent of total sales. What decisions have to be made before investing in an information system solution?

Improving Decision Making: Using Databases to Analyze Sales Trends

Software skills: Database querying and reporting
Business skills: Sales trend analysis

1-9 In this project, you will start out with raw transactional sales data and use Microsoft Access database software to develop queries and reports that help managers make better decisions about product pricing, sales promotions, and inventory replenishment. In MyMISLab, you can find a Store and Regional Sales Database developed in Microsoft Access. The database contains raw data on weekly store sales of computer equipment in various sales regions. The database includes fields for store identification number, sales region, item number, item description, unit price, units sold, and the weekly sales period when the sales were made. Use Access to develop some reports and queries to make this information more useful for running the business. Sales and production managers want answers to the following questions:

- Which products should be restocked?
- Which stores and sales regions would benefit from a promotional campaign and additional marketing?
- When (what time of year) should products be offered at full price, and when should discounts be used?

You can easily modify the database table to find and report your answers. Print your reports and results of queries.

Improving Decision Making: Using the Internet to Locate Jobs Requiring Information Systems Knowledge

Software skills: Internet-based software
Business skills: Job searching

1-10 Visit a job-posting Web site such as Monster.com. Spend some time at the site examining jobs for accounting, finance, sales, marketing, and human resources. Find two or three descriptions of jobs that require some information systems knowledge. What information systems knowledge do these jobs require? What do you need to do to prepare for these jobs? Write a one- to two-page report summarizing your findings.

Collaboration and Teamwork Project

1-11 In MyMISLab, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google +, or other open-source collaboration tools to complete the assignment.

Mashaweer: Online Personal Services in the Gulf

CASE STUDY

Mashaweer is the first personal service company in Egypt. It's purely dedicated to saving its clients' time and effort by offering a personal assistant 24 hours a day. The personal assistant is a rider with a motorcycle who runs any errands for individual clients or corporations at any given time. The most common service they provide is buying groceries or other goods from stores, paying bills, and acting as a courier. Mashaweer's success relies heavily on their flexibility, and they have often received unusual requests that they have fulfilled in order to gain customer loyalty, including: going to the gym to tell someone to turn on the phone as someone is trying to reach them, delivering presents to a client's fiancée every 15 minutes, and carrying a client's shopping bags from the car to the house.

Mashaweer is an essential service for Egyptians because traffic is a problem that everyone in Egypt faces, making it difficult for an individual to get a couple of errands done on the same day. Mashaweer's service has achieved such success in Alexandria and Cairo, where traffic is an issue, saving people one of the most valuable commodities out there: time. The service is able to give people more quality time to spend with family or friends, instead of taking care of the daily errands that usually take up half of one's day. They also act as a security or safety measure as they perform people's errands in unsafe times, such as the period after the revolution or simply late at night. Most individuals cannot afford having a full-time assistant to perform their errands whenever needed. Mashaweer's agents act as full-time assistants for every individual at a part-time cost.

Since starting the company in Alexandria in 2010, Mashaweer has since expanded to Cairo and operates around 600 orders per day. They plan to expand even further geographically within Egypt and to other countries in the region as well as enhancing and increasing the services they provide.

The idea of Mashaweer was created by Mohamed Wahid (24 years old) and then co-founded with his partners, Ahmed El Kordy (25 years old) and Aly El Shazly (27 years old). They were all born and raised

in Alexandria. Ahmed El Kordy and Mohamed Wahid met when they both transferred from different schools to IGCSE Academy (AAST) for high school. Ahmed El Kordy finished high school in 2 years and went on to achieve his bachelor's degree in industrial engineering from the Arab Academy of Science and Technology (AAST), graduating in 2008. Part of his undergraduate degree was spent doing a year abroad in Carleton University in Ottawa, Canada. During the summers of his undergraduate years, Ahmed completed several internships in the United Kingdom and Ireland. Mohamed Wahid also went to AAST, graduating in 2009 with a bachelor's degree in construction engineering. Aly El Shazly attended St. Marks School for his entire school career, he then went on to Alexandria University, where he studied business and graduated in 2007. After college, Ahmed El Kordy went on to work at his father's import/export business. Mohamed Wahid went on to establish a company called X-trade for trade and contracting, followed by a marketing and advertising company called Green Media. Currently, he's a main shareholder in both, in addition to being the vice-chairman of Green Towers, a real estate company with a net worth of about $16 million.

Wahid thought of the idea of establishing Mashaweer while he was preparing for his wedding. His bride-to-be was overwhelmed with errands that she had to get done within a few days and he started wondering what she would have done if she couldn't afford a full-time driver who did all of her errands for her. While on his honeymoon, he kept thinking about this idea and how much time people could save and what a valuable service it could be. He decided to call his friends to start transforming the idea into an actual business plan. After developing the plan, the three entrepreneurs decided to go into the implementation phase and actually build this business. They started small and grew organically as the demand for the service increased. Each of the three entrepreneurs invested $5,000 into the project to total a starting capital of $15,000. They started with only 3 motorcycles, 6 riders, and a hotline.

As the three friends realized they had actually succeeded in Alexandria, they decided they wanted to move to the next phase by establishing Mashaweer in Cairo. When they decided to expand to Cairo, they decided to adopt a completely different strategy. They wanted to be able to cover all of Greater Cairo, as a whole, and not just specific areas, from the very beginning. During the Revolution in January 2011 they started gathering market research to expand in Cairo and started investing heavily. Since business all over the country had come to a standstill, they made several large purchases such as motorcycles and advertising space for fractions of the price. When others saw it as a time to slow down, the entrepreneurs saw it as an opportunity to start marketing for their business. By March they realized that they needed to increase the original investment so that they can grow large enough to capture the market in Cairo. To do so, they brought in other investors, mainly from their friends and family, to raise the capital investment up to $1.67 million. They planned to enter Cairo with full force so that there would be a high barrier of entry for any competitor. They decided that their competitive advantage would have to be in investing in technology. They wanted to get an enterprise resource planning (ERP) system but found quotations to be too high. To fix this they started their own information technology company, Innov8 ("innovate"), where they created a customized ERP system that they then connected to their customized PDAs (Personal Digital Assistants) through a cloud computing system made by LinkDotNet and Mobinil. Each rider receives tasks one at a time on the PDA, which also includes a GPS to provide detailed directions. The GPS monitors the rider's location.

To reduce cost and ensure quality, Mashaweer does not rely on outsourcing in any of its stages as long as it can do the work with the same or better quality. This was why Mashaweer founded Innov8 in order to build its system and manage its technical work. Now, Mashaweer only owns part of this company and is one of its numerous clients. One further example of Mashaweer's in-house capabilities is its call center. The company preferred to have an internal call center after rejecting a number of offers for an outsourced one. They wanted to be able to monitor the performance of the agents and always work on improving the quality of their customer service. Investing in an innovative contact center and using CISCO, which supports up to 300IP phones, a reporting module, and a recording system, made it much easier for Mashaweer to track its received calls and work on any problems that might face its customer service agents.

Software components developed by Innov8 include the Mashaweer Server, Mashaweer API (Application Programmers' Interface), and Mashaweer PDA client.

The Mashaweer Server is a centralized application that manages the following elements:

- Orders (placement, editing, pricing, review, tracking, and reports)
- Routes management and optimization

- Clients (management, reports, discounts)
- Packages tracking
- Contracts
- The call center
- Satellite offices
- Representatives
- Cash transactions and expenses tracking for representatives and satellite offices
- Asset tracking of vehicles, PDAs, and mobile printers
- Management reports

The API is a method of integrating Mashaweer ordering system with third parties. This allows third parties to automate their delivery system and integrate Mashaweer into their existing CRM/dispatching systems, opening a wide opportunity for business expansion.

The Mashaweer PDA application is installed on each representative PDA and manages the following elements:

- Order items progress tracking
- Collection of order fees and other costs, against a printed invoice
- Package handling (barcode scanning and destinations)
- Messaging
- Cash and expenses tracking
- Synchronizing data periodically and at the beginning of each shift

When Mashaweer was first introduced in Egypt, it captured 100 percent of market share for such a service, because it was the first and only company of its nature. However, the market was not aware or used to such a service, so it started growing slowly in Alexandria until people grasped the idea and got accustomed to the fact that there is a company that can take over your errands. In contrast, when the company started operating in Cairo, it grew at a surprisingly fast pace. There are several factors that are expected to affect the target market and make it easier for Mashaweer to penetrate it aggressively.

At the beginning, people's assumption is that using Mashaweer is too luxurious and costly. When they use it for the first few times, this perception changes and they begin to rely on this convenient service. As more and more people get accustomed to the service, it creates a cultural change that significantly affects the demand on the service.

Another factor that is expected to facilitate working conditions and reduce costs is the technological advances that occur every day. Mashaweer heavily depends on technological tools, and would benefit from the advancements and price reductions that continuously take place. As a result, Mashaweer's total costs will decrease, enabling it to decrease its prices and further improve its quality to become even more convenient for a larger number of people.

Mashaweer is the only company of its kind in Egypt that operates on this scale. However, there is a company called Wassaly that was established in Cairo after Mashaweer's success in Alexandria. This company operates on a much smaller scale. Their indirect competitors include other courier services (e.g. DHL, UPS, TNT, and FedEx). However, they have positioned themselves as the flexible courier in contrast to the others available in the market today; they offer same-day delivery rather than next-day delivery. Mashaweer has several other advantages that make it very hard for others to compete:

- A database of thousands of loyal clients.
- Manageable self-investment.
- Highly qualified and carefully selected riders due to the high salaries compared to the delivery sector in the Egypt.
- Various revenue streams.
- Being the owner of Innov8, which fosters technology integration in Mashaweer.

Mashaweer has several unique selling propositions. The main two aspects are being the first in the market, and being the only company of its kind. The most important differentiator is the flexibility of their service, which addresses all of their customer's needs and requests.

Unlike new entrants or copycats in the market, Mashaweer have invested highly in the systems they use. They invested in PDAs to enable the operations process to be monitored accurately since it provides data like GPS tracking to track each order and the location or stage the messenger is located. Through this technology, Mashaweer decreases the amount of errors, as the messengers are tied to an automated process where they receive their tasks through the PDA handheld. Meanwhile, a SCADA (Supervisory Control and Data Acquisition) system presented on a big screen will be available at Mashaweer headquarters to monitor all live orders and measure the traffic in case of rush hours, thus enabling the operation team to react and try a preventive and corrective action.

Mashaweer's infrastructures includes the following

Equipment: 130 motorcycles units and 10 cars.

Software: A logistics management solution system was developed specifically for Mashaweer, and served

from a cloud-hosted server. The solution consists of a web-based portal where call center agents, logistics, and managers can add, edit, track, and view reports.

PDA: A PDA client was developed to connect to the server in order to allow Mashaweer representatives to view and update their assigned orders via an XML-based web service. Except for the PDA client, the solution is based on open source technologies (PHP, CodeIgniter, MySQL, jQuery, Ubuntu Linux). The PDA devices will be a main factor in integrating the operational team with the fleet of riders.

Hardware: Windows Mobile PDAs were used for viewing and updating orders on the move. Each PDA is paired to a Bluetooth mobile printer for printing receipts. The printer is also equipped with a swipe card reader module so that it can be used in the future for credit card payment collection, and for promotion cards. Mashaweer server is a Linux VM hosted on a cloud solution provided by Innov8, the sister company that developed the entire information technology system.

Head Quarters: The decision was made to buy a new headquarters instead of renting an existing one.

Mashaweer's future strategy is as follows:

Mashaweer Market: Mashaweer Market is an online supermarket that will enable people to do their grocery shopping through Mashaweer's website and get it delivered by its representatives within 30 minutes of placing the order. This will be made possible by having access to a large number of supermarkets around Cairo and Alexandria, so that representatives can pick the order from the closest outlet and deliver it to the customer as quickly as possible. All products will be displayed on the website.

Mashaweer is hoping to reach an average of 4000 orders daily in return for a delivery charge of 5 Egyptian pounds per order.

Call center: Mashaweer's call center is expected to make up an important revenue stream for the company in the near future, as the company starts introducing marketing campaigns. In addition, Mashaweer is planning to expand its call center to include other companies other than Mashaweer.

Geographical Expansion: Using the technology they have invested in building their infrastructure, Mashaweer now has the potential to easily enter and penetrate other markets in different regions at a very low initiation cost. They plan to expand to other regions within Egypt, in addition to expanding to other countries within the Middle East. In October 2013 they opened their first franchise in Beirut, Lebanon. In 2014 they opened up for business in Dubai, and have plans for expanding to several countries in the Gulf.

Sources: Pamella de Leon, "Startup Mashaweer Wants to Do Your Errands In Dubai," entrepreneurmiddleeast.com, November 19, 2014; Mohammad Osmangoni, "Case 1: Mashaweer," mohammadosmangoni.wordpress.com/2014/10/17/case-1, October 17, 2014; "Brands Speak Digital: Mahsaweer's Social Media Strategy," http://www.digibuzzme.com, November 22, 2012.

CASE STUDY QUESTIONS

1-12 What kinds of applications are described in this case? What business functions do they support?

1-13 What are the benefits from equipping their riders with PDAs?

1-14 Was it a good decision to expand the business to Cairo? What are the implications of information systems?

1-15 Do you think that Mashaweer will be able to accomplish their future strategy and sustain its market share?

1-16 Do you think in near future, the competition between Mashaweer and Wassaly will be aggressive? Why?

Case contributed by Niveen Ezzat, Cairo University.

MyMISLab

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1-17 What are the strategic objectives that firms try to achieve by investing in information systems and technologies? For each strategic objective, give an example of how a firm could use information systems to achieve the objective.

1-18 Describe the complementary assets that firms need in order to optimize returns from their information system investments. For each type of complementary asset, give an example of a specific asset a firm should have.

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CHAPTER

Global E-business and Collaboration

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What are business processes? How are they related to information systems?
2. How do systems serve the different management groups in a business and how do systems that link the enterprise improve organizational performance?
3. Why are systems for collaboration and social business so important and what technologies do they use?
4. What is the role of the information systems function in a business?

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CHAPTER CASES

Social Business at BASF
Schiphol International Hub to Become Faultless: Truth or Dare?
Is Social Business Working Out?
Modernization of NTUC Income

VIDEO CASES

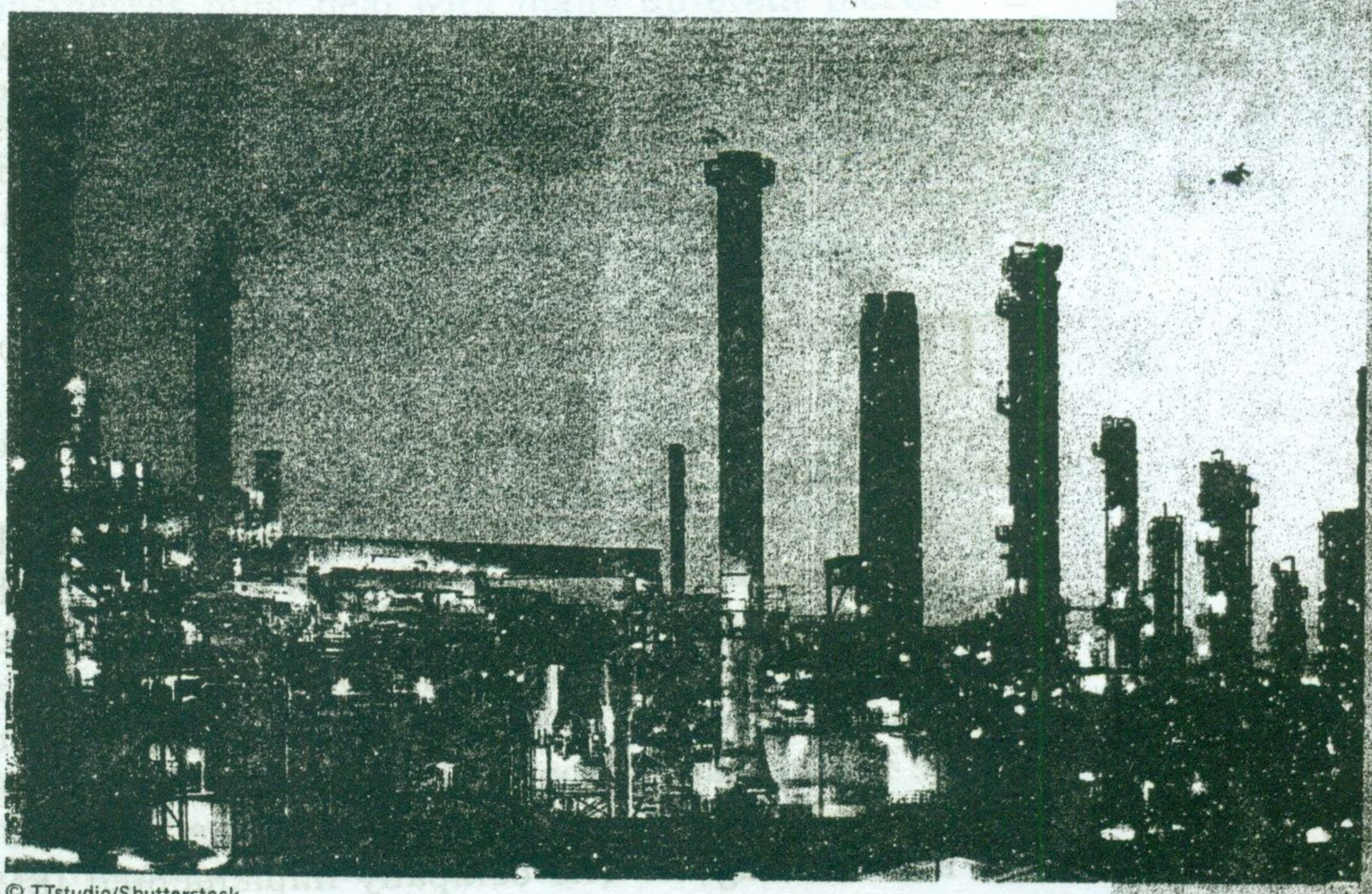
Walmart's Retail Link Supply Chain
Salesforce.com: The Emerging Social Enterprise
How FedEx Works: Inside the Memphis Hub
Instructional Video: US Foodservice Grows Market with Oracle CRM on Demand

SOCIAL BUSINESS AT BASF

BASF is the largest chemical company in the world, generating over $74 billion in 2013, 3% higher than 2012. BASF is a German company with headquarters in Ludwigshaven. It has nearly 400 production sites around the world, operates in 200 countries, and has just over 100,000 employees. As a diversified chemical company, BASF supplies chemicals, plastics, catalysts, industrial coatings, crop technology, and crude oil and gas exploration for a wide variety of industries. The very size and scope of BASF's operations provide obvious advantages of scale, but also raise difficult management and organizational issues. With existing information technologies it was difficult to create a single global BASF culture, to coordinate initiatives and employees across so many time zones, to collaborate in real time, and to allow employees to participate in decision making.

BASF managers believed one potential solution to the challenges of managing a far-flung global enterprise was to use social technology as a platform to solve the challenges. Exactly how to do this, what technology to use, and how to implement this across the globe for its 100,000 employees was not initially clear. Older stand-alone solutions such as forums, blogs, wikis, and corporate Web sites provided only partial solutions.

Instead management implemented a social business platform called connect.BASF. The platform is based on the IBM Connections enterprise social network platform, which operates in the IBM Cloud environment. According to IDC, enterprise social network platforms provided by several firms have been adopted rapidly by global firms in the last few years to drive greater collaboration, coordination, and innovation throughout their firms. Connect. BASF includes many of the same functions that can be found on popular con-



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sumer social sites like Facebook, LinkedIn, Tumblr, cloud storage sites like Dropbox, and Web-based community knowledge sites like Wikipedia, incldуing user profiles, status updates, news feeds, notifications, bookmarks, and file sharing. The purpose is to share knowledge, collaborate, and encourage employees and managers to have conversations about their work.

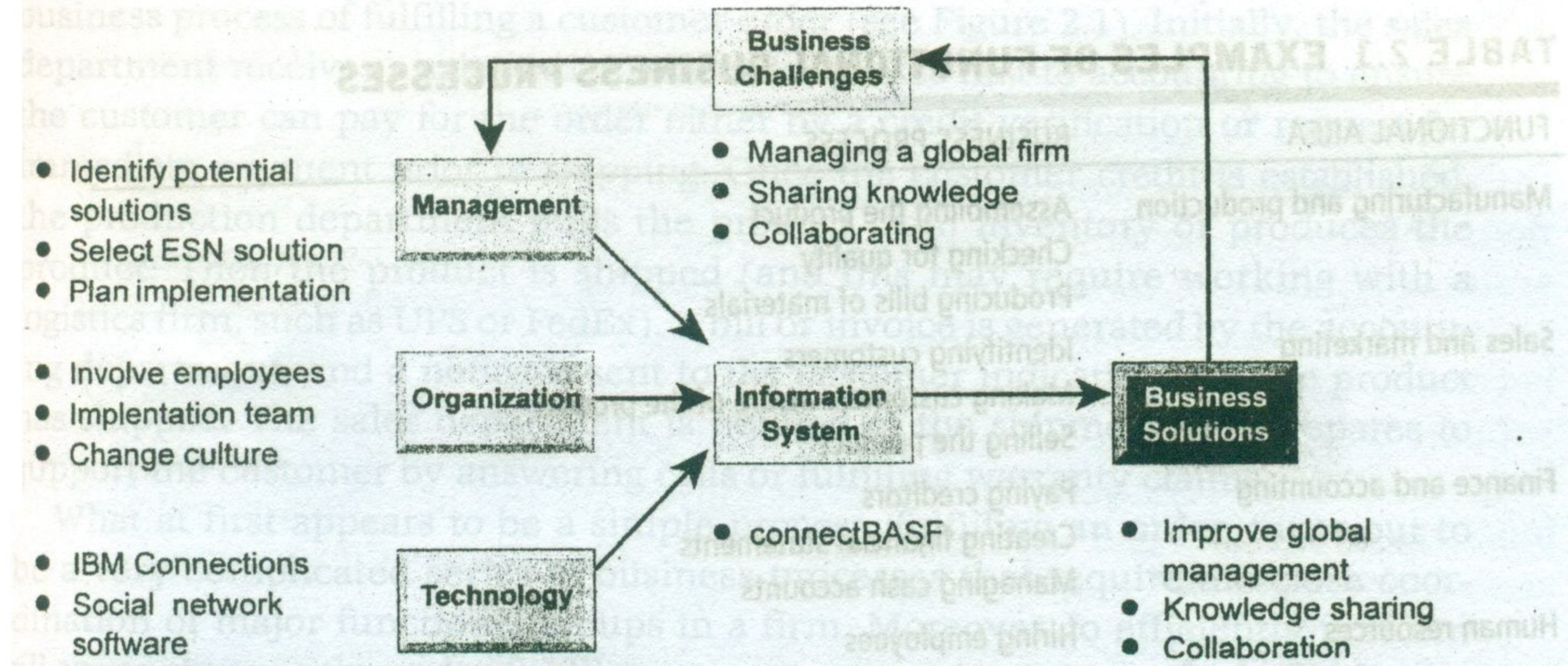
To implement connect.BASF, managers decided that employees should not be required to participate, but instead should be attracted to participate based on the benefits and capabilities of the platform as they perceived them. Implementation was carried out by two global community managers, and three regional community managers. They in turn recruited advocates, the early adopters, who volunteer their time to spread awareness of the social network, and document best practices. Users are encouraged to build communities of practice, online spaces where employees with similar professional backgrounds can share ideas. The implementation team used a multifaceted set of tools such as webinars, learning events, demonstrations, and internal consulting to attract employees.

In the first two years of operation, connect.BASF gathered over 33,000 users. The network supports more than 3,100 active work communities, and 84% of the users understand the business objectives of connect.BASF. Management believes the enterprise social network provides faster access to company experts, higher employee productivity, and better flow of knowledge throughout the firm. Younger workers in particular are attracted to the network, and more comfortable with using it. The use of email and the extensive overhead in systems and employee distraction has been greatly reduced. Managers have also had to learn new styles of management suitable to an online social environment as opposed to relying solely on traditional face-to-face interactions with employees.

The experience of BASF illustrates how much organizations today rely on information systems to improve their performance and remain competitive. It also shows how much systems supporting collaboration and teamwork make a difference in an organization's ability to innovate, execute, and grow profits.

Sources: "Social Business Case Study: BASF," Cordelia Kroos, "The Growth of an Enterprise Social Network at BASF," simply-communicate.com, November 26, 2014; "Worldwide Enterprise Social Networks 2014–2018 Forecast and 2013 Vendor Shares," International Data Corporation, July 2014; BASF, Annual Report 2013, http://report.basf.com/2013/en/notes/policies-and-scope-of-consolidation/accounting-policies/general-information.html, March 16, 2014.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. BASF is very much a knowledge-intensive company, but it was hampered by the absence of an information system that enabled efficient global management decision.making, collaboration among professional employees, and convenient sharing of knowledge. This impacted the company's ability to create and deliver leading-edge chemical products and services. It was very difficult to manage the firm on a global basis, or to bring together teams located in distant time zones. BASF management decided that the best solution was to deploy recently developed social network technologies to move from a static corporate knowledge and work environment to one in which actively engaged employees and enabled them to obtain more knowledge from colleagues. The company implemented IBM's Enterprise Social Network platform as an enterprise-wide platform for collaboration, management, knowledge acquisition, and knowledge transfer. It took advantage of the



software's new "social" tools to increase employee collaboration and engagement. BASF now relies on its internal enterprise social network for much of employee learning and problem solving.

Much more than technology was involved in the transformation of BASF's work culture. BASF managers developed a management philosophy of voluntary participation in the network. It created an implementation team at the top and middle of the form, and slowly spread the word to corporate entities around the globe through webinars, learning events, and internal consulting.

Here are some questions to think about: How are collaboration and employee engagement keeping BASF competitive? How did using a single enterprise social network platform change the way work was performed at BASF?

2.1 WHAT ARE BUSINESS PROCESSES? HOW ARE THEY RELATED TO INFORMATION SYSTEMS?

In order to operate, businesses must deal with many different pieces of information about suppliers, customers, employees, invoices, and payments, and of course their products and services. They must organize work activities that use this information to operate efficiently and enhance the overall performance of the firm. Information systems make it possible for firms to manage all their information, make better decisions, and improve the execution of their business processes.

BUSINESS PROCESSES

Business processes, which we introduced in Chapter 1, refer to the manner in which work is organized, coordinated, and focused to produce a valuable product or service. Business processes are the collection of activities required to produce a product or service. These activities are supported by flows of material, information, and knowledge among the participants in business processes. Business processes also refer to the unique ways in which organizations coordinate work, information, and knowledge, and the ways in which management chooses to coordinate work.

To a large extent, the performance of a business firm depends on how well its business processes are designed and coordinated. A company's business processes can be a source of competitive strength if they enable the company to innovate or to execute better than its rivals. Business processes can also be liabilities if they

TABLE 2.1 EXAMPLES OF FUNCTIONAL BUSINESS PROCESSES

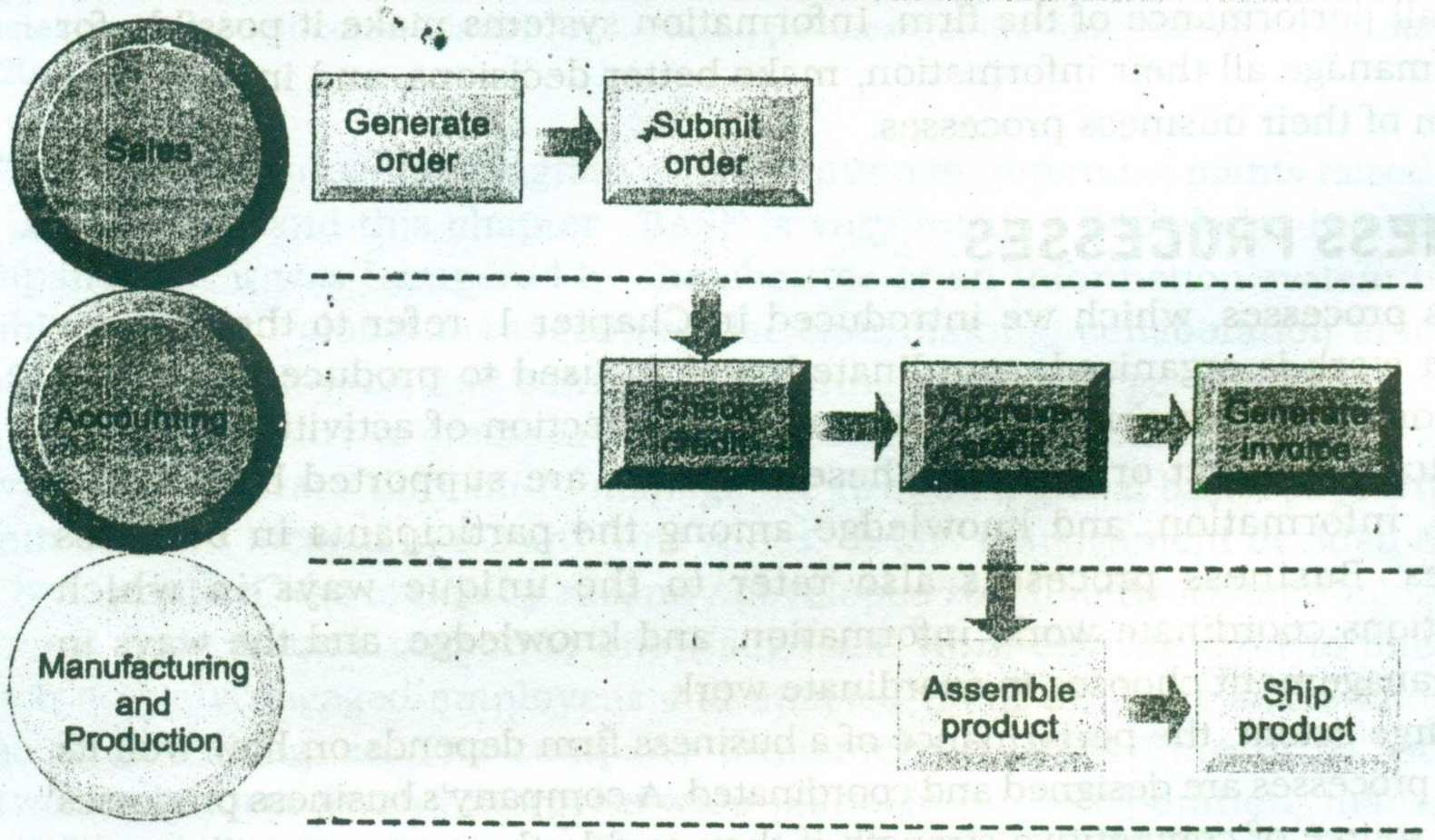
FUNCTIONAL AREA	BUSINESS PROCESS
Manufacturing and production	Assembling the product Checking for quality Producing bills of materials
Sales and marketing	Identifying customers Making customers aware of the product Selling the product
Finance and accounting	Paying creditors Creating financial statements Managing cash accounts
Human resources	Hiring employees Evaluating employees' job performance Enrolling employees in benefits plans

are based on outdated ways of working that impede organizational responsiveness and efficiency. The chapter-opening case describing BASF's improvements in knowledge-sharing processes clearly illustrates these points, as do many of the other cases in this text.

Every business can be seen as a collection of business processes, some of which are part of larger, encompassing processes. For instance, uses of mentoring, wikis, blogs, and videos are all part of the overall knowledge management process. Many business processes are tied to a specific functional area. For example, the sales and marketing function is responsible for identifying customers, and the human resources function is responsible for hiring employees. Table 2.1 describes some typical business processes for each of the functional areas of business.

Other business processes cross many different functional areas and require coordination across departments. For instance, consider the seemingly simple

FIGURE 2.1 THE ORDER FULFILLMENT PROCESS



Fulfilling a customer order involves a complex set of steps that requires the close coordination of the sales, accounting, and manufacturing functions.

business process of fulfilling a customer order (see Figure 2.1). Initially, the sales department receives a sales order. The order passes first to accounting to ensure the customer can pay for the order either by a credit verification or request for immediate payment prior to shipping. Once the customer credit is established, the production department pulls the product from inventory or produces the product. Then the product is shipped (and this may require working with a logistics firm, such as UPS or FedEx). A bill or invoice is generated by the accounting department, and a notice is sent to the customer indicating that the product has shipped. The sales department is notified of the shipment and prepares to support the customer by answering calls or fulfilling warranty claims.

What at first appears to be a simple process, fulfilling an order, turns out to be a very complicated series of business processes that require the close coordination of major functional groups in a firm. Moreover, to efficiently perform all these steps in the order fulfillment process requires a great deal of information. The required information must flow rapidly both within the firm from one decision maker to another; with business partners, such as delivery firms; and with the customer. Computer-based information systems make this possible.

HOW INFORMATION TECHNOLOGY IMPROVES BUSINESS PROCESSES

Exactly how do information systems improve business processes? Information systems automate many steps in business processes that were formerly performed manually, such as checking a client's credit, or generating an invoice and shipping order. But today, information technology can do much more. New technology can actually change the flow of information, making it possible for many more people to access and share information, replacing sequential steps with tasks that can be performed simultaneously, and eliminating delays in decision making. New information technology frequently changes the way a business works and supports entirely new business models. Downloading a Kindle e-book from Amazon, buying a computer online at Best Buy, and downloading a music track from iTunes are entirely new business processes based on new business models that would be inconceivable without today's information technology.

That's why it's so important to pay close attention to business processes, both in your information systems course and in your future career. By analyzing business processes, you can achieve a very clear understanding of how a business actually works. Moreover, by conducting a business process analysis, you will also begin to understand how to change the business by improving its processes to make it more efficient or effective. Throughout this book, we examine business processes with a view to understanding how they might be improved by using information technology to achieve greater efficiency, innovation, and customer service.

MANAGEMENT GROUPS IN A BUSINESS AND HOW DO SYSTEMS THAT LINK THE ENTERPRISE IMPROVE ORGANIZATIONAL PERFORMANCE?

Now that you understand business processes, it is time to look more closely at how information systems support the business processes of a firm. Because there are different interests, specialties, and levels in an organization, there are

different kinds of systems. No single system can provide all the information an organization needs.

A typical business organization has systems supporting processes for each of the major business functions—sales and marketing, manufacturing and production, finance and accounting, and human resources. You can find examples of systems for each of these business functions in the Learning Tracks for this chapter. Functional systems that operate independently of each other are becoming a thing of the past because they cannot easily share information to support cross-functional business processes. Many have been replaced with large-scale cross-functional systems that integrate the activities of related business processes and organizational units. We describe these integrated cross-functional applications later in this section.

A typical firm also has different systems supporting the decision-making needs of each of the main management groups we described in Chapter 1. Operational management, middle management, and senior management each use systems to support the decisions they must make to run the company. Let's look at these systems and the types of decisions they support.

SYSTEMS FOR DIFFERENT MANAGEMENT GROUPS

A business firm has systems to support different groups or levels of management. These systems include transaction processing systems and systems for business intelligence.

Transaction Processing Systems

Operational managers need systems that keep track of the elementary activities and transactions of the organization, such as sales, receipts, cash deposits, payroll, credit decisions, and the flow of materials in a factory. **Transaction processing systems (TPS)** provide this kind of information. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to conduct business, such as sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

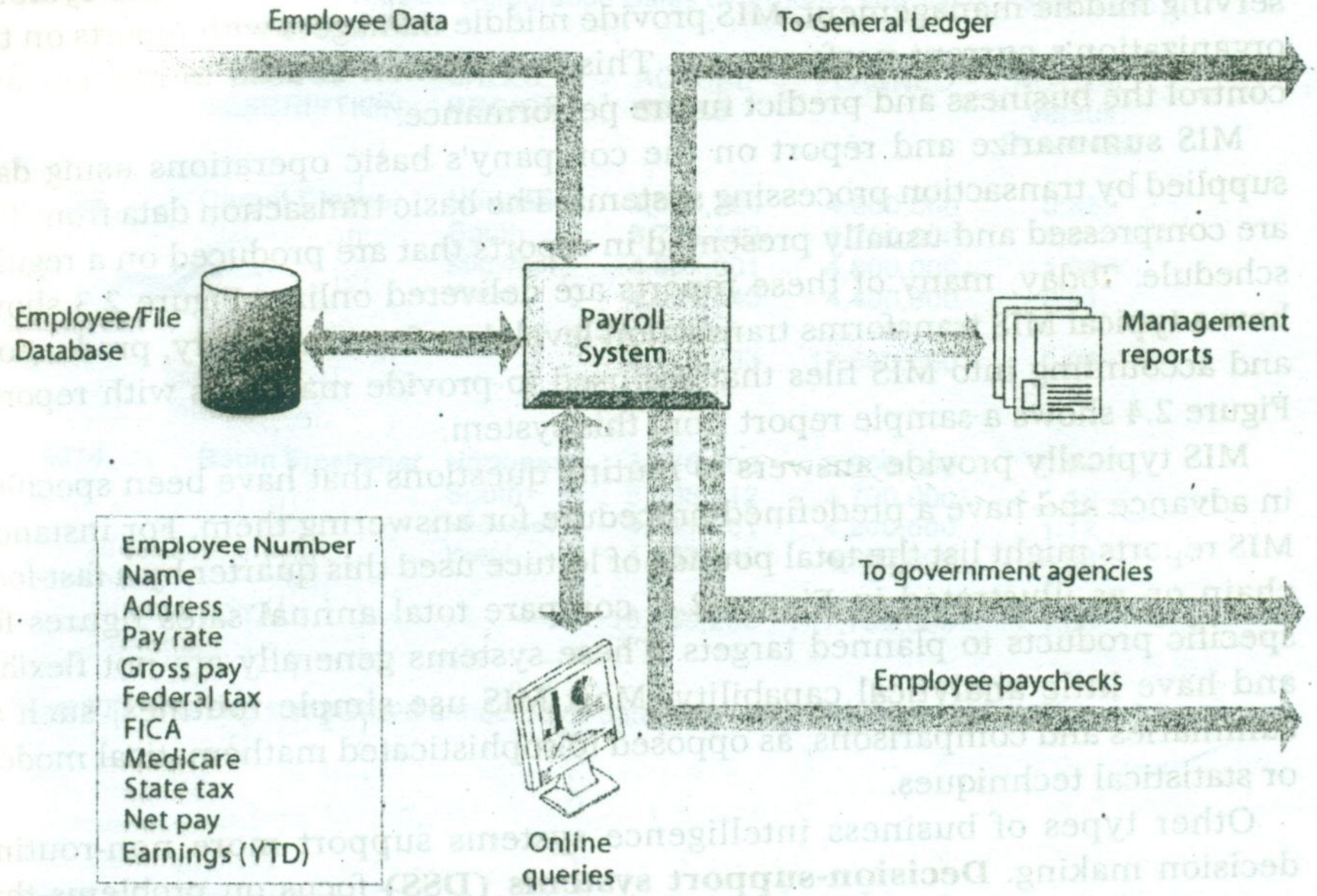
The principal purpose of systems at this level is to answer routine questions and to track the flow of transactions through the organization. How many parts are in inventory? What happened to Mr. Smith's payment? To answer these kinds of questions, information generally must be easily available, current, and accurate.

At the operational level, tasks, resources, and goals are predefined and highly structured. The decision to grant credit to a customer, for instance, is made by a lower-level supervisor according to predefined criteria. All that must be determined is whether the customer meets the criteria.

Figure 2.2 illustrates a TPS for payroll processing. A payroll system keeps track of money paid to employees. An employee time sheet with the employee's name, social security number, and number of hours worked per week represents a single transaction for this system. Once this transaction is input into the system, it updates the system's master file (or database—see Chapter 6) that permanently maintains employee information for the organization. The data in the system are combined in different ways to create reports of interest to management and government agencies and to send paychecks to employees.

Managers need TPS to monitor the status of internal operations and the firm's relations with the external environment. TPS are also major producers of information for the other systems and business functions. For example, the payroll system illustrated in Figure 2.2, along with other accounting TPS, supplies data to

FIGURE 2.2 **A PAYROLL TPS**



A TPS for payroll processing captures employee payment transaction data (such as a time card). System outputs include online and hard-copy reports for management and employee paychecks.

the company's general ledger system, which is responsible for maintaining records of the firm's income and expenses and for producing reports such as income statements and balance sheets. It also supplies employee payment history data for insurance, pension, and other benefits calculations to the firm's human resources function, and employee payment data to government agencies such as the U.S. Internal Revenue Service and Social Security Administration.

Transaction processing systems are often so central to a business that TPS failure for a few hours can lead to a firm's demise and perhaps that of other firms linked to it. Imagine what would happen to UPS if its package tracking system was not working! What would the airlines do without their computerized reservation systems?

Systems for Business Intelligence

Firms also have business intelligence systems that focus on delivering information to support management decision making. **Business intelligence** is a contemporary term for data and software tools for organizing, analyzing, and providing access to data to help managers and other enterprise users make more informed decisions. Business intelligence addresses the decision-making needs of all levels of management. This section provides a brief introduction to business intelligence. You'll learn more about this topic in Chapters 6 and 12.

Business intelligence systems for middle management help with monitoring, controlling, decision-making, and administrative activities. In Chapter 1, we defined management information systems as the study of information systems in business and management. The term **management information**

systems (MIS) also designates a specific category of information systems serving middle management. MIS provide middle managers with reports on the organization's current performance. This information is used to monitor and control the business and predict future performance.

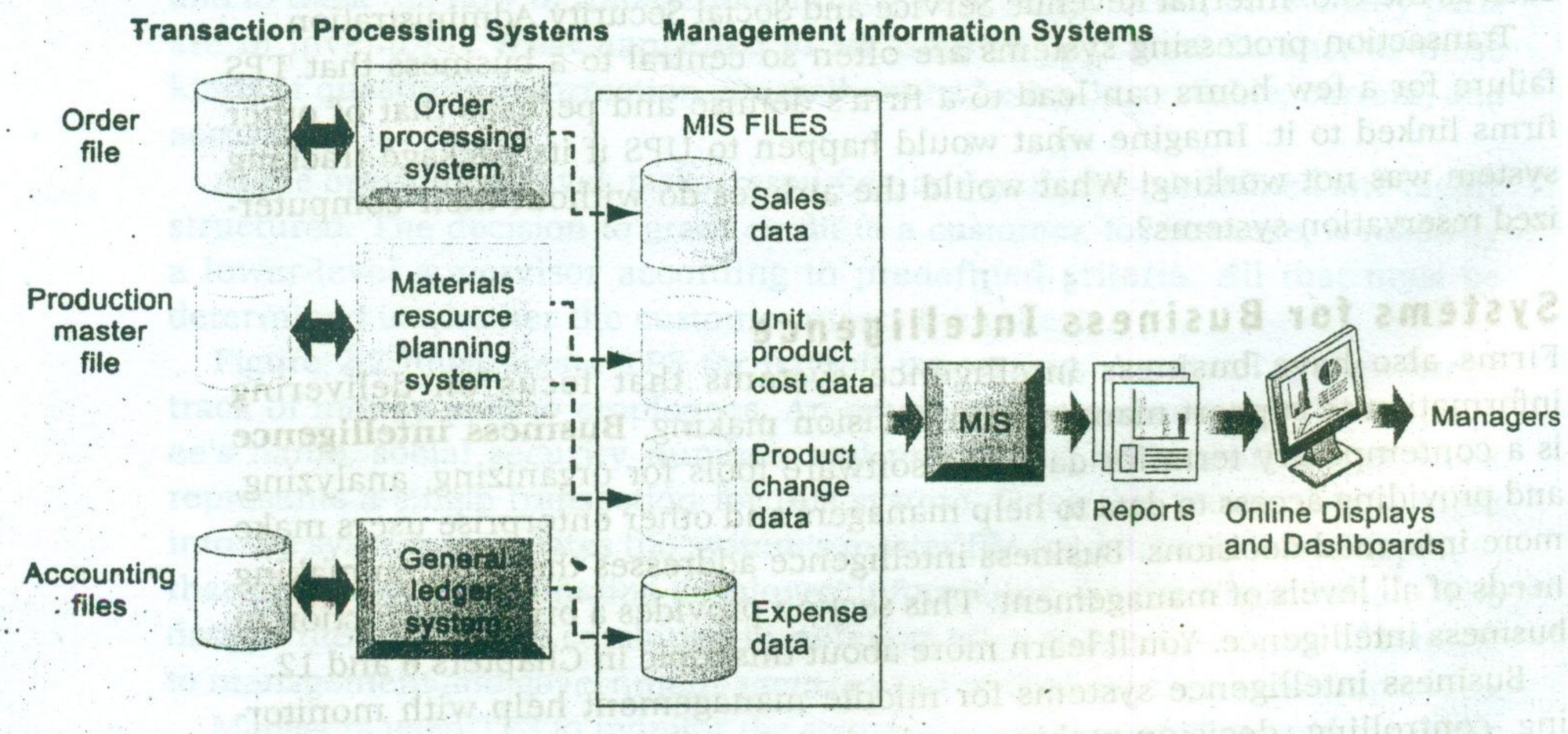
MIS summarize and report on the company's basic operations using data supplied by transaction processing systems. The basic transaction data from TPS are compressed and usually presented in reports that are produced on a regular schedule. Today, many of these reports are delivered online. Figure 2.3 shows how a typical MIS transforms transaction-level data from inventory, production, and accounting into MIS files that are used to provide managers with reports. Figure 2.4 shows a sample report from this system.

MIS typically provide answers to routine questions that have been specified in advance and have a predefined procedure for answering them. For instance, MIS reports might list the total pounds of lettuce used this quarter by a fast-food chain or, as illustrated in Figure 2.4, compare total annual sales figures for specific products to planned targets. These systems generally are not flexible and have little analytical capability. Most MIS use simple routines, such as summaries and comparisons, as opposed to sophisticated mathematical models or statistical techniques.

Other types of business intelligence systems support more non-routine decision making. **Decision-support systems (DSS)** focus on problems that are unique and rapidly changing, for which the procedure for arriving at a solution may not be fully predefined in advance. They try to answer questions such as these: What would be the impact on production schedules if we were to double sales in the month of December? What would happen to our return on investment if a factory schedule were delayed for six months?

Although DSS use internal information from TPS and MIS, they often bring in information from external sources, such as current stock prices or product

FIGURE 2.3 HOW MANAGEMENT INFORMATION SYSTEMS OBTAIN THEIR DATA FROM THE ORGANIZATION'S TPS



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

FIGURE 2.4 SAMPLE MIS REPORT

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2015

PRODUCT CODE	PRODUCT DESCRIPTION	SALES REGION	ACTUAL SALES	PLANNED	ACTUAL versus PLANNED
4469	Carpet Cleaner	Northeast	4,066,700	4,800,000	0.85
		South	3,778,112	3,750,000	1.01
		Midwest	4,867,001	4,600,000	1.06
		West	4,003,440	4,400,000	0.91
	TOTAL		16,715,253	17,550,000	0.95
5674	Room Freshener	Northeast	3,676,700	3,900,000	0.94
		South	5,608,112	4,700,000	1.19
		Midwest	4,711,001	4,200,000	1.12
		West	4,563,440	4,900,000	0.93
	TOTAL		18,559,253	17,700,000	1.05

This report, showing summarized annual sales data, was produced by the MIS in Figure 2.3.

prices of competitors. These systems are employed by "super-user" managers and business analysts who want to use sophisticated analytics and models to analyze data.

An interesting, small, but powerful DSS is the voyage-estimating system of a large global shipping company that transports bulk cargoes of coal, oil, ores, and finished products. The firm owns some vessels, charters others, and bids for shipping contracts in the open market to carry general cargo. A voyage-estimating system calculates financial and technical voyage details. Financial calculations include ship/time costs (fuel, labor, capital), freight rates for various types of cargo, and port expenses. Technical details include a myriad of factors, such as ship cargo capacity, speed, port distances, fuel and water consumption, and loading patterns (location of cargo for different ports).

The system can answer questions such as the following: Given a customer delivery schedule and an offered freight rate, which vessel should be assigned at what rate to maximize profits? What is the optimal speed at which a particular vessel can optimize its profit and still meet its delivery schedule? What is the optimal loading pattern for a ship bound for the U.S. West Coast from Malaysia? Figure 2.5 illustrates the DSS built for this company. The system operates on a powerful desktop personal computer, providing a system of menus that makes it easy for users to enter data or obtain information.

The voyage-estimating DSS we have just described draws heavily on models. Other business intelligence systems are more data-driven, focusing instead on extracting useful information from massive quantities of data. For example, large ski resort companies such as Intrawest and Vail Resorts collect and store large amounts of customer data from call centers, lodging and dining reservations, ski schools, and ski equipment rental stores. They use special software to analyze these data to determine the value, revenue potential, and loyalty of each customer to help managers make better decisions about how to target their marketing programs.

The Interactive Session on Technology provides more detail on how Schiphol International Airport uses data to power its new baggage handling system and

INTERACTIVE SESSION: TECHNOLOGY

SCHIPHOL INTERNATIONAL HUB TO BECOME FAULTLESS: TRUTH OR DARE?

Conceptually, baggage handling is quite simple. Baggage input is connected to merely two events: an airplane lands or a person checks in. However, it's risky business. Baggage handling is one of the most important factors in having a pleasant trip. Moreover, mishandled baggage is a US$ 2.5 billion problem for industry every year. This problem may annually affect about 51 million passengers traveling through Schiphol alone.

In 2004, IBM Corporation, Vanderlande Industries, and later Grenzebach Automation Systems jointly took up the challenge of renewing the Baggage Control System for one of the biggest airport hubs in Europe, and one of the busiest in the world: Schiphol International Airport, in Amsterdam, The Netherlands. With an investment of around US$1 billion over a period of about 10 years, Schiphol's goal was threefold: (a) realize a monumental 1% maximum loss of transfer-bags (against the initial 22 million lost baggage); (b) increase capacity from 40 to 70 million bags; (c) reduce cost per bag without increasing wait-times.

Most of the job involved Schiphol's gigantic baggage conveyors network: 21 kilometers of transport tracks, 6 robotic units, 9,000 storage capacitors all behaving as one system. Also, extending it with more surfaces is not possible, given the land conditions surrounding the airport. The Schiphol baggage conveyors networks have a very simple goal: the right bag must be at the right place at the right time. To pursue this goal the network must perform several key roles: move bags from the check-in area to the departure gate, move bags from gate to gate, move bags from the arrival gate to the baggage claim, and plan and control peripheral hardware and software. In addition, these roles involve a wide variety of sensors, actuators, mechanical devices, and computers. The network uses over 3 million lines of source code. Some of the advanced technology used in baggage-handling systems includes destination-coded vehicles (DCVs), automatic bar code scanners, radio-frequency identification (RFID) tags, and high-tech conveyors equipped with sorting machines. In addition, all of this must be available and robust; that is, operate 99.99% of times while being able to minimize loss or damage in that 0.01% of the time it doesn't.

The following simple scenario summarizes the operations of the Schiphol baggage conveyors network. You arrive at check-in desk, and your bags are tagged. The tags contain your flight information and a bar-code/RFID that all of the computers in the baggage-handling system can read. When computers in the system scan the bar code or detect the RFID, they process the information it contains and determine where to send your bag. After being scanned (at least) once, the system always knows where your bag is at any point, and is able to redirect it based on three parameters: (a) time of its flight; (b) priority; (c) size. Bags for immediate embarkation are considered "hot." These are sent immediately to aircraft stands while "cold" baggage (i.e. low priority, distant flight time) are quickly rerouted away from the main "highway" tracks, directed towards various storage points in the network. DCVs are unmanned carts that can load and unload bags without stopping movement. These carts move on tracks like miniature roller coasters along the main "highway" tracks that span the airport. Buffers and hot/cold storage areas are used to avoid overcrowding. Computers throughout the system keep track of the location of each bag, its destination, and the time it is needed at that destination. The system can optimize the routes taken by the carts to get the bags needed most urgently to their destinations fastest. Because DCVs move at high speed and do not come to a full stop to receive baggage, the conveyors must be extremely precise, depositing bags where they are needed at just the right time for maximum efficiency. Once bags reach the gate, they enter a sorting station where airline employees use computer terminals to send bags to the correct plane. To make even surer that baggage is not lost, the system "reconciles" baggage with its owner; it checks if the baggage and the owner are actually on the same plane.

However beautiful and harmonious this process may seem, there are still many things that can go wrong. For example, what if baggage is mis-tagged? What if the tag is unreadable? What about schedule changes? Although baggage handling is a complex process and baggage handling systems can be extremely expensive, if implemented successfully, they pay for themselves. Imagine saving around 0.1% of 2.5 billion. It's a lot of money!

The new baggage system at Schiphol is not flawless. In November 2012, a special warrant by local police was issued that required stopping the tracks

at Schiphol as part of a cocaine-smuggling investigation. Some of the 140,000 passengers that were being served by the international hub suffered baggage losses. In 2014, many of the baggage handlers involved in the investigation went on trial, and other drug-related arrests were announced. But these sorts of incidents aren't confined to Schiphol; other regional airports are also affected by drug-related activities. On a brighter note, Schiphol launched a fleet of 167 Tesla electrically powered taxis in 2014, further cementing its status as one of the greenest airports in the world.

Sources: "Airports In The News – Winter 2014," Airportbusiness.com, November 18, 2014; "Baggage Handlers Go on Trial over Cocaine Smuggling Ring at Schiphol Airport," *Amsterdam Herald,* January 6, 2014; Ciara Byrne, "Robots, Dutchmen and IBM Create Supersmart Baggage Handling System," Venturebeat.com, March 18, 2011; "Schiphol Introduces Innovative Unloading System for Baggage Containers," Schiphol.nl, accessed December 2014.

Case Contributed by Damian A. Tamburri and Patricia Lago, VU University Amsterdam

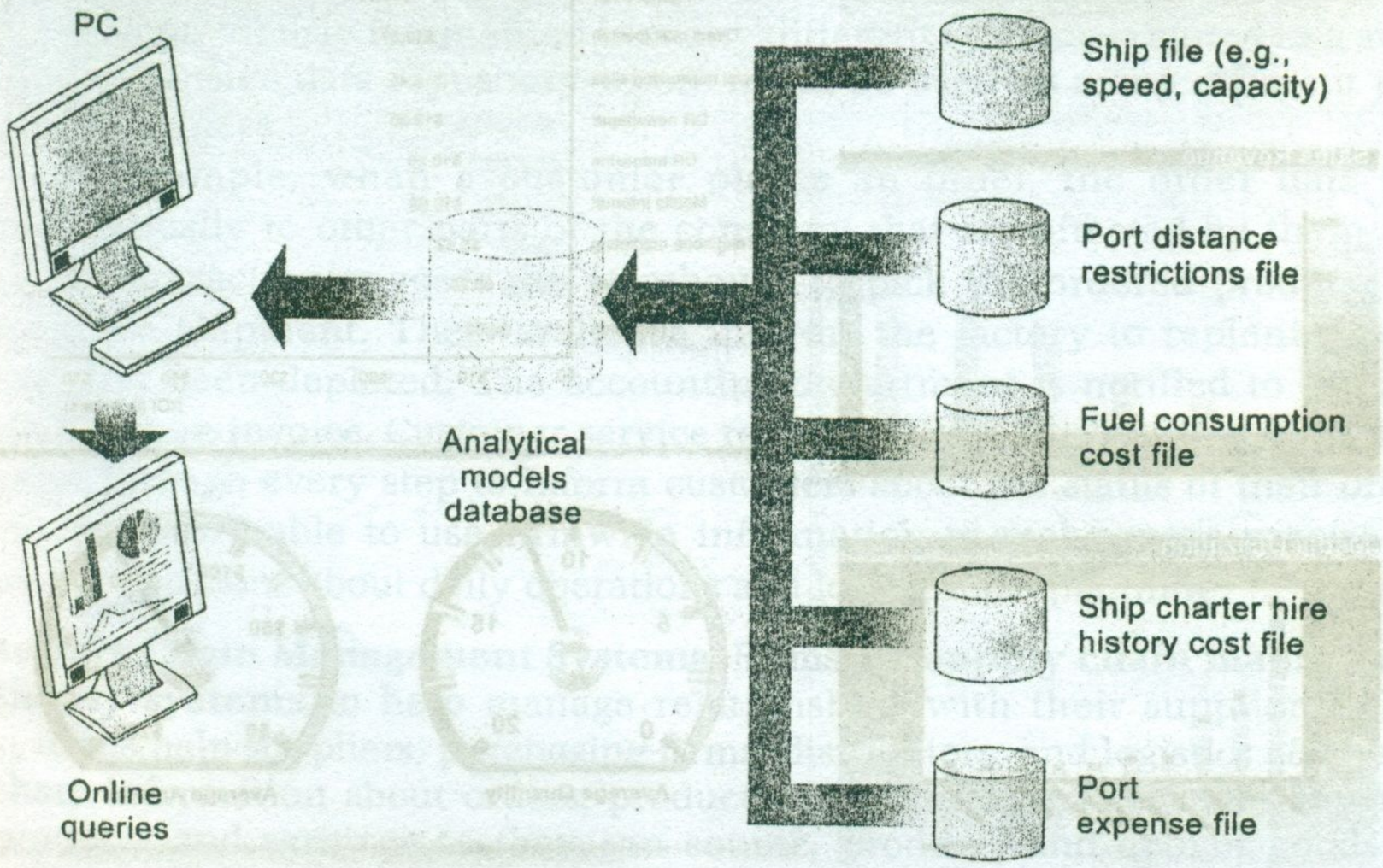
CASE STUDY QUESTIONS

1. How many levels of complexity can you identify in Schiphol's baggage conveyors network?
2. What are the management, organization, and technology components of Schiphol's baggage conveyors network?
3. What is the problem that Schiphol is trying to solve? Discuss the business impact of this problem.
4. Think of the data that the network uses. What kinds of management reports can be generated from that data?

improve the customer experience. As you read this case, try to identify the problems solved by Schiphol's information systems and how the systems improve business operations and decision making.

Business intelligence systems also address the decision-making needs of senior management. Senior managers need systems that focus on strategic issues and long-term trends, both in the firm and in the external environment. They are concerned with questions such as: What will employment levels be in five years? What are the long-term industry cost trends? What products should we be making in five years?

FIGURE 2.5 VOYAGE-ESTIMATING DECISION-SUPPORT SYSTEM



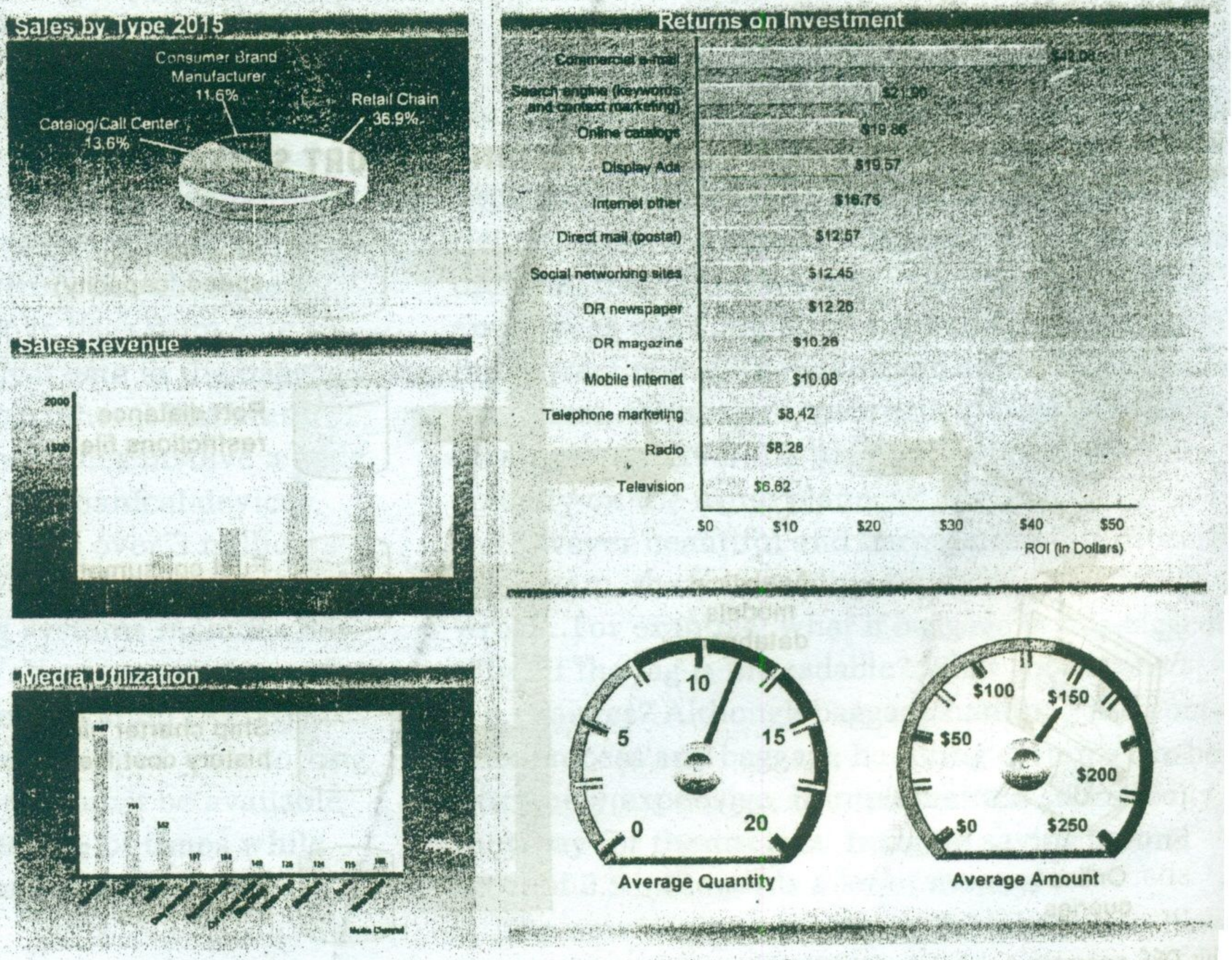
This DSS operates on a powerful PC. It is used daily by managers who must develop bids on shipping contracts.

Executive support systems (ESS) help senior management make these decisions. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution. ESS present graphs and data from many sources through an interface that is easy for senior managers to use. Often the information is delivered to senior executives through a **portal**, which uses a Web interface to present integrated personalized business content.

ESS are designed to incorporate data about external events, such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers. Increasingly, such systems include business intelligence analytics for analyzing trends, forecasting, and "drilling down" to data at greater levels of detail.

For example, the CEO of Leiner Health Products, the largest manufacturer of private-label vitamins and supplements in the United States, has an ESS that provides on his desktop a minute-to-minute view of the firm's financial performance as measured by working capital, accounts receivable, accounts payable, cash flow, and inventory. The information is presented in the form of a **digital dashboard**, which displays on a single screen graphs and charts of key performance indicators for managing a company. Digital dashboards are becoming an increasingly popular tool for management decision makers.

Contemporary business intelligence and analytics technology have promoted data-driven management, where decision makers rely heavily on analytical tools and data at their fingertips to guide their work. Data captured at the factory or sales floor level are immediately available for high-level or detailed views in executive dashboards and reports. It's real-time management.



A digital dashboard delivers comprehensive and accurate information for decision making often using a single screen. The graphical overview of key performance indicators helps managers quickly spot areas that need attention.

SYSTEMS FOR LINKING THE ENTERPRISE

Reviewing all the different types of systems we have just described, you might wonder how a business can manage all the information in these different systems. You might also wonder how costly it is to maintain so many different systems. And you might wonder how all these different systems can share information and how managers and employees are able to coordinate their work. In fact, these are all important questions for businesses today.

Enterprise Applications

Getting all the different kinds of systems in a company to work together has proven a major challenge. Typically, corporations are put together both through normal "organic" growth and through acquisition of smaller firms. Over a period of time, corporations end up with a collection of systems, most of them older, and face the challenge of getting them all to "talk" with one another and work together as one corporate system. There are several solutions to this problem.

One solution is to implement **enterprise applications**, which are systems that span functional areas, focus on executing business processes across the business firm, and include all levels of management. Enterprise applications help businesses become more flexible and productive by coordinating their business processes more closely and integrating groups of processes so they focus on efficient management of resources and customer service.

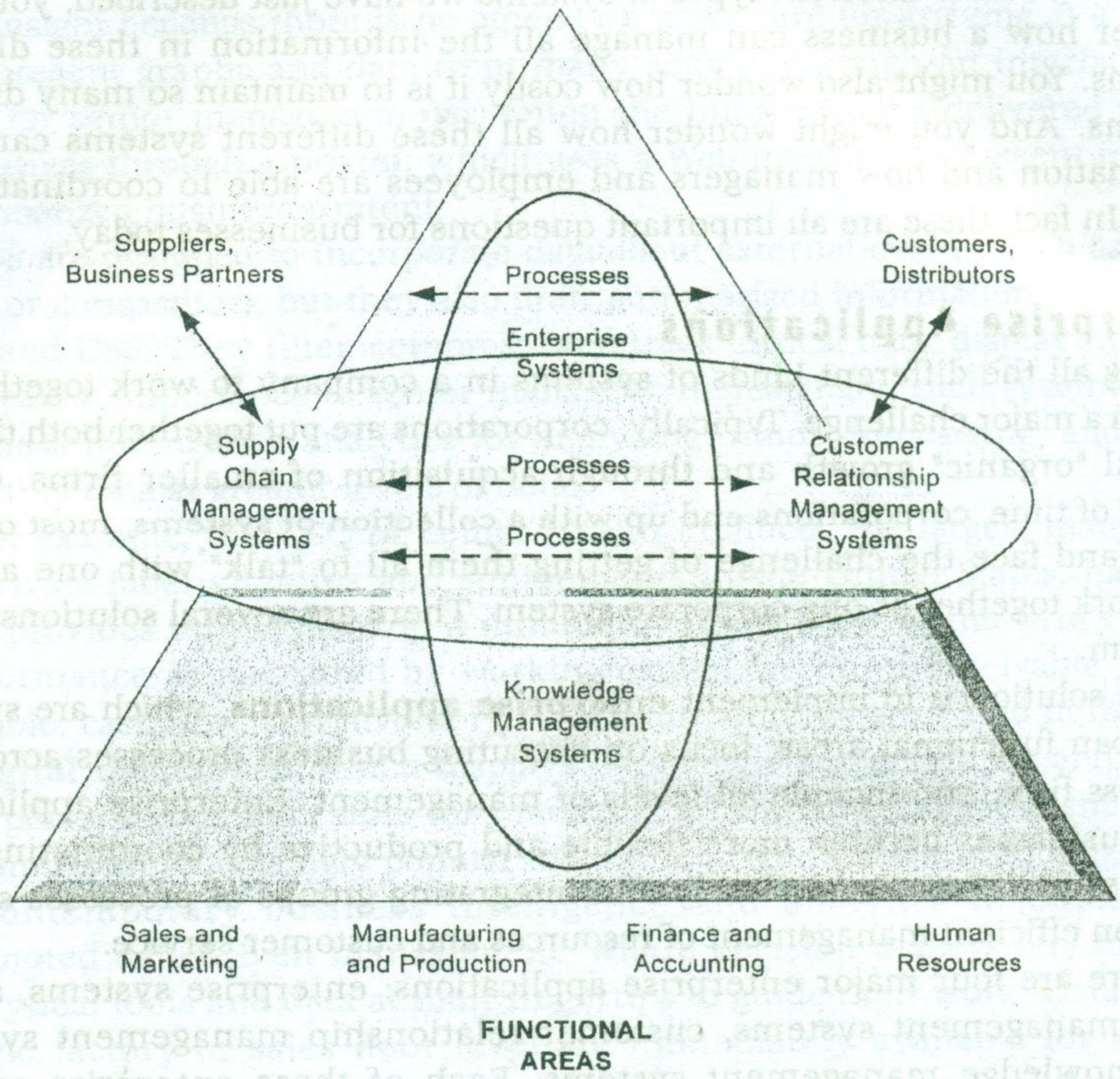
There are four major enterprise applications: enterprise systems, supply chain management systems, customer relationship management systems, and knowledge management systems. Each of these enterprise applications integrates a related set of functions and business processes to enhance the performance of the organization as a whole. Figure 2.6 shows that the architecture for these enterprise applications encompasses processes spanning the entire organization and, in some cases, extending beyond the organization to customers, suppliers, and other key business partners.

Enterprise Systems Firms use **enterprise systems**, also known as enterprise resource planning (ERP) systems, to integrate business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources into a single software system. Information that was previously fragmented in many different systems is stored in a single comprehensive data repository where it can be used by many different parts of the business.

For example, when a customer places an order, the order data flow automatically to other parts of the company that are affected by them. The order transaction triggers the warehouse to pick the ordered products and schedule shipment. The warehouse informs the factory to replenish whatever has been depleted. The accounting department is notified to send the customer an invoice. Customer service representatives track the progress of the order through every step to inform customers about the status of their orders. Managers are able to use firmwide information to make more precise and timely decisions about daily operations and longer-term planning.

Supply Chain Management Systems Firms use **supply chain management (SCM) systems** to help manage relationships with their suppliers. These systems help suppliers, purchasing firms, distributors, and logistics companies share information about orders, production, inventory levels, and delivery of products and services so they can source, produce, and deliver goods and services efficiently. The ultimate objective is to get the right amount of their

FIGURE 2.6 ENTERPRISE APPLICATION ARCHITECTURE



Enterprise applications automate processes that span multiple business functions and organizational levels and may extend outside the organization.

products from their source to their point of consumption in the least amount of time and at the lowest cost. These systems increase firm profitability by lowering the costs of moving and making products and by enabling managers to make better decisions about how to organize and schedule sourcing, production, and distribution.

Supply chain management systems are one type of **interorganizational system** because they automate the flow of information across organizational boundaries. You will find examples of other types of interorganizational information systems throughout this text because such systems make it possible for firms to link electronically to customers and to outsource their work to other companies.

Customer Relationship Management Systems Firms use **customer relationship management (CRM) systems** to help manage their relationships with their customers. CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing, and service to optimize revenue, customer satisfaction, and customer retention. This information helps firms identify, attract, and retain the most profitable customers; provide better service to existing customers; and increase sales.

Knowledge Management Systems Some firms perform better than others because they have better knowledge about how to create, produce, and deliver products and services. This firm knowledge is unique, difficult to imitate, and can be leveraged into long-term strategic benefits. **Knowledge management systems (KMS)** enable organizations to better manage processes for capturing

and applying knowledge and expertise. These systems collect all relevant knowledge and experience in the firm, and make it available wherever and whenever it is needed to improve business processes and management decisions. They also link the firm to external sources of knowledge.

We examine enterprise systems and systems for supply chain management and customer relationship management in greater detail in Chapter 9. We discuss collaboration systems that support knowledge management in this chapter and cover other types of knowledge management applications in Chapter 11.

Intranets and Extranets

Enterprise applications create deep-seated changes in the way the firm conducts its business, offering many opportunities to integrate important business data into a single system. They are often costly and difficult to implement. Intranets and extranets deserve mention here as alternative tools for increasing integration and expediting the flow of information within the firm, and with customers and suppliers.

Intranets are simply internal company Web sites that are accessible only by employees. The term "intranet" refers to an internal network, in contrast to the Internet, which is a public network linking organizations and other external networks. Intranets use the same technologies and techniques as the larger Internet, and they often are simply a private access area in a larger company Web site. Likewise with extranets. Extranets are company Web sites that are accessible to authorized vendors and suppliers, and are often used to coordinate the movement of supplies to the firm's production apparatus.

For example, Six Flags, which operates 19 theme parks throughout North America, maintains an intranet for its 2,500 full-time employees that provides company-related news and information on each park's day-to-day operations, including weather forecasts, performance schedules, and details about groups and celebrities visiting the parks. The company also uses an extranet to broadcast information about schedule changes and park events to its 30,000 seasonal employees. We describe the technology for intranets and extranets in more detail in Chapter 7.

E-BUSINESS, E-COMMERCE, AND E-GOVERNMENT

The systems and technologies we have just described are transforming firms' relationships with customers, employees, suppliers, and logistic partners into digital relationships using networks and the Internet. So much business is now enabled by or based upon digital networks that we use the terms "electronic business" and "electronic commerce" frequently throughout this text.

Electronic business, or **e-business**, refers to the use of digital technology and the Internet to execute the major business processes in the enterprise. E-business includes activities for the internal management of the firm and for coordination with suppliers and other business partners. It also includes **electronic commerce**, or **e-commerce**.

E-commerce is the part of e-business that deals with the buying and selling of goods and services over the Internet. It also encompasses activities supporting those market transactions, such as advertising, marketing, customer support, security, delivery, and payment.

The technologies associated with e-business have also brought about similar changes in the public sector. Governments on all levels are using Internet technology to deliver information and services to citizens, employees, and businesses with which they work. **E-government** refers to the application of the Internet

and networking technologies to digitally enable government and public sector agencies' relationships with citizens, businesses, and other arms of government.

In addition to improving delivery of government services, e-government makes government operations more efficient and also empowers citizens by giving them easier access to information and the ability to network electronically with other citizens. For example, citizens in some states can renew their driver's licenses or apply for unemployment benefits online, and the Internet has become a powerful tool for instantly mobilizing interest groups for political action and fund-raising.

2.3 WHY ARE SYSTEMS FOR COLLABORATION AND SOCIAL BUSINESS SO IMPORTANT AND WHAT TECHNOLOGIES DO THEY USE?

With all these systems and information, you might wonder how is it possible to make sense of them? How do people working in firms pull it all together, work towards common goals, and coordinate plans and actions? Information systems can't make decisions, hire or fire people, sign contracts, agree on deals, or adjust the price of goods to the marketplace. In addition to the types of systems we have just described, businesses need special systems to support collaboration and teamwork.

WHAT IS COLLABORATION?

Collaboration is working with others to achieve shared and explicit goals. Collaboration focuses on task or mission accomplishment and usually takes place in a business, or other organization, and between businesses. You collaborate with a colleague in Tokyo having expertise on a topic about which you know nothing. You collaborate with many colleagues in publishing a company blog. If you're in a law firm, you collaborate with accountants in an accounting firm in servicing the needs of a client with tax problems.

Collaboration can be short-lived, lasting a few minutes, or longer term, depending on the nature of the task and the relationship among participants. Collaboration can be one-to-one or many-to-many.

Employees may collaborate in informal groups that are not a formal part of the business firm's organizational structure or they may be organized into formal teams. **Teams** have a specific mission that someone in the business assigned to them. Team members need to collaborate on the accomplishment of specific tasks and collectively achieve the team mission. The team mission might be to "win the game," or "increase online sales by 10 percent." Teams are often short-lived, depending on the problems they tackle and the length of time needed to find a solution and accomplish the mission.

Collaboration and teamwork are more important today than ever for a variety of reasons.

- *Changing nature of work.* The nature of work has changed from factory manufacturing and pre-computer office work where each stage in the production process occurred independently of one another, and was coordinated by supervisors. Work was organized into silos. Within a silo, work passed from one machine tool station to another, from one desktop to another, until the finished product was completed. Today, jobs require much

closer coordination and interaction among the parties involved in producing the service or product. A recent report from the consulting firm McKinsey & Company argued that 41 percent of the U.S. labor force is now composed of jobs where interaction (talking, e-mailing, presenting, and persuading) is the primary value-adding activity. Even in factories, workers today often work in production groups, or pods.

- *Growth of professional work.* "Interaction" jobs tend to be professional jobs in the service sector that require close coordination and collaboration. Professional jobs require substantial education, and the sharing of information and opinions to get work done. Each actor on the job brings specialized expertise to the problem, and all the actors need to take one another into account in order to accomplish the job.
- *Changing organization of the firm.* For most of the industrial age, managers organized work in a hierarchical fashion. Orders came down the hierarchy, and responses moved back up the hierarchy. Today, work is organized into groups and teams, and the members are expected to develop their own methods for accomplishing the task. Senior managers observe and measure results, but are much less likely to issue detailed orders or operating procedures. In part, this is because expertise and decision-making power have been pushed down in organizations.
- *Changing scope of the firm.* The work of the firm has changed from a single location to multiple locations—offices or factories throughout a region, a nation, or even around the globe. For instance, Henry Ford developed the first mass-production automobile plant at a single Dearborn, Michigan factory. In 2014, Ford employed 180,000 people at around 965 plants and facilities worldwide. With this kind of global presence, the need for close coordination of design, production, marketing, distribution, and service obviously takes on new importance and scale. Large global companies need to have teams working on a global basis.
- *Emphasis on innovation.* Although we tend to attribute innovations in business and science to great individuals, these great individuals are most likely working with a team of brilliant colleagues. Think of Bill Gates and Steve Jobs (founders of Microsoft and Apple), both of whom are highly regarded innovators, and both of whom built strong collaborative teams to nurture and support innovation in their firms. Their initial innovations derived from close collaboration with colleagues and partners. Innovation, in other words, is a group and social process, and most innovations derive from collaboration among individuals in a lab, a business, or government agencies. Strong collaborative practices and technologies are believed to increase the rate and quality of innovation.
- *Changing culture of work and business.* Most research on collaboration supports the notion that diverse teams produce better outputs, faster, than individuals working on their own. Popular notions of the crowd ("crowdsourcing," and the "wisdom of crowds") also provide cultural support for collaboration and teamwork.

WHAT IS SOCIAL BUSINESS?

Many firms today enhance collaboration by embracing **social business**—the use of social networking platforms, including Facebook, Twitter, and internal corporate social tools—to engage their employees, customers, and suppliers. These tools enable workers to set up profiles, form groups, and "follow" each other's status updates. The goal of social business is to deepen interactions with groups inside and outside the firm to expedite and enhance information-sharing, innovation, and decision making.

A key word in social business is "conversations." Customers, suppliers, employees, managers, and even oversight agencies continually have conversations about firms, often without the knowledge of the firm or its key actors (employees and managers).

Supporters of social business argue that, if firms could tune into these conversations, they would strengthen their bonds with consumers, suppliers, and employees, increasing their emotional involvement in the firm.

All of this requires a great deal of information transparency. People need to share opinions and facts with others quite directly, without intervention from executives or others. Employees get to know directly what customers and other employees think; suppliers will learn very directly the opinions of supply chain partners; and even managers presumably will learn more directly from their employees how well they are doing. Nearly everyone involved in the creation of value will know much more about everyone else.

If such an environment could be created, it is likely to drive operational efficiencies, spur innovation, and accelerate decision making. If product designers can learn directly about how their products are doing in the market in real time, based on consumer feedback, they can speed up the redesign process. If employees can use social connections inside and outside the company to capture new knowledge and insights, they will be able to work more efficiently and solve more business problems.

Table 2.2 describes important applications of social business inside and outside the firm. This chapter focuses on enterprise social business—its internal corporate uses. Chapters 7 and 10 describe social business applications relating to customers and suppliers outside the company.

BUSINESS BENEFITS OF COLLABORATION AND SOCIAL BUSINESS

Although many articles and books have been written about collaboration, nearly all of the research on this topic is anecdotal. Nevertheless, there is a general belief among both business and academic communities that the more a business firm is "collaborative," the more successful it will be, and that collaboration within and among firms is more essential than in the

TABLE 2.2 APPLICATIONS OF SOCIAL BUSINESS

SOCIAL BUSINESS APPLICATION	DESCRIPTION
Social networks	Connect through personal and business profiles
Crowdsourcing	Harness collective knowledge to generate new ideas and solutions
Shared workspaces	Coordinate projects and tasks; co-create content
Blogs and wikis	Publish and rapidly access knowledge; discuss opinions and experiences
Social commerce	Share opinions about purchasing or purchase on social platforms
File sharing	Upload, share, and comment on photos, videos, audio, text documents
Social marketing	Use social media to interact with customers; derive customer insights
Communities	Discuss topics in open forums; share expertise

past. A recent global survey of business and information systems managers found that investments in collaboration technology produced organizational improvements that returned over four times the amount of the investment, with the greatest benefits for sales, marketing, and research and development functions (Frost and White, 2009). Another study of the value of collaboration also found that the overall economic benefit of collaboration was significant: for every word seen by an employee in e-mails from others, $70 of additional revenue was generated (Aral, Brynjolfsson, and Van Alstyne, 2007). McKinsey & Company consultants predict that social technologies used within and across enterprises could potentially raise the productivity of interaction workers by 20 to 25 percent (McKinsey, 2012).

Table 2.3 summarizes some of the benefits of collaboration and social business that have been identified. Figure 2.7 graphically illustrates how collaboration is believed to impact business performance.

BUILDING A COLLABORATIVE CULTURE AND BUSINESS PROCESSES

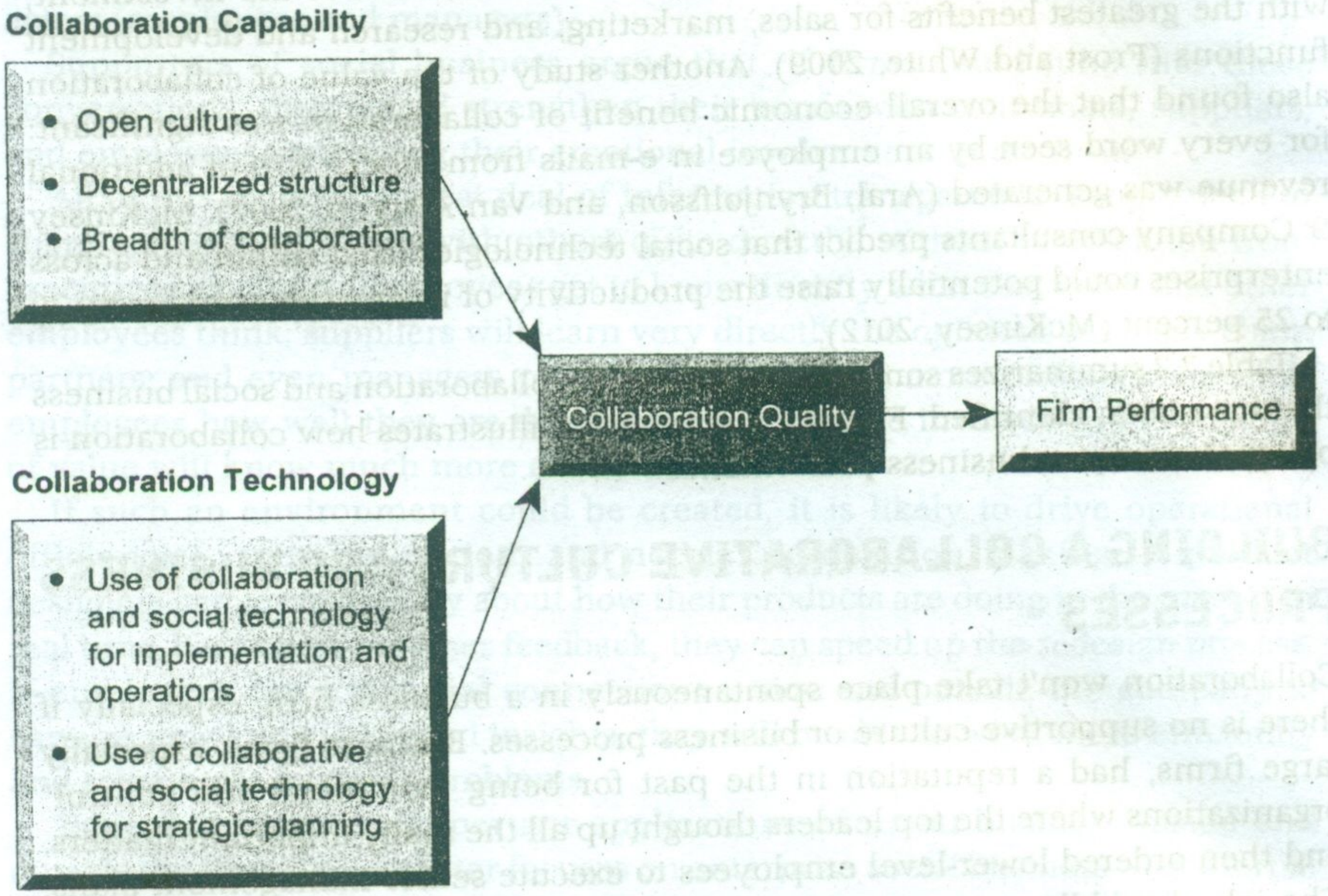
Collaboration won't take place spontaneously in a business firm, especially if there is no supportive culture or business processes. Business firms, especially large firms, had a reputation in the past for being "command and control" organizations where the top leaders thought up all the really important matters, and then ordered lower-level employees to execute senior management plans. The job of middle management supposedly was to pass messages back and forth, up and down the hierarchy.

Command and control firms required lower-level employees to carry out orders without asking too many questions, with no responsibility to improve processes, and with no rewards for teamwork or team performance. If your work group needed help from another work group, that was something for the bosses to figure out. You never communicated horizontally, always vertically, so management could control the process. Together, the expectations of

TABLE 2.3 BUSINESS BENEFITS OF COLLABORATION AND SOCIAL BUSINESS

BENEFIT	RATIONALE
Productivity	People interacting and working together can capture expert knowledge and solve problems more rapidly than the same number of people working in isolation from one another. There will be fewer errors.
Quality	People working collaboratively can communicate errors, and corrective actions faster than if they work in isolation. Collaborative and take social technologies help reduce time delays in design and production.
Innovation	People working collaboratively can come up with more innovative ideas for products, services, and administration than the same number working in isolation from one another. Advantages to diversity and the "wisdom of crowds."
Customer service	People working together using collaboration and social tools can solve customer complaints and issues faster and more effectively than if they were working in isolation from one another.
Financial performance (profitability, sales, and sales growth)	As a result of all of the above, collaborative firms have superior sales, sales growth, and financial performance.

FIGURE 2.7 REQUIREMENTS FOR COLLABORATION



Successful collaboration requires an appropriate organizational structure and culture, along with appropriate collaboration technology.

management and employees formed a culture, a set of assumptions about common goals and how people should behave. Many business firms still operate this way.

A collaborative business culture and business processes are very different. Senior managers are responsible for achieving results, but rely on teams of employees to achieve and implement the results. Policies, products, designs, processes, and systems are much more dependent on teams at all levels of the organization to devise, to create, and to build. Teams are rewarded for their performance and individuals are rewarded for their performance in a team. The function of middle managers is to build the teams, coordinate their work, and monitor their performance. The business culture and business processes are more "social." In a collaborative culture, senior management establishes collaboration and teamwork as vital to the organization, and it actually implements collaboration for the senior ranks of the business as well.

TOOLS AND TECHNOLOGIES FOR COLLABORATION AND SOCIAL BUSINESS

A collaborative, team-oriented culture won't produce benefits without information systems in place to enable collaboration and social business. Currently there are hundreds of tools designed to deal with the fact that, in order to succeed in our jobs, we are all much more dependent on one another, our fellow employees, customers, suppliers and managers. Some of these tools are expensive, but others are available online for free (or with premium versions for a modest fee). Let's look more closely at some of these tools.

E-mail and Instant Messaging (IM)

E-mail and instant messaging (including text messaging) have been major communication and collaboration tools for interaction jobs. Their software operates on computers, cell phones, and other wireless devices and includes features for sharing files as well as transmitting messages. Many instant messaging systems allow users to engage in real-time conversations with multiple participants simultaneously. In recent years, e-mail use has declined, with messaging and social media becoming preferred channels of communication.

Wikis

Wikis are a type of Web site that makes it easy for users to contribute and edit text content and graphics without any knowledge of Web page development or programming techniques. The most well-known wiki is Wikipedia, the largest collaboratively edited reference project in the world. It relies on volunteers, makes no money and accepts no advertising.

Wikis are very useful tools for storing and sharing corporate knowledge and insights. Enterprise software vendor SAP AG has a wiki that acts as a base of information for people outside the company, such as customers and software developers who build programs that interact with SAP software. In the past, those people asked and sometimes answered questions in an informal way on SAP online forums, but that was an inefficient system, with people asking and answering the same questions over and over.

Virtual Worlds

Virtual worlds, such as Second Life, are online 3-D environments populated by "residents" who have built graphical representations of themselves known as avatars. Companies like IBM, Cisco, and Intel Corporations use the online world for meetings, interviews, guest speaker events, and employee training. Real-world people represented by avatars meet, interact, and exchange ideas at these virtual locations using gestures, chat box conversations, and voice communication.

Collaboration and Social Business Platforms

There are now suites of software products providing multi-function platforms for collaboration and social business among teams of employees who work together from many different locations. The most widely used are Internet-based audio conferencing and video conferencing systems, cloud collaboration services such as Google's online tools and cyberlockers, corporate collaboration systems such as Microsoft SharePoint, and enterprise social networking tools such as Salesforce Chatter, Microsoft's Yammer, Jive, and IBM Connections.

Virtual Meeting Systems In an effort to reduce travel expenses, many companies, both large and small, are adopting videoconferencing and Web conferencing technologies. Companies such as Heinz, General Electric, and Pepsico are using virtual meeting systems for product briefings, training courses, strategy sessions, and even inspirational chats.

A videoconference allows individuals at two or more locations to communicate simultaneously through two-way video and audio transmissions. High-end videoconferencing systems feature **telepresence** technology, an integrated audio and visual environment which allows a person to give the appearance of being present at a location other than his or her true physical location. Free or low-cost Internet-based systems such as Skype group videoconferencing, Google+ Hangouts, Zoom, and ooVoo are of lower quality, but

still useful for smaller companies. Apple's FaceTime is useful for one-to-one videoconferencing.

Companies of all sizes are finding Web-based online meeting tools such as Cisco WebEx, Microsoft Lync, and Adobe Connect especially helpful for training and sales presentations. These products enable participants to share documents and presentations in conjunction with audioconferencing and live video via Webcam.

Cloud Collaboration Services: Google Tools and Cyberlockers Google offers many online tools and services, and some are suitable for collaboration. They include Google Drive, Google Docs, Google Apps, Google Sites, and Google +. Most are free of charge.

Google Drive is a file storage and synchronization service for cloud storage, file sharing and collaborative editing. Google Drive is an example of a cloud-based **cyberlocker**. Cyberlockers are online file-sharing services that allow users to upload files to secure online storage sites from which the files can be shared with others. Microsoft OneDrive and Dropbox are other leading cyberlocker services. They feature both free and paid services, depending on the amount of storage space and administration required. Users are able to synchronize their files stored online with their local PCs and other kinds of devices, with options for making the files private or public and for sharing them with designated contacts.

Google Drive and Microsoft OneDrive are integrated with tools for document creation and sharing. OneDrive provides online storage for Microsoft Office documents and other files and works with Microsoft Office apps, both installed and on the Web. It can share to Facebook as well. Google Drive is integrated with Google Docs, a suite of productivity applications that offer collaborative editing on documents, spreadsheets, and presentations. Google's cloud-based productivity suite for businesses (word processing, spreadsheets, presentations, calendars, and mail) called Google Apps for Business also works with Google Drive.

Google Sites allows users to quickly create online team-oriented sites where multiple people can collaborate and share files. Google + is Google's effort to make these tools and other products and services it offers more "social" for both consumer and business use. Google + users can create a profile as well as "Circles," for organizing people into specific groups for sharing and collaborating. "Hangouts" enable people to engage in group video chat, with a maximum of 10 people participating at any point in time.

Microsoft SharePoint Microsoft SharePoint is a browser-based collaboration and document management platform, combined with a powerful search engine that is installed on corporate servers. SharePoint has a Web-based interface and close integration with everyday tools such as Microsoft Office desktop software products. SharePoint software makes it possible for employees to share their documents and collaborate on projects using Office documents as the foundation.

SharePoint can be used to host internal Web sites that organize and store information in one central workspace to enable teams to coordinate work activities, collaborate on and publish documents, maintain task lists, implement workflows, and share information via wikis and blogs. Users are able to control versions of documents and document security. Because SharePoint stores and organizes information in one place, users can find relevant information quickly and efficiently while working together closely on tasks, projects, and documents. Enterprise search tools help locate people, expertise, and content. SharePoint now features social tools.

The Fair Work Ombudsman (FWO) is an independent statutory office of the Australian federal government that provides advice and related services to employers and employees on workplace relations and entitlements. FWO has around 800 full time staff in offices in all Australian capital cities and 18 regional locations. FWO had been overwhelmed with the details of project management and compliance, with staff having to draw information from many different systems and piece it together manually. FWO implemented Microsoft Sharepoint Server to create a single organization-wide secure and reliable platform for managing and reporting on Projects, Programs, and Portfolios that would also facilitate collaboration. The Sharepoint system captures all project types undertaken by FWO; supports built-in user roles, views and security; provides storage and access to data, including project documentation; and automates workflows, including approvals, alerts and communication (Microsoft, 2014).

IBM Notes IBM Notes (formerly Lotus Notes)is a collaborative software system with capabilities for sharing calendars, e-mail, messaging, collective writing and editing, shared database access, and electronic meetings. Notes software installed on desktop or laptop computers obtains applications stored on an IBM Domino server. Notes is Web-enabled, and offers an application development environment so that users can build custom applications to suit their unique needs. Notes has also added capabilities for blogs, microblogs, wikis, RSS aggregators, help desk systems, voice and video conferencing, and online meetings. A related IBM product called Quickr provides more specialized tools for teamwork (team spaces, content libraries, discussion forums, wikis) and is able to access information from Notes.

IBM Notes promises high levels of security and reliability, and the ability to retain control over sensitive corporate information. Finncontainers, a Helsinki, Finland logistics company specializing in the sale, rental, and transportation of new and used shipping containers, selected Notes as a dependable collaboration platform on which to build a strong network of partners, suppliers and customers. The company did not want to miss sales opportunities if its e-mail system went down suddenly. (IBM, 2013).

Enterprise Social Networking Tools The tools we have just described include capabilities for supporting social business, but there are also more specialized social tools for this purpose, such as Salesforce Chatter, Microsoft's Yammer, Jive, and IBM Connections. Enterprise social networking tools create business value by connecting the members of an organization through profiles, updates, and notifications, similar to Facebook features, but tailored to internal corporate uses. Table 2.4 provides more detail about these internal social capabilities.

Although companies have benefited from enterprise social networking, internal social networking has not caught on as quickly as consumer uses of Facebook, Twitter, and other public social networking products. The Interactive Session on Management addresses this topic.

Checklist for Managers: Evaluating and Selecting Collaboration and Social Software Tools

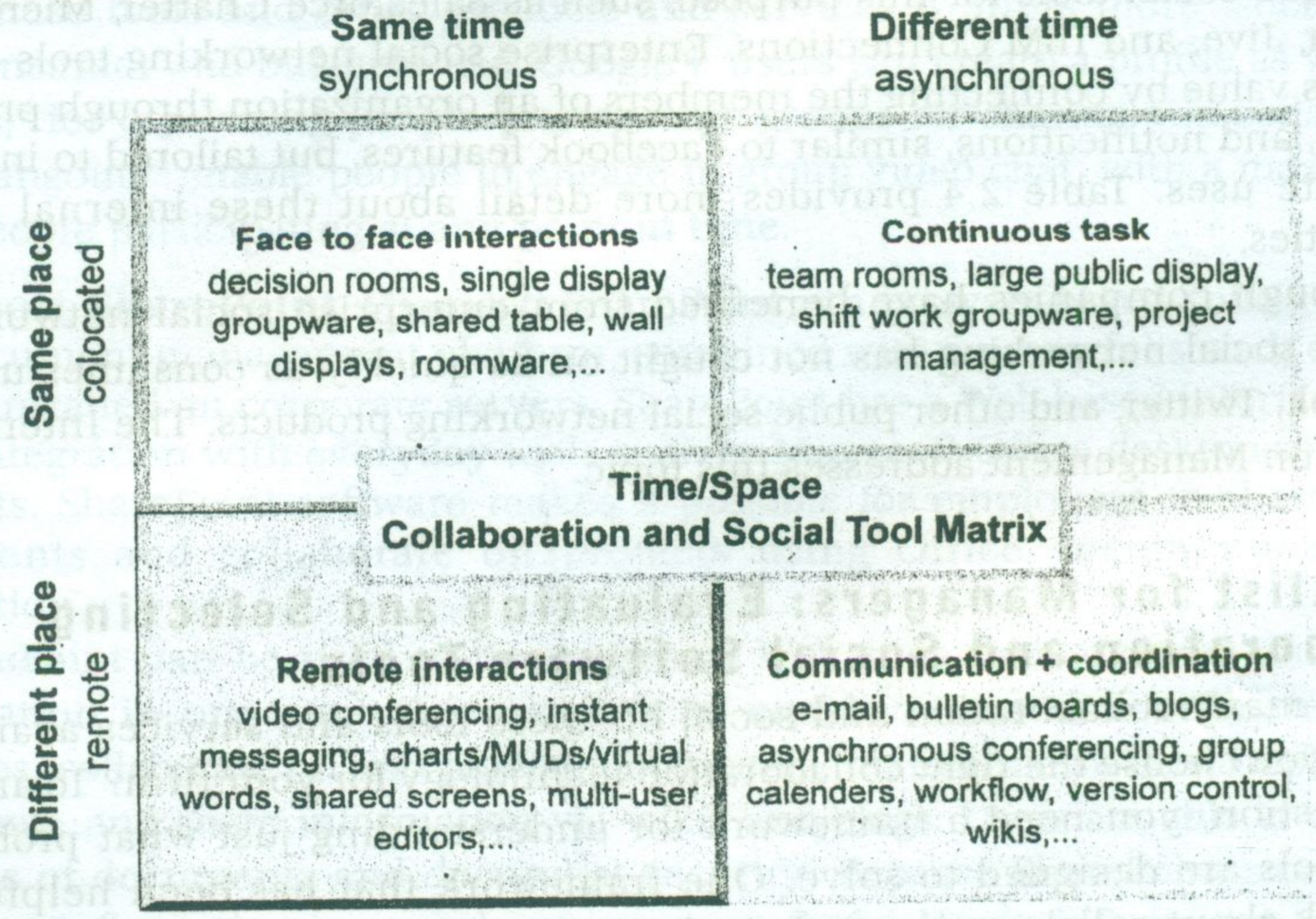
With so many collaboration and social business tools and services available, how do you choose the right collaboration technology for your firm? To answer this question, you need a framework for understanding just what problems these tools are designed to solve. One framework that has been helpful for us to talk about collaboration tools is the time/space collaboration and social tool matrix developed in the early 1990s by a number of collaborative work scholars (Figure 2.8).

TABLE 2.4 ENTERPRISE SOCIAL NETWORKING SOFTWARE CAPABILITIES

SOCIAL SOFTWARE CAPABILITY	DESCRIPTION
Profiles	Ability to set up member profiles describing who individuals are, educational background, interests. Includes work-related associations and expertise (skills, projects, teams).
Content Sharing	Share, store, and manage content including documents, presentations, images, and videos.
Feeds and Notifications	Real-time information streams, status updates, and announcements from designated individuals and groups.
Groups and Team Workspaces	Establish groups to share information, collaborate on documents, and work on projects, with the ability to set up private and public groups and to archive conversations to preserve team knowledge.
Tagging and Social Bookmarking	Indicate preferences for specific pieces of content, similar to the Facebook "like" button. Tagging lets people add keywords to identify content they like.
Permissions and Privacy	Ability to make sure private information stays within the right circles, as determined by the nature of relationships. In enterprise social networks, there is a need to establish who in the company has permission to see what information.

The time/space matrix focuses on two dimensions of the collaboration problem: time and space. For instance, you need to collaborate with people in different time zones and you cannot all meet at the same time. Midnight in New York is noon in Bombay, so this makes it difficult to have a videoconference (the people in New York are too tired). Time is clearly an obstacle to collaboration on a global scale.

FIGURE 2.8 THE TIME/SPACE COLLABORATION AND SOCIAL TOOL MATRIX



Collaboration and social technologies can be classified in terms of whether they support interactions at the same or different time or place, and whether these interactions are remote or colocated.

INTERACTIVE SESSION: MANAGEMENT

IS SOCIAL BUSINESS WORKING OUT?

Social networking has never been more popular, with social tools accounting for 20 percent of all online activity, according to ComScore. Many of today's employees are already well versed in the basics of public social networking using tools such as Facebook, Twitter, and Instagram. Larry Ellison, head of the giant software firm Oracle, even went so far as to declare that social networking should be the backbone of business applications and that Facebook is a good model for how users should interact with software. But when it comes to actually using social tools for internal business purposes, the results have been mixed.

Information Week's 2013 Social Networking in the Enterprise Survey found that only 18 percent of respondents believed their internal social networking programs were successful. The Information Week survey cited lackluster adoption as a major obstacle to success. As with many technology upgrades, companies that have tried to deploy internal social networks have found that employees are used to doing business in a certain way, and overcoming that organizational inertia can prove difficult. IT leaders hoping to switch to a more social, collaborative office culture usually find that most employees still prefer to use e-mail, for example. The employees may feel too time-pressed to learn a new software tool.

Employees who are used to collaborating and doing business in more traditional ways need an incentive to use social software. Most companies are not providing that incentive: only 22 percent of social software users believe the technology to be necessary to their jobs. You might join Facebook because all your friends are on it, but in the workplace, ease of use and increased job efficiency are more important than peer pressure in driving adoption.

IT organizations need to take charge to ensure that the internal and external social networking efforts of the company are providing genuine value to the business. Content on the networks needs to be relevant, up-to-date, and easy to access; users need to be able to connect to people that have the information they need and that would otherwise be out of reach or difficult to reach. Social business tools should be appropriate for the tasks on hand and the organization's business processes, and users need to understand how and why to use them.

In the summer of 2009, the NASA's Goddard Space Flight Center launched a custom-built enterprise social network called Spacebook to help small teams collaborate without e-mailing larger groups. Spacebook featured user profiles, group workspaces (wikis, file sharing, discussion forums, groups), and social bookmarks. Very few users adopted it, and Spacebook was decommissioned on June 1, 2012. According to Kevin Jones, a consulting social and organizational strategist at NASA's Marshall and Goddard Space Flight Centers, Spacebook failed because it didn't focus enough on people. It had been designed and developed without taking into consideration the organization's culture and politics. No one knew how Spacebook would help them do their jobs, as opposed to an existing method of collaboration such as e-mail.

Despite the pitfalls associated with launching an internal social network, there are companies using these networks successfully. For example, Red Robin, a chain of 355 restaurants with over 20,000 employees, uses social networking to give its front-line employees who interact with customers a greater voice in the company. Chris Laping, Red Robin's CIO and senior vice-president of business transformation believed that engaging these workers would also increase employee loyalty.

Red Robin decided to try out Yammer, which is referred to as a "Facebook for business." Yammer lets people create conversations, perform status updates, upload and share files, and set up workgroups for small project teams. The social collaboration software would allow Red Robin to get out a message and receive immediate feedback, so that the company could rapidly make modifications. For example, when Red Robin introduced its new Tavern Burger product line in April, 2012, it was able to refine the recipes and operational procedures in restaurants in about four weeks. The process would have taken 6 to 18 months in the past. Guests reported their feedback to servers in the restaurants, who relayed this information to their managers. Then all the managers got together right away on Yammer.

Red Robin used a viral approach to drive adoption. In the first month, 20 to 25 employees started using it and invited others. Membership spread quickly and Red Robin wound up with two Yammer networks:

"Yummversity" is a network for training employees, while "Yummer" is a network for restaurant managers, regional managers, and corporate office members to exchange information and respond to questions from the field staff. Yummer provides a voice for the company's front-line workers. In the past they would pass information up the corporate management chain, but rarely received feedback about what was done with the information.

Yummer also provided the foundation for the company's "Blueprint Project" designed to identify the best employee idea for cutting expenses without negatively impacting the customer experience. Thousands of people contributed ideas to compete for a $1000 prize. The winning entry was from a Seattle location manager who proposed replacing disposable child beverage cups with reusable ones. This seemingly small change produced a six-figure savings for the company.

Sources: David Lavenda, "How Red Robin Transformed Its Business with Yammer," Fast Company, February 6, 2014; James Niccolai, "Ellison: Facebook the New Model for Business Applications," IDG News Service, January 30, 2014; Margaret Jones, "Top Four Social Collaboration Software Fails," SearchConsumerization.com, accessed February 3, 2014; Michael Healey, "Why Enterprise Social Networking Falls Short," *Information Week*, March 4, 2013; Debra Donston-Miller, "10 Ways to Foster Effective Social Employees," *Information Week*, March 6, 2013; Jacob Morgan, "How to Market Collaboration to Employees," *Information Week*, March 21, 2013; " www.nasa.gov, accessed February 20, 2014; and Justin Kern, "Enterprises 'Like' Social Networks, Don't 'Love' Results," Information Management, February 28, 2012.

CASE STUDY QUESTIONS

1. Identify the management, organization, and technology factors responsible for impeding adoption of internal corporate social networks.
2. Compare the experiences for implementing internal social networks of the two organizations. Why was one more successful than the other? What role did management play in this process?
3. Should all companies implement internal enterprise social networks? Why or why not?

Place (location) also inhibits collaboration in large global or even national and regional firms. Assembling people for a physical meeting is made difficult by the physical dispersion of distributed firms (firms with more than one location), the cost of travel, and the time limitations of managers.

The collaboration and social technologies we have just described are ways of overcoming the limitations of time and space. Using this time/space framework will help you to choose the most appropriate collaboration and teamwork tools for your firm. Note that some tools are applicable in more than one time/place scenario. For example, Internet collaboration suites such as Lotus Notes have capabilities for both synchronous (instant messaging, electronic meeting tools) and asynchronous (e-mail, wikis, document editing) interactions.

Here's a "to-do" list to get started. If you follow these six steps, you should be led to investing in the correct collaboration software for your firm at a price you can afford, and within your risk tolerance.

1. What are the collaboration challenges facing the firm in terms of time and space? Locate your firm in the time/space matrix. Your firm can occupy more than one cell in the matrix. Different collaboration tools will be needed for each situation.
2. Within each cell of the matrix where your firm faces challenges, exactly what kinds of solutions are available? Make a list of vendor products.
3. Analyze each of the products in terms of their cost and benefits to your firm. Be sure to include the costs of training in your cost estimates, and the costs of involving the information systems department, if needed.

4. Identify the risks to security and vulnerability involved with each of the products. Is your firm willing to put proprietary information into the hands of external service providers over the Internet? Is your firm willing to risk its important operations to systems controlled by other firms? What are the financial risks facing your vendors? Will they be here in three to five years? What would be the cost of making a switch to another vendor in the event the vendor firm fails?
5. Seek the help of potential users to identify implementation and training issues. Some of these tools are easier to use than others.
6. Make your selection of candidate tools, and invite the vendors to make presentations.

2.4 WHAT IS THE ROLE OF THE INFORMATION SYSTEMS FUNCTION IN A BUSINESS?

We've seen that businesses need information systems to operate today and that they use many different kinds of systems. But who is responsible for running these systems? Who is responsible for making sure the hardware, software, and other technologies used by these systems are running properly and are up to date? End users manage their systems from a business standpoint, but managing the technology requires a special information systems function.

In all but the smallest of firms, the **information systems department** is the formal organizational unit responsible for information technology services. The information systems department is responsible for maintaining the hardware, software, data storage, and networks that comprise the firm's IT infrastructure. We describe IT infrastructure in detail in Chapter 5.

THE INFORMATION SYSTEMS DEPARTMENT

The information systems department consists of specialists, such as programmers, systems analysts, project leaders, and information systems managers. **Programmers** are highly trained technical specialists who write the software instructions for computers. **Systems analysts** constitute the principal liaisons between the information systems groups and the rest of the organization. It is the systems analyst's job to translate business problems and requirements into information requirements and systems. **Information systems managers** are leaders of teams of programmers and analysts, project managers, physical facility managers, telecommunications managers, or database specialists. They are also managers of computer operations and data entry staff. Also, external specialists, such as hardware vendors and manufacturers, software firms, and consultants, frequently participate in the day-to-day operations and long-term planning of information systems.

In many companies, the information systems department is headed by a **chief information officer (CIO)**. The CIO is a senior manager who oversees the use of information technology in the firm. Today's CIOs are expected to have a strong business background as well as information systems expertise and to play a leadership role in integrating technology into the firm's business strategy. Large firms today also have positions for a chief security officer, chief knowledge officer, and chief privacy officer, all of whom work closely with the CIO.

The **chief security officer (CSO)** is in charge of information systems security for the firm and is responsible for enforcing the firm's information

security policy (see Chapter 8). (Sometimes this position is called the chief information security officer [CISO] where information systems security is separated from physical security.) The CSO is responsible for educating and training users and information systems specialists about security, keeping management aware of security threats and breakdowns, and maintaining the tools and policies chosen to implement security.

Information systems security and the need to safeguard personal data have become so important that corporations collecting vast quantities of personal data have established positions for a **chief privacy officer (CPO)**. The CPO is responsible for ensuring that the company complies with existing data privacy laws.

The **chief knowledge officer (CKO)** is responsible for the firm's knowledge management program. The CKO helps design programs and systems to find new sources of knowledge or to make better use of existing knowledge in organizational and management processes.

The **chief data officer (CDO)** is responsible for enterprise-wide governance and utilization of information to maximize the value the organization can realize from its data. The CDO ensures that the firm is collecting the appropriate data to serve its needs, deploying appropriate technologies for analyzing the data and using the results to support business decisions. This position arose to deal with the massive amounts of data organizations are now generating and collecting (see Chapter 6).

End users are representatives of departments outside of the information systems group for whom applications are developed. These users are playing an increasingly large role in the design and development of information systems.

In the early years of computing, the information systems group was composed mostly of programmers who performed highly specialized but limited technical functions. Today, a growing proportion of staff members are systems analysts and network specialists; with the information systems department acting as a powerful change agent in the organization. The information systems department suggests new business strategies and new information-based products and services, and coordinates both the development of the technology and the planned changes in the organization.

In the next five years, employment growth in IS/MIS jobs will be about 50 percent greater than the average job growth in other fields. Out of 114 occupations, MIS is ranked 15th in terms of salaries. While all IS occupations show above-average growth, the fastest growing occupations are computer support specialists (30%), systems analysts (21%), software engineers and programmers (20%), and information systems managers (17%) (Bureau of Labor Statistics, 2012). With businesses and government agencies increasingly relying on the Internet for computing and communication resources, system and network security management positions are especially in demand. See the Learning Track for this chapter titled "Occupational and Career Outlook for Information Systems Majors 2012–2018" for more details on IS job opportunities.

ORGANIZING THE INFORMATION SYSTEMS FUNCTION

There are many types of business firms, and there are many ways in which the IT function is organized within the firm. A very small company will not have a formal information systems group. It might have one employee who is responsible for keeping its networks and applications running, or it might

use consultants for these services. Larger companies will have a separate information systems department, which may be organized along several different lines, depending on the nature and interests of the firm. Our Learning Track describes alternative ways of organizing the information systems function within the business.

The question of how the information systems department should be organized is part of the larger issue of IT governance. **IT governance** includes the strategy and policies for using information technology within an organization. It specifies the decision rights and framework for accountability to ensure that the use of information technology supports the organization's strategies and objectives. How much should the information systems function be centralized? What decisions must be made to ensure effective management and use of information technology, including the return on IT investments? Who should make these decisions? How will these decisions be made and monitored? Firms with superior IT governance will have clearly thought out the answers (Weill and Ross, 2004).

Review Summary

1. *What are business processes? How are they related to information systems?*

A business process is a logically related set of activities that defines how specific business tasks are performed, and it represents a unique way in which an organization coordinates work, information, and knowledge. Managers need to pay attention to business processes because they determine how well the organization can execute its business, and they may be a source of strategic advantage. There are business processes specific to each of the major business functions, but many business processes are cross-functional. Information systems automate parts of business processes, and they can help organizations redesign and streamline these processes.

2. *How do systems serve the different management groups in a business and how do systems that link the enterprise improve organizational performance?*

Systems serving operational management are transaction processing systems (TPS), such as payroll or order processing, that track the flow of the daily routine transactions necessary to conduct business. Management information systems (MIS) produce reports serving middle management by condensing information from TPS, and these are not highly analytical. Decision-support systems (DSS) support management decisions that are unique and rapidly changing using advanced analytical models. All of these types of systems provide business intelligence that helps managers and enterprise employees make more informed decisions. These systems for business intelligence serve multiple levels of management, and include executive support systems (ESS) for senior management that provide data in the form of graphs, charts, and dashboards delivered via portals using many sources of internal and external information.

Enterprise applications are designed to coordinate multiple functions and business processes. Enterprise systems integrate the key internal business processes of a firm into a single software system to improve coordination and decision making. Supply chain management systems help the firm manage its relationship with suppliers to optimize the planning, sourcing, manufacturing, and delivery of products and services. Customer relationship management (CRM) systems coordinate the business processes surrounding the firm's customers. Knowledge management systems enable firms to optimize the creation, sharing, and distribution of knowledge. Intranets and extranets are private corporate networks based on Internet technology that assemble information from disparate systems. Extranets make portions of private corporate intranets available to outsiders.

3. ***Why are systems for collaboration and social business so important and what technologies do they use?***

Collaboration is working with others to achieve shared and explicit goals. Social business is the use of internal and external social networking platforms to engage employees, customers, and suppliers, and it can enhance collaborative work. Collaboration and social business have become increasingly important in business because of globalization, the decentralization of decision making, and growth in jobs where interaction is the primary value-adding activity. Collaboration and social business enhance innovation, productivity, quality, and customer service. Tools for collaboration and social business include e-mail and instant messaging, wikis, virtual meeting systems, virtual worlds, cloud-based cyberlockers and online services such as those of Google and Microsoft, corporate collaboration systems such as Microsoft Sharepoint, and enterprise social networking tools such as Chatter, Yammer, Jive, and IBM Connections.

4. ***What is the role of the information systems function in a business?***

The information systems department is the formal organizational unit responsible for information technology services. It is responsible for maintaining the hardware, software, data storage, and networks that comprise the firm's IT infrastructure. The department consists of specialists, such as programmers, systems analysts, project leaders, and information systems managers, and is often headed by a CIO.

Key Terms

Business intelligence, 79
Chief data officer (CDO), 100
Chief information officer (CIO), 99
Chief knowledge officer (CKO), 100
Chief privacy officer (CPO), 100
Chief security officer (CSO), 99
Collaboration, 88
Customer relationship management (CRM) systems, 86
Cyberlockers, 94
Decision-support systems (DSS), 80
Digital dashboard, 84
Electronic business (e-business), 87
Electronic commerce (e-commerce), 87
E-government, 87
End users, 100
Enterprise applications, 85
Enterprise systems, 85
Executive support systems (ESS), 84
Information systems department, 99
Information systems managers, 99
Interorganizational system, 86
IT governance, 101
Knowledge management systems (KMS), 86
Management information systems (MIS), 79
Portal, 84
Programmers, 99
Social business, 89
Supply chain management (SCM) systems, 85
Systems analysts, 99
Teams, 88
Telepresence, 93
Transaction processing systems (TPS), 78

MyMISLab

Go to **mymislab.com** to complete the problems marked with this icon ✪.

Review Questions

2-1 What are business processes? How are they related to information systems?

- Define business processes and describe the role they play in organizations.
- Explain how information technology and information systems enhance business processes.

2-2 How do systems serve the different management groups and how do systems that link the enterprise improve organizational performance?

- Describe the characteristics of transaction processing systems (TPS) and the roles they play in a business and how do systems that

link the enterprise improve organizational performance?

- Describe the characteristics of management information systems (MIS) and explain how MIS differ from TPS and from DSS.
- Describe the characteristics of decision-support systems (DSS) and how they benefit businesses.
- Describe the characteristics of executive support systems (ESS) and explain how these systems differ from DSS.
- Explain how enterprise applications improve organizational performance.
- Define enterprise systems, supply chain management systems, customer relationship management systems, and knowledge management systems and describe their business benefits.
- Explain how intranets and extranets help firms integrate information and business processes.

2-3 Why are systems for collaboration and social business so important and what technologies do they use?

- Define collaboration and social business, and explain why they have become so important in business today.
- List and describe the business benefits of collaboration and social business.
- Describe a supportive organizational culture and business processes for collaboration.
- List and describe the various types of collaboration and social business tools.

2-4 What is the role of the information systems function in a business?

- Describe how the information systems function supports a business.
- Describe the services provided by information systems departments.
- Compare the roles played by programmers, systems analysts, information systems managers, the chief information officer (CIO), chief security officer (CSO), chief data officer (CDO), and chief knowledge officer (CKO).

Discussion Questions

✪ **2-5** How could information systems be used to support the order fulfillment process illustrated in Figure 2.1? What are the most important pieces of information these systems should capture? Explain your answer.

✪ **2-6** Identify the steps that are performed in the process of selecting and checking out a book from your college library and the information that flows among these activities. Diagram the process. Are there any ways this process could be changed to improve the performance of your library or your school? Diagram the improved process.

✪ **2-7** Use the Time/Space Collaboration and Social Tool Matrix to classify the collaboration and social technologies used by BASF..

Hands-On MIS Projects

The projects in this section give you hands-on experience analyzing opportunities to improve business processes with new information system applications, using a spreadsheet to improve decision making about suppliers, and using Internet software to plan efficient transportation routes.

Management Decision Problems

2-8 Fulbert Timber Merchants in Brixton, UK features a large selection of building supplies, including timber, fencing and decking, mouldings, hardwood flooring, sheet materials, windows, doors, ironmongery, and other materials. The prices of building materials are constantly changing. When a customer inquires about the price on fixtures, fittings, hangings, and other items, sales representatives consult a manual price sheet and then call the supplier for the most recent price. The supplier in turn uses a manual price sheet, which has been updated each day. Often, the supplier must call back Fulbert's sales reps because the company does not have the newest pricing information immediately on hand. Assess the business impact of this situation, describe how this process could be improved with information technology, and identify the decisions that would have to be made to implement a solution.

2-9 Quincaillerie is a small family hardware store in Paris, France. The owners must use every square foot of store space as profitably as possible. They have never kept detailed inventory or sales records. As soon as a shipment of goods arrives, the items are immediately placed on store shelves. Invoices from suppliers are only kept for tax purposes. When an item is sold, the item number and price are rung up at the cash register. The owners use their own judgment in identifying items that need to be reordered. What is the business impact of this situation? How could information systems help the owners run their business? What data should these systems capture? What decisions could the systems improve?

Improving Decision Making: Using a Spreadsheet to Select Suppliers

Software skills: Spreadsheet date functions, data filtering, DAVERAGE function
Business skills: Analyzing supplier performance and pricing

2-10 In this exercise, you will learn how to use spreadsheet software to improve management decisions about selecting suppliers. You will filter transactional data on suppliers based on several different criteria to select the best suppliers for your company.

You run a company that manufactures aircraft components. You have many competitors who are trying to offer lower prices and better service to customers, and you are trying to determine whether you can benefit from better supply chain management. In MyMISLab, you will find a spreadsheet file that contains a list of all of the items that your firm has ordered from its suppliers during the past three months. The fields in the spreadsheet file include vendor name, vendor identification number, purchaser's order number, item identification number and item description (for each item ordered from the vendor), cost per item, number of units of the item ordered (quantity), total cost of each order, vendor's accounts payable terms, order date, and actual arrival date for each order.

Prepare a recommendation of how you can use the data in this spreadsheet database to improve your decisions about selecting suppliers. Some criteria to consider for identifying preferred suppliers include the supplier's track record for on-time deliveries, suppliers offering the best accounts payable terms, and suppliers offering lower pricing when the same item can be provided by multiple suppliers. Use your spreadsheet software to prepare reports to support your recommendations.

Achieving Operational Excellence: Using Internet Software to Plan Efficient Transportation Routes

Software skills: Internet-based software
Business skills: Transportation planning

2-11 In this exercise, you will use Google Maps to map out transportation routes for a business and select the most efficient route.

You have just started working as a dispatcher for Trans-Europe Transport, a trucking and delivery service based in Brussels, Belgium. Your first assignment is to plan a shipment of paintings from the Museum Aan de Stroom in Antwerp, Belgium to the Royal Museums of Fine Arts of Belgium in Brussels. To guide your trucker, you need to know the most efficient route between the two cities. Use Google Maps to determine the route that is the shortest distance between the two cities, the route that takes the least time, and the estimated fuel cost for both routes. Compare the results. Which route should Trans-Europe Transport use?

Collaboration and Teamwork Project

2-12 In MyMISLab, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google+, or other open-source collaboration tools to complete the assignment.

Modernization of NTUC Income

CASE STUDY

NTUC Income (Income), one of Singapore's largest insurers, has over 2 million policy holders with total assets of S$31.3 billion. The insurer employs about 3,400 insurance advisors and 1,200 office staff, with the majority located across an eight-branch network. In 2014, the company solidified its status as a market leader in Singapore, but its modernization began years ago with a critical information systems upgrade.

On June 1, 2003, Income succeeded in the migration of its legacy insurance systems to a digital Web-based system. The Herculean task required not only the upgrading of hardware and applications, it also required Income to streamline its decade-old business processes and IT practices.

Up until a few years prior to the revamp, Income's insurance processes were very tedious and paper-based. The entire insurance process started with customers meeting an agent, filling in forms, and submitting documents. The agent would then submit the forms at branches, from where they were sent by couriers to the office services department. The collection schedule could introduce delays of two to three days. Office Services would log documents, sort them, and then send them to departments for underwriting. Proposals were allocated to underwriting staff, mostly randomly. Accepted proposals were sent for printing at the computer services department and then redistributed. For storage, all original documents were packed and sent to warehouses where, over two to three days, a total of seven staff would log and store the documents. In all, paper policies comprising 45 million documents were stored in over 16,000 cartons at three warehouses. Whenever a document needed to be retrieved, it would take about two days to locate and ship it by courier. Refiling would again take about two days.

In 2002, despite periodic investments to upgrade the HP 3000 mainframe that hosted the core insurance applications as well as the accounting and management information systems, it still frequently broke down. According to James Kang, then CIO at Income, "The system breakdowns were a real nightmare. Work would stop and the staff had to choose either data reconciliation, or backup. However, the HP 3000 backup system allowed restoration to only up to the previous day's backup data. If the daily backup was not completed at the end of the day, the affected day's data would be lost and costly and tedious reconciliation would be needed to bring the data up to date." In one of the hardware crashes, reconciliation took several months to restore the data loss. In all, the HP 3000 system experienced a total of three major hardware failures, resulting in a total of six days of complete downtime.

That was not enough. The COBOL programs that were developed in the early 1980s and maintained by Income's in-house IT team also broke multiple times, halted the systems, and caused temporary interruptions. In addition, the IT team found developing new products in COBOL to be quite cumbersome and the time taken to launch new products ranged from a few weeks to months.

At the same time, transaction processing for policy underwriting was still a batch process and information was not available to agents and advisors in real-time. As a result, when staff processed a new customer application for motor insurance, they did not know if the applicant was an existing customer of Income, which led to the loss of opportunities for cross-product sales. Commenting on the problems faced by the agents, Kang said, "When the agents tried to submit the documents using notebooks, they ran into a lot of problems. HP 3000 was a terrible machine to connect to such devices. And with more of the advisors telecommuting, availability became an issue too." In addition, various departments did not have up-to-date information and had to pass physical documents among each other.

All this changed in June 2003, when Income switched to the Java-based eBao LifeSystem from eBao Technology. The software comprised three subsystems: Policy Administration, Sales Management, and Supplementary Resources. Commenting on its features, Kang said, "It has everything we are looking for—a customer-centric design, seamless integration with imaging and barcode technology, a product definition module that supports new products, new channels and changes in business processes."

Implementation work started in September 2002 and the project was completed in nine months. By May 2003, all the customization, data migration of Income's individual and group life insurance businesses and training were completed.

The new system was immediately operational on a high-availability platform. All applications resided on two or more servers, each connected by two or more communication lines, all of which were "load balanced." This robust architecture minimized downtime occurrence due to hardware or operating system failures.

As part of eBao implementation, Income decided to replace its entire IT infrastructure with a more robust, scalable architecture. For example, all servicing branches were equipped with scanners; monitors were changed to 20 inches; PC RAM size was upgraded to 128 MB; and new hardware and software for application servers, database servers, Web servers, and disk storage systems were installed. Furthermore, the LAN cables were replaced with faster cables, a fiber-optic backbone, and wireless capability.

In addition, Income also revamped its business continuity and disaster-recovery plans. A real-time hot backup disaster-recovery center was implemented, where the machines were always running and fully operational. Data was transmitted immediately on the fly from the primary data center to the backup machines' data storage. In the event of the data center site becoming unavailable, the operations could be switched quickly to the disaster-recovery site without the need to rely on restoration of previous day data.

Moving to a paperless environment, however, was not easy. Income had to throw away all paper records, including legal paper documents. Under the new system, all documents were scanned and stored on "trusted" storage devices—secured, reliable digital vaults that enabled strict compliance with stringent statutory requirements. Income had to train employees who had been accustomed to working with paper to use the eBao system and change the way they worked.

As a result of adopting eBao Life System, about 500 office staff and 3,400 insurance advisors could access the system anytime, anywhere. Staff members who would telecommute enjoyed faster access to information, almost as fast as those who accessed the information in the office.

According to Kang, "We got a singular view of every customer—across products and channels and even better life and general insurance business lines. That allowed us opportunities to cross-sell and improve customer service. In addition, because of the straight through processing workflow capabilities, we had 50 percent savings on both the time and cost needed to process policies. We had also cut the time needed to design and launch new products which was reduced from weeks to just days using the table-driven rule-based product-definition module."

Commenting on the benefits of eBao system, former CEO Tan Kin Lian remarked, "...eBaoTech LifeSystem has the best straight through processing workflow and it is very flexible. It cuts our new product launch time from months to days. It also allows us to support agents, brokers, and customers to do online services easily. I got a fantastic deal: the best system with much lower cost and much shorter implementation time. I have to say that this is a revolution!"

Although the eBao system has undergone improvements since its initial rollout, Income's culture of innovation and modernization continues. In 2011, Income announced plans to invest $4 million annually to improve its customer service as part of its "Orange Revolution" campaign. The broader goal of the campaign was to establish NTUC Income as a friendlier, more honest insurance company known for superlative customer service. The subgoals include Orange Speak, to standardize usage of simple-to-understand English across the firm, and Orange Force, to create a more visible presence of NTUC Income insurance advisors in the public eye.

For example, as part of Orange Speak, the company released a series of television advertisements and videos poking fun at the insurance industry's complicated verbiage, casting themselves as a simpler, more straightforward alternative. As part of Orange Force, the company created a task force of 30 motorcyclists with a distinctive orange NTUC Income color palette with the objective of being able to ride to traffic accidents in the surrounding areas within 20 minutes.

In 2014, the campaign was finally completed and has been a resounding success, resulting in multiple national awards for exemplary service, a reduction of average monthly complaints from 274 before the launch of the campaign to approximately 70 midway through the campaign's completion, and improving the company's bottom line, boosting profits slightly over the course of the campaign.

Technologically, the company continues to keep pace. In 2013, Income adopted Singapore's national two-factor authentication system, becoming the first local insurer to do so. The system uses a physical token resembling a credit card that links to individual NTUC Income accounts and generates one-use passwords for online transactions. The system will help NTUC policyholders to stay safe online while sharing sensitive personal information. The

company also continues to bolster its policy offerings, announcing plans to extend insurance to children with special needs such as Downs syndrome and autism, insurance for low-income families with young children, and more comprehensive motorcycle insurance. The legacy of modernization established in the 2000s continues at NTUC Income to the present day.

Sources: Giles Simon, "Membership Campaign Case Study: NTUC Income," www.thenews.coop, April 9, 2014; Eileen Yu, "NTUC Income Adopts S'pore 2FA," by Eileen Yu, Zdnet.com, March 6, 2013; "2013 Consolidated Financial Statements," income.com.sg, accessed 2014; "Media Releases - 2014," income.com.sg, accessed 2014; Melina Chan, "Singapore's NTUC Income Simplifies Contracts, Parodies the Industry's Legalese," Anxietyindex.com, April 8, 2013.

CASE STUDY QUESTIONS

2-13 What were the problems faced by Income in this case? How were the problems resolved by the new digital system?.

2-14 What types of information systems and business processes were used by Income before migrating to the fully digital system?

2-15 Describe the Information systems and IT infrastructure at Income after migrating to the fully digital system.

2-16 What benefits did Income reap from the new system?

2-17 How well is Income prepared for the future? Are the problems described in the case likely to be repeated?

Case prepared by Neerja Sethi and Vijay Sethi, Nanyang Technological University.

MyMISLab

Go to **mymislab.com** for the following Assisted-graded writing questions.

2-18 Identify and describe the capabilities of enterprise social networking software. Describe how a firm could use each of these capabilities.

2-19 Describe the systems used by various management groups within the firm in terms of the information they use, their outputs, and groups served.

Chapter 2 References

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Information Systems, Organizations, and Strategy

CHAPTER 3

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. Which features of organizations do managers need to know about to build and use information systems successfully?
2. What is the impact of information systems on organizations?
3. How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?
4. What are the challenges posed by strategic information systems and how should they be addressed?

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CHAPTER CASES

Grupo Modelo: Competing on Processes

Automakers Become Software Companies

Identifying Market Niches in the Age of Big Data

Can This Bookstore Be Saved?

VIDEO CASES

National Basketball Association: Competing on Global Delivery with Akamai OS Streaming

IT and Geo-Mapping Help a Small Business Succeed

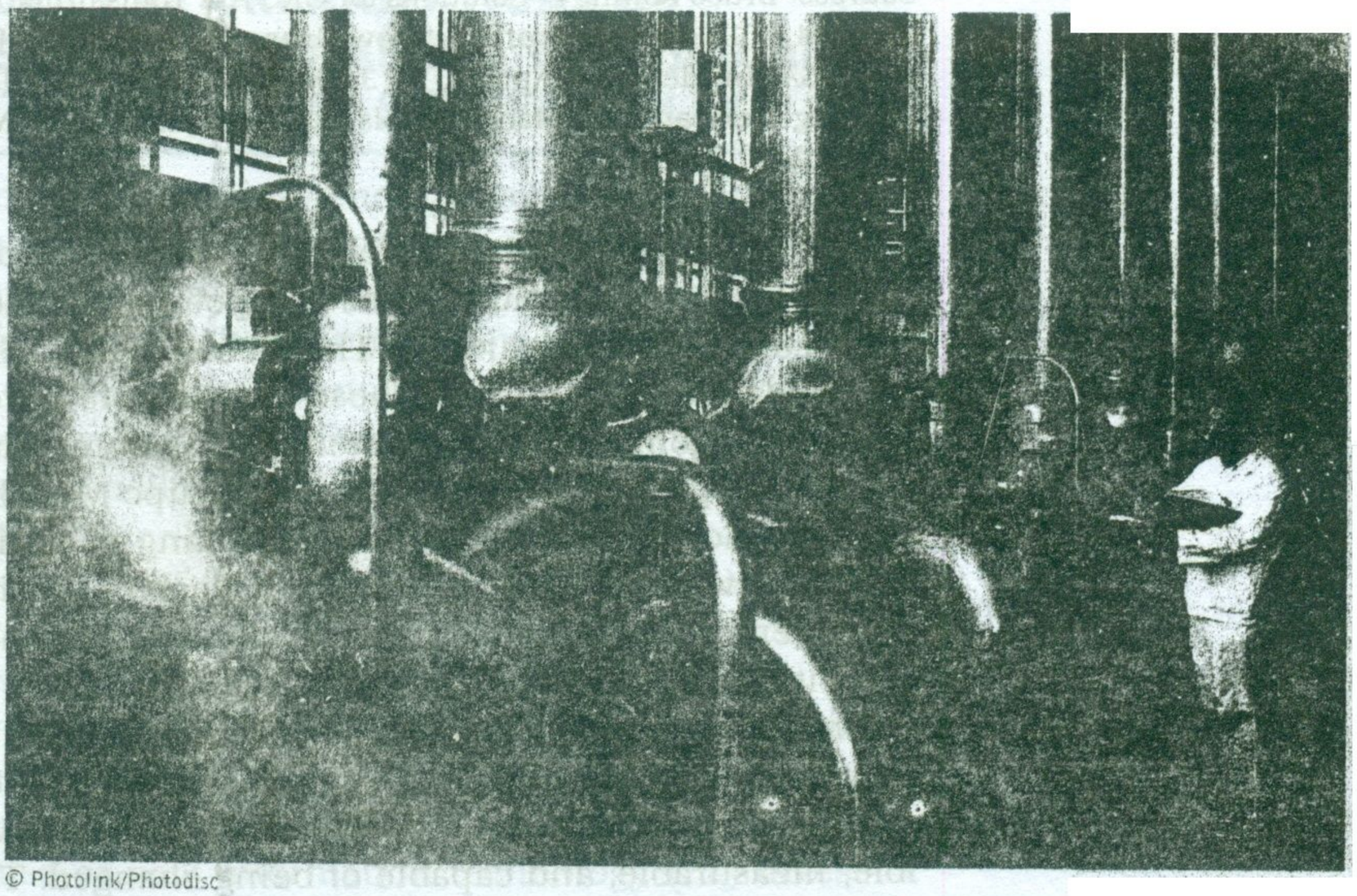
Materials Handling Equipment Corp: Enterprise Systems Drive Corporate Strategy for a Small Business

Instructional Video: SAP BusinessOne ERP: From Orders to Payment

GRUPO MODELO: COMPETING ON PROCESSES

If you drink beer, chances are good you've tasted Grupo Modelo products. Grupo Modelo is Mexico's largest brewer of beer, with a capacity of 1.5 billion gallons annually, placing it in the top ten brewers of the world. The brewer also brews beer solely for the local market including Estrella, Leon, and Montejo. Anheuser-Busch InBev, the largest brewer in the world, recently completed its acquisition of Grupo Modelo for a purchase price of €14 billion euros. InBev already owned 50% of Grupo Modelo from a previous purchase. Like many firms that have grown from a collection of enterprises to a regional powerhouse and then to a global firm, Grupo Modelo needed to transform its administration so that managers could understand the complexity of the now larger firm, and compete with other global firms. In the future, Grupo Modelo would be competing with other firms on the basis of efficient business processes, and not just the taste of its beer.

Grupo Modelo worked with the consulting firm Deloitte Consulting to implement an SAP enterprise management system, creating a single database for all the firm's business units. With nearly 100 different business units, from its seven breweries to convenience stores and distribution centers, the firm was hoping to integrate the disparate units and make it possible to manage them using a single software environment. The first step in building an enterprise system is to identify, document, and begin to measure the firm's business processes. This can take several years. Once identified, managers need to prioritize their efforts by focusing on the most important processes and build an administrative apparatus to manage them. For instance, there are thousands of business processes in large firms. Who will govern these processes? Who will manage the risks associ-



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ated with these processes? And who will ensure that employees conduct business in compliance with the firm's official processes? These are referred to as GRC challenges (for governance, risk, and compliance). Transforming a traditional organization into a modern competitive enterprise requires both significant cultural change and technology investment.

To address these challenges Grupo Modelo organized a new program to bring about the transformation of Grupo Modelo into a process-oriented firm. The new program, the Enterprise Model for Administration Transformation, worked with SAP enterprise software modules to build automated dashboards that would allow managers throughout the firm to visually observe how the firm's business processes were working.

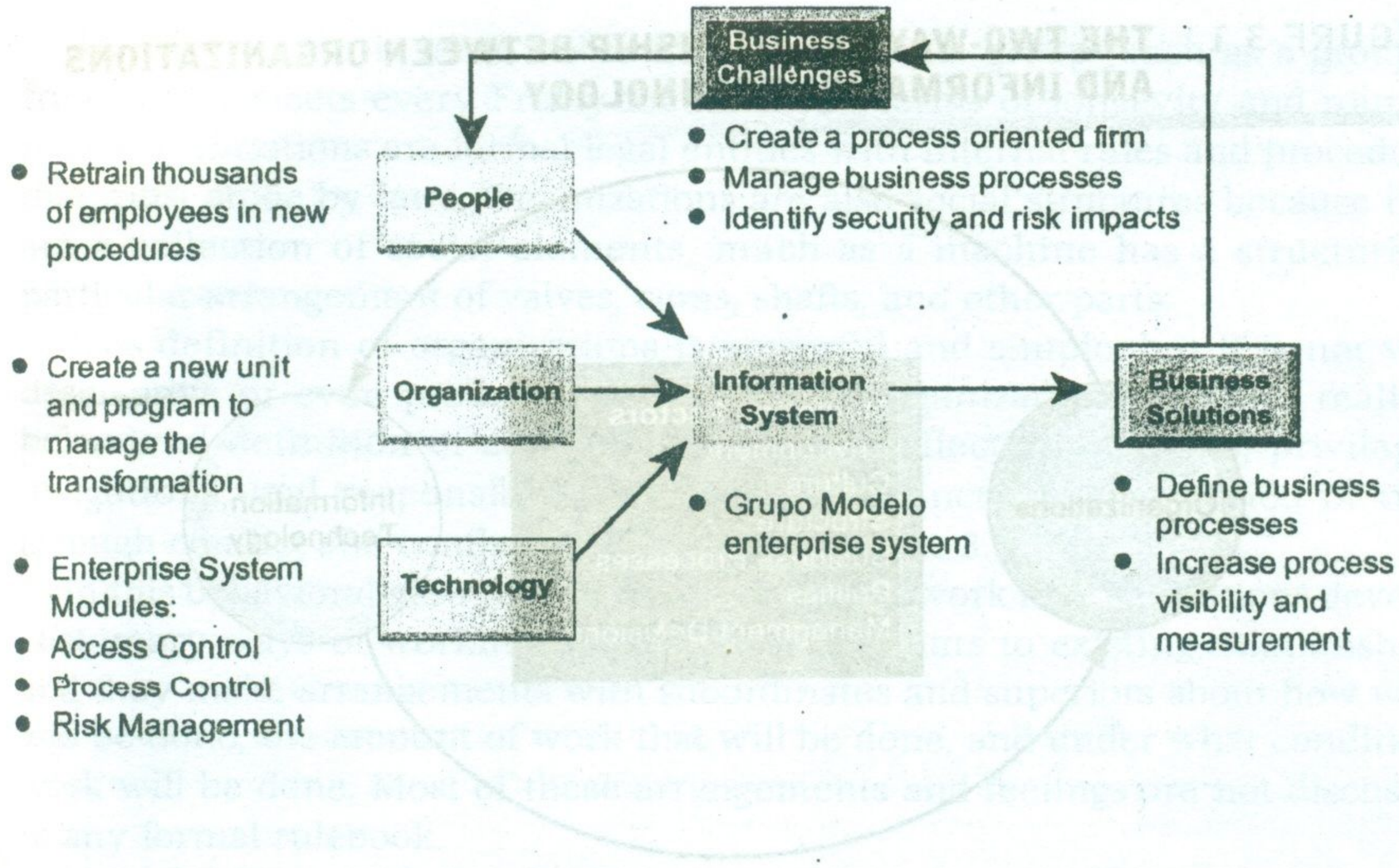
SAP's Access Control module formalized security in the firm, ensuring that only authorized employees could define business processes and access process information, and that there was a proper "segregation of duties" in the firm. Segregation of duties is an auditing concept that attempts to prevent fraud and errors by spreading tasks and authorizations to specific business processes among multiple users. SAP's Process Control module contains the descriptions of processes, regulations that affect the processes, and the extent to which employees comply with the processes. The Risk Management module measures and displays the change risks associated with each process, everything from supplier risk, to regulatory changes, and liability issues. The software tracks key risk indicators and tries to estimate the potential losses and impacts of poor decisions, or adverse risk events.

The result of Grupo Modelo's enterprise systems effort is a unification of a far flung company doing business on a global scale, giving management for the first time insights into the firm that had been hidden before. Among the benefits cited by managers are better security controls throughout the company, automating workflows, automated monitoring of processes and risk, and better decision making based on the notion that all managers in the firm knew the correct way of performing a business process no matter where they were located.

Sources: Bruce Romney, "Solutions for GRC Are Transformational for Grupo Modelo, SAP.com, June 24, 2013; Insider Profiles, "How Grupo Modelo Brews Up Process Change and Manages Risk," SAPInsider.com, April 1, 2013; Dana Cimilluca, "Stella, Bud—Meet Corona: AB InBev, Tapping Mexican Beer Market, Seals $20.1 Billion Deal for Modelo," *Wall Street Journal*, June 29, 2012.

The story of Grupo Modelo illustrates some of the ways that information systems help businesses compete—and also the challenges of sustaining a competitive advantage. The global beer business is dominated by a few consolidated, global firms. These competitors have developed extremely efficient management control systems using enterprise wide software tools. If it was to compete in this environment, Grupo Modelo managers needed to have a much more fine-grained understanding of all its business processes, and build software tools in the form of desktop dashboards that would permit management to operate in real time. The firm also needed tools to ensure security, and understand and mitigate risk.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. Grupo Modelo faced the challenge of becoming a "process oriented" firm, a firm where all the business processes were visible, measurable, and capable of being changed. The firm needed to identify, and then mitigate, security threats and understand the impact of other risks on the firm. New technology was one part of the solution: the firm built on the enterprise software of SAP by implementing process, security, and risk



management modules. In order to raise awareness among all employees of the importance of this project, management created a program and a new office to implement and manage the transformation towards a process orientation. A successful implementation required that thousands of the firm's employees had to be trained in the new software and the newly defined business processes. The result is an information system that defines and makes visible on managers' desktops the important business processes of the firm.

Here are some questions to think about: How do competitive forces and value chain models apply to Grupo Modelo? What do you think was the most difficult challenge Grupo Modelo faced when implementing its new system?

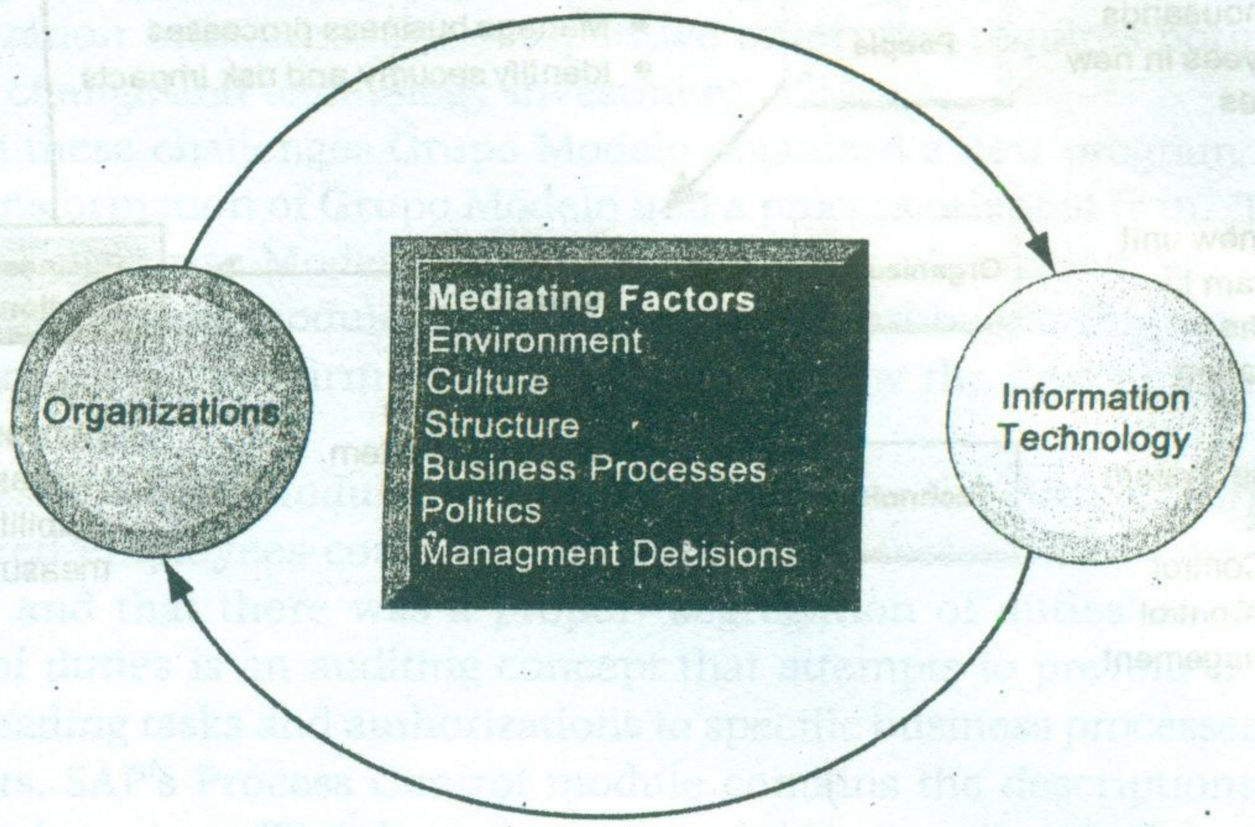
3.1 WHICH FEATURES OF ORGANIZATIONS DO MANAGERS NEED TO KNOW ABOUT TO BUILD AND USE INFORMATION SYSTEMS SUCCESSFULLY?

Information systems and organizations influence one another. Information systems are built by managers to serve the interests of the business firm. At the same time, the organization must be aware of and open to the influences of information systems to benefit from new technologies.

The interaction between information technology and organizations is complex and is influenced by many mediating factors, including the organization's structure, business processes, politics, culture, surrounding environment, and management decisions (see Figure 3.1). You will need to understand how information systems can change social and work life in your firm. You will not be able to design new systems successfully or understand existing systems without understanding your own business organization.

As a manager, you will be the one to decide which systems will be built, what they will do, and how they will be implemented. You may not be able to anticipate all of the consequences of these decisions. Some of the changes that occur in business firms because of new information technology (IT) investments cannot be foreseen and have results that may or may not meet your expectations. Who would have imagined fifteen years ago, for instance, that e-mail and instant messaging would become a dominant form of business

FIGURE 3.1 THE TWO-WAY RELATIONSHIP BETWEEN ORGANIZATIONS AND INFORMATION TECHNOLOGY



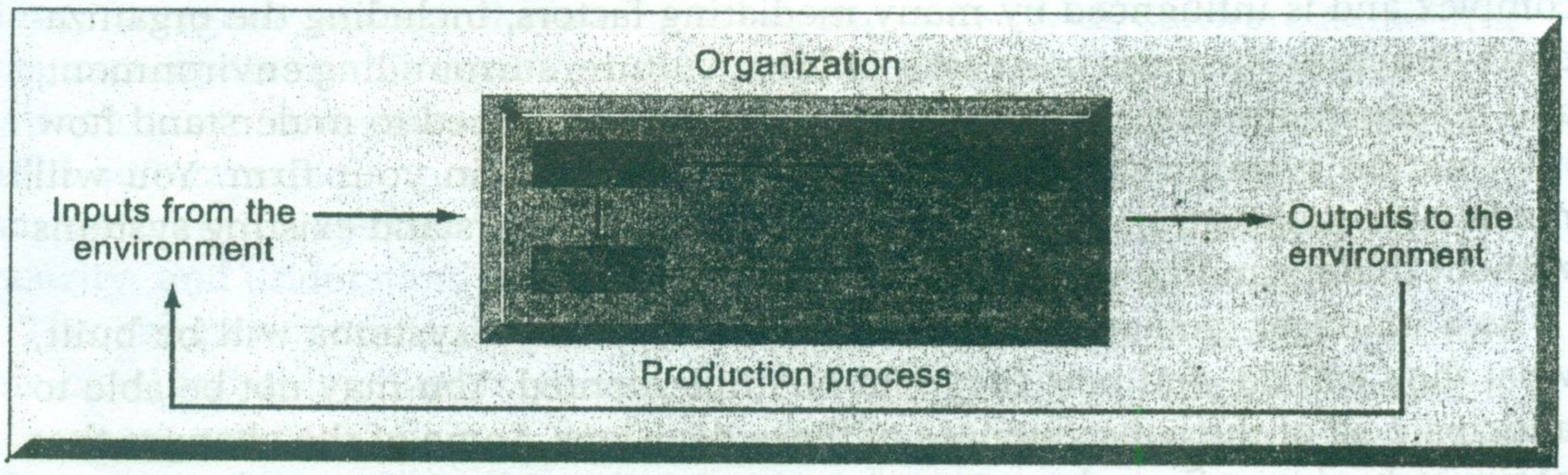
This complex two-way relationship is mediated by many factors, not the least of which are the decisions made—or not made—by managers. Other factors mediating the relationship include the organizational culture, structure, politics, business processes, and environment.

communication and that many managers would be inundated with more than 200 e-mail messages each day?

WHAT IS AN ORGANIZATION?

An **organization** is a stable, formal social structure that takes resources from the environment and processes them to produce outputs. This technical definition focuses on three elements of an organization. Capital and labor are primary production factors provided by the environment. The organization (the firm) transforms these inputs into products and services in a production function. The products and services are consumed by environments in return for supply inputs (see Figure 3.2).

FIGURE 3.2 THE TECHNICAL MICROECONOMIC DEFINITION OF THE ORGANIZATION



In the microeconomic definition of organizations, capital and labor (the primary production factors provided by the environment) are transformed by the firm through the production process into products and services (outputs to the environment). The products and services are consumed by the environment, which supplies additional capital and labor as inputs in the feedback loop.

An organization is more stable than an informal group (such as a group of friends that meets every Friday for lunch) in terms of longevity and routineness. Organizations are formal legal entities with internal rules and procedures that must abide by laws. Organizations are also social structures because they are a collection of social elements, much as a machine has a structure—a particular arrangement of valves, cams, shafts, and other parts.

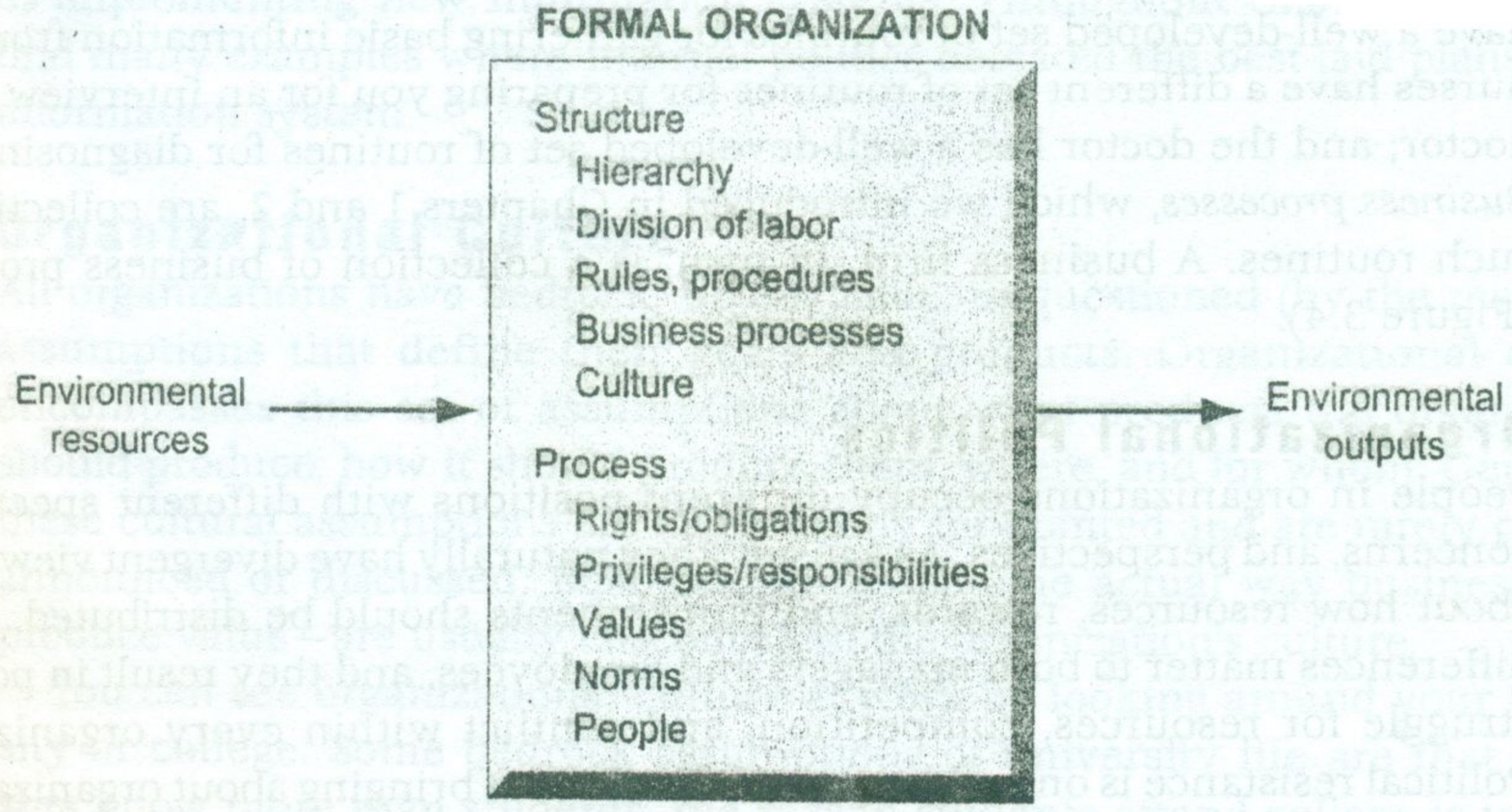
This definition of organizations is powerful and simple, but it is not very descriptive or even predictive of real-world organizations. A more realistic behavioral definition of an organization is a collection of rights, privileges, obligations, and responsibilities delicately balanced over a period of time through conflict and conflict resolution (see Figure 3.3).

In this behavioral view of the firm, people who work in organizations develop customary ways of working; they gain attachments to existing relationships; and they make arrangements with subordinates and superiors about how work will be done, the amount of work that will be done, and under what conditions work will be done. Most of these arrangements and feelings are not discussed in any formal rulebook.

How do these definitions of organizations relate to information systems technology? A technical view of organizations encourages us to focus on how inputs are combined to create outputs when technology changes are introduced into the company. The firm is seen as infinitely malleable, with capital and labor substituting for each other quite easily. But the more realistic behavioral definition of an organization suggests that building new information systems, or rebuilding old ones, involves much more than a technical rearrangement of machines or workers—that some information systems change the organizational balance of rights, privileges, obligations, responsibilities, and feelings that have been established over a long period of time.

Changing these elements can take a long time, be very disruptive, and requires more resources to support training and learning. For instance, the length of time required to implement a new information system effectively is much longer than usually anticipated simply because there is a lag between implementing a technical system and teaching employees and managers how to use the system.

FIGURE 3.3 THE BEHAVIORAL VIEW OF ORGANIZATIONS



The behavioral view of organizations emphasizes group relationships, values, and structures.

F-8/A

Technological change requires changes in who owns and controls information, who has the right to access and update that information, and who makes decisions about whom, when, and how. This more complex view forces us to look at the way work is designed and the procedures used to achieve outputs.

The technical and behavioral definitions of organizations are not contradictory. Indeed, they complement each other: The technical definition tells us how thousands of firms in competitive markets combine capital, labor, and information technology, whereas the behavioral model takes us inside the individual firm to see how that technology affects the organization's inner workings. Section 3.2 describes how each of these definitions of organizations can help explain the relationships between information systems and organizations.

FEATURES OF ORGANIZATIONS

All modern organizations share certain characteristics. They are bureaucracies with clear-cut divisions of labor and specialization. Organizations arrange specialists in a hierarchy of authority in which everyone is accountable to someone and authority is limited to specific actions governed by abstract rules or procedures. These rules create a system of impartial and universal decision making. Organizations try to hire and promote employees on the basis of technical qualifications and professionalism (not personal connections). The organization is devoted to the principle of efficiency: maximizing output using limited inputs. Other features of organizations include their business processes, organizational culture, organizational politics, surrounding environments, structure, goals, constituencies, and leadership styles. All of these features affect the kinds of information systems used by organizations:

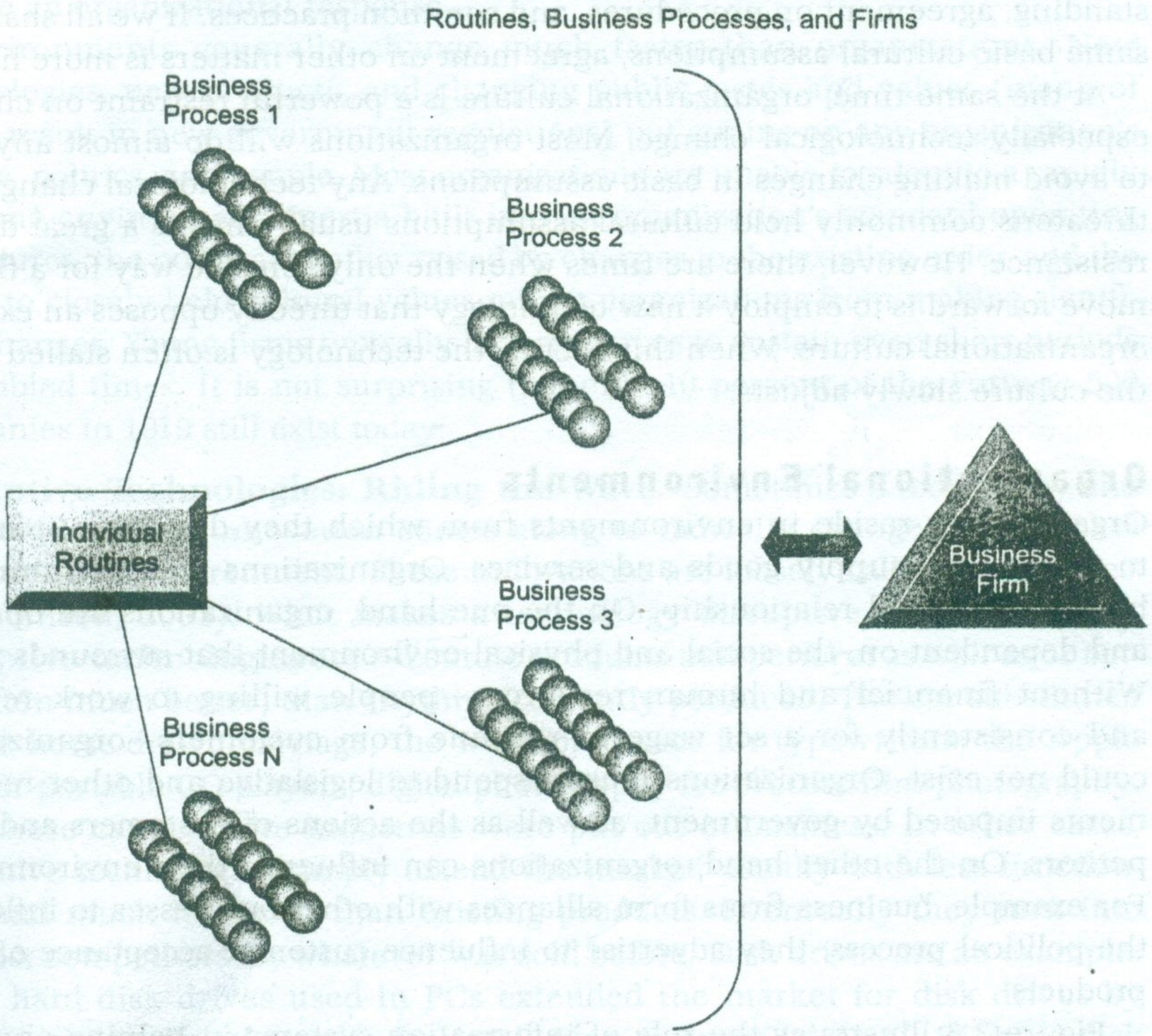
Routines and Business Processes

All organizations, including business firms, become very efficient over time because individuals in the firm develop **routines** for producing goods and services. Routines—sometimes called *standard operating procedures*—are precise rules, procedures, and practices that have been developed to cope with virtually all expected situations. As employees learn these routines, they become highly productive and efficient, and the firm is able to reduce its costs over time as efficiency increases. For instance, when you visit a doctor's office, receptionists have a well-developed set of routines for gathering basic information from you; nurses have a different set of routines for preparing you for an interview with a doctor; and the doctor has a well-developed set of routines for diagnosing you. *Business processes*, which we introduced in Chapters 1 and 2, are collections of such routines. A business firm, in turn, is a collection of business processes (Figure 3.4).

Organizational Politics

People in organizations occupy different positions with different specialties, concerns, and perspectives. As a result, they naturally have divergent viewpoints about how resources, rewards, and punishments should be distributed. These differences matter to both managers and employees, and they result in political struggle for resources, competition, and conflict within every organization. Political resistance is one of the great difficulties of bringing about organizational change—especially the development of new information systems. Virtually all large information systems investments by a firm that bring about significant

FIGURE 3.4 ROUTINES, BUSINESS PROCESSES, AND FIRMS



All organizations are composed of individual routines and behaviors, a collection of which make up a business process. A collection of business processes make up the business firm. New information system applications require that individual routines and business processes change to achieve high levels of organizational performance.

changes in strategy, business objectives, business processes, and procedures become politically charged events. Managers who know how to work with the politics of an organization will be more successful than less-skilled managers in implementing new information systems. Throughout this book, you will find many examples where internal politics defeated the best-laid plans for an information system.

Organizational Culture

All organizations have bedrock, unassailable, unquestioned (by the members) assumptions that define their goals and products. Organizational culture encompasses this set of assumptions about what products the organization should produce, how it should produce them, where, and for whom. Generally, these cultural assumptions are taken totally for granted and are rarely publicly announced or discussed. Business processes—the actual way business firms produce value—are usually ensconced in the organization's culture.

You can see organizational culture at work by looking around your university or college. Some bedrock assumptions of university life are that professors know more than students, the reason students attend college is to learn, and classes follow a regular schedule. Organizational culture is a powerful

unifying force that restrains political conflict and promotes common understanding, agreement on procedures, and common practices. If we all share the same basic cultural assumptions, agreement on other matters is more likely.

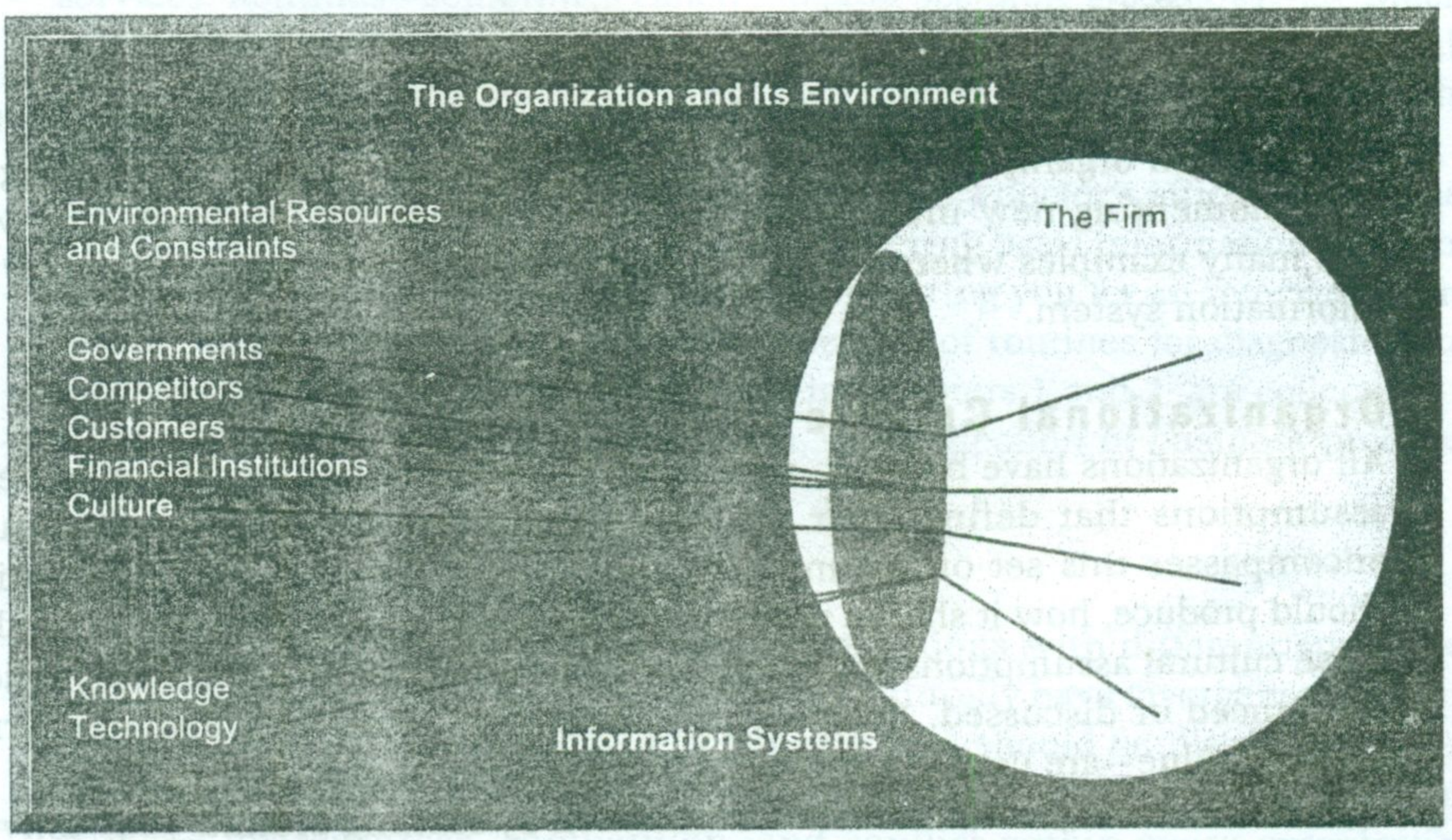
At the same time, organizational culture is a powerful restraint on change, especially technological change. Most organizations will do almost anything to avoid making changes in basic assumptions. Any technological change that threatens commonly held cultural assumptions usually meets a great deal of resistance. However, there are times when the only sensible way for a firm to move forward is to employ a new technology that directly opposes an existing organizational culture. When this occurs, the technology is often stalled while the culture slowly adjusts.

Organizational Environments

Organizations reside in environments from which they draw resources and to which they supply goods and services. Organizations and environments have a reciprocal relationship. On the one hand, organizations are open to, and dependent on, the social and physical environment that surrounds them. Without financial and human resources—people willing to work reliably and consistently for a set wage or revenue from customers—organizations could not exist. Organizations must respond to legislative and other requirements imposed by government, as well as the actions of customers and competitors. On the other hand, organizations can influence their environments. For example, business firms form alliances with other businesses to influence the political process; they advertise to influence customer acceptance of their products.

Figure 3.5 illustrates the role of information systems in helping organizations perceive changes in their environments and also in helping organizations act on their environments. Information systems are key instruments for

FIGURE 3.5 ENVIRONMENTS AND ORGANIZATIONS HAVE A RECIPROCAL RELATIONSHIP



Environments shape what organizations can do, but organizations can influence their environments and decide to change environments altogether. Information technology plays a critical role in helping organizations perceive environmental change and in helping organizations act on their environment.

environmental scanning, helping managers identify external changes that might require an organizational response.

Environments generally change much faster than organizations. New technologies, new products, and changing public tastes and values (many of which result in new government regulations) put strains on any organization's culture, politics, and people. Most organizations are unable to adapt to a rapidly changing environment. Inertia built into an organization's standard operating procedures, the political conflict raised by changes to the existing order, and the threat to closely held cultural values inhibit organizations from making significant changes. Young firms typically lack resources to sustain even short periods of troubled times. It is not surprising that only 10 percent of the Fortune 500 companies in 1919 still exist today.

Disruptive Technologies: Riding the Wave. Sometimes a technology and resulting business innovation comes along to radically change the business landscape and environment. These innovations are loosely called "disruptive." (Christensen, 2003). What makes a technology disruptive? In some cases, **disruptive technologies** are substitute products that perform as well as or better (often much better) than anything currently produced. The car substituted for the horse-drawn carriage; the word processor for typewriters; the Apple iPod for portable CD players; digital photography for process film photography.

In these cases, entire industries were put out of business. In other cases, disruptive technologies simply extend the market, usually with less functionality and much less cost, than existing products. Eventually they turn into low-cost competitors for whatever was sold before. Disk drives are an example: Small hard disk drives used in PCs extended the market for disk drives by offering cheap digital storage for small files. Eventually, small PC hard disk drives became the largest segment of the disk drive marketplace.

Some firms are able to create these technologies and ride the wave to profits; others learn quickly and adapt their business; still others are obliterated because their products, services, and business models become obsolete. They may be very efficient at doing what no longer needs to be done! There are also cases where no firms benefit, and all the gains go to consumers (firms fail to capture any profits). Table 3.1 describes just a few disruptive technologies from the past.

Disruptive technologies are tricky. Firms that invent disruptive technologies as "first movers" do not always benefit if they lack the resources to exploit the technology or fail to see the opportunity. The MITS Altair 8800 is widely regarded as the first PC, but its inventors did not take advantage of their first mover status. Second movers, so-called "fast followers" such as IBM and Microsoft, reaped the rewards. Citibank's ATMs revolutionized retail banking, but they were copied by other banks. Now all banks use ATMs, with the benefits going mostly to the consumers.

Organizational Structure

All organizations have a structure or shape. Mintzberg's classification, described in Table 3.2, identifies five basic kinds of organizational structure (Mintzberg, 1979).

The kind of information systems you find in a business firm—and the nature of problems with these systems—often reflects the type of organizational structure. For instance, in a professional bureaucracy such as a hospital, it is not unusual to find parallel patient record systems operated by the administration, another by doctors, and another by other professional staff such as nurses and social workers. In small entrepreneurial firms, you will often find poorly

TABLE 3.1 DISRUPTIVE TECHNOLOGIES: WINNERS AND LOSERS

TECHNOLOGY	DESCRIPTION	WINNERS AND LOSERS
Microprocessor chips (1971)	Thousands and eventually millions of transistors on a silicon chip	Microprocessor firms win (Intel, Texas Instruments) while transistor firms (GE) decline.
Personal computers (1975)	Small, inexpensive, but fully functional desktop computers	PC manufacturers (HP, Apple, IBM), and chip manufacturers prosper (Intel), while mainframe (IBM) and minicomputer (DEC) firms lose.
Digital photography (1975)	Using CCD (charge-coupled device) image sensor chips to record images	CCD manufacturers and traditional camera companies win, manufacturers of film products lose.
World Wide Web (1989)	A global database of digital files and "pages" instantly available	Owners of online content, news benefit while traditional publishers (newspapers, magazines, and broadcast television) lose.
Internet music, video, TV services (1998)	Repositories of downloadable music, video, TV broadcasts on the Web	Owners of Internet platforms, telecommunications providers owning Internet backbone (ATT, Verizon), local Internet service providers win, while content owners and physical retailers lose (Tower Records, Blockbuster).
PageRank algorithm	A method for ranking Web pages in terms of their popularity to supplement Web search by key terms	Google is the winner (they own the patent), while traditional key word search engines (Alta Vista) lose.
Software as Web service	Using the Internet to provide remote access to online software	Online software services companies (Salesforce.com) win, while traditional "boxed" software companies (Microsoft, SAP, Oracle) lose.

designed systems developed in a rush that often quickly outgrow their usefulness. In huge multidivisional firms operating in hundreds of locations, you will often find there is not a single integrating information system, but instead each locale or each division has its set of information systems.

TABLE 3.2 ORGANIZATIONAL STRUCTURES

ORGANIZATIONAL TYPE	DESCRIPTION	EXAMPLES
Entrepreneurial structure	Young, small firm in a fast-changing environment. It has a simple structure and is managed by an entrepreneur serving as its single chief executive officer.	Small start-up business
Machine bureaucracy	Large bureaucracy existing in a slowly changing environment, producing standard products. It is dominated by a centralized management team and centralized decision making.	Midsize manufacturing firm
Divisionalized bureaucracy	Combination of multiple machine bureaucracies, each producing a different product or service, all topped by one central headquarters.	Fortune 500 firms, such as General Motors
Professional bureaucracy	Knowledge-based organization where goods and services depend on the expertise and knowledge of professionals. Dominated by department heads with weak centralized authority.	Law firms, school systems, hospitals
Adhocracy	Task force organization that must respond to rapidly changing environments. Consists of large groups of specialists organized into short-lived multidisciplinary teams and has weak central management.	Consulting firms, such as the Rand Corporation

Other Organizational Features

Organizations have goals and use different means to achieve them. Some organizations have coercive goals (e.g., prisons); others have utilitarian goals (e.g., businesses). Still others have normative goals (universities, religious groups). Organizations also serve different groups or have different constituencies, some primarily benefiting their members, others benefiting clients, stockholders, or the public. The nature of leadership differs greatly from one organization to another—some organizations may be more democratic or authoritarian than others. Another way organizations differ is by the tasks they perform and the technology they use. Some organizations perform primarily routine tasks that can be reduced to formal rules that require little judgment (such as manufacturing auto parts), whereas others (such as consulting firms) work primarily with nonroutine tasks.

3.2 WHAT IS THE IMPACT OF INFORMATION SYSTEMS ON ORGANIZATIONS?

Information systems have become integral, online, interactive tools deeply involved in the minute-to-minute operations and decision making of large organizations. Over the last decade, information systems have fundamentally altered the economics of organizations and greatly increased the possibilities for organizing work. Theories and concepts from economics and sociology help us understand the changes brought about by IT.

ECONOMIC IMPACTS

From the point of view of economics, IT changes both the relative costs of capital and the costs of information. Information systems technology can be viewed as a factor of production that can be substituted for traditional capital and labor. As the cost of information technology decreases, it is substituted for labor, which historically has been a rising cost. Hence, information technology should result in a decline in the number of middle managers and clerical workers as information technology substitutes for their labor.

As the cost of information technology decreases, it also substitutes for other forms of capital such as buildings and machinery, which remain relatively expensive. Hence, over time we should expect managers to increase their investments in IT because of its declining cost relative to other capital investments.

IT also affects the cost and quality of information and changes the economics of information. Information technology helps firms contract in size because it can reduce transaction costs—the costs incurred when a firm buys on the marketplace what it cannot make itself. According to **transaction cost theory**, firms and individuals seek to economize on transaction costs, much as they do on production costs. Using markets is expensive because of costs such as locating and communicating with distant suppliers, monitoring contract compliance, buying insurance, obtaining information on products, and so forth (Coase, 1937; Williamson, 1985). Traditionally, firms have tried to reduce transaction costs through vertical integration, by getting bigger, hiring more employees, and buying their own suppliers and distributors, as both General Motors and Ford used to do.

Information technology, especially the use of networks, can help firms lower the cost of market participation (transaction costs), making it worthwhile for

firms to contract with external suppliers instead of using internal sources. As a result, firms can shrink in size (numbers of employees) because it is far less expensive to outsource work to a competitive marketplace rather than hire employees.

For instance, by using computer links to external suppliers, auto makers such as Chrysler, Toyota, and Honda can achieve economies by obtaining more than 70 percent of their parts from the outside. Information systems make it possible for companies such as Cisco Systems and Dell Inc. to outsource their production to contract manufacturers such as Flextronics instead of making their products themselves.

As transaction costs decrease, firm size (the number of employees) should shrink because it becomes easier and cheaper for the firm to contract for the purchase of goods and services in the marketplace rather than to make the product or offer the service itself. Firm size can stay constant or contract even as the company increases its revenues. For example, when Eastman Chemical Company split off from Kodak in 1994, it had $3.3 billion in revenue and 24,000 full-time employees. In 2013, it generated over $9.3 billion in revenue with only 14,000 employees.

Information technology also can reduce internal management costs. According to **agency theory**, the firm is viewed as a "nexus of contracts" among self-interested individuals rather than as a unified, profit-maximizing entity (Jensen and Meckling, 1976). A principal (owner) employs "agents" (employees) to perform work on his or her behalf. However, agents need constant supervision and management; otherwise, they will tend to pursue their own interests rather than those of the owners. As firms grow in size and scope, agency costs or coordination costs rise because owners must expend more and more effort supervising and managing employees.

Information technology, by reducing the costs of acquiring and analyzing information, permits organizations to reduce agency costs because it becomes easier for managers to oversee a greater number of employees. By reducing overall management costs, information technology enables firms to increase revenues while shrinking the number of middle managers and clerical workers. We have seen examples in earlier chapters where information technology expanded the power and scope of small organizations by enabling them to perform coordinating activities such as processing orders or keeping track of inventory with very few clerks and managers.

Because IT reduces both agency and transaction costs for firms, we should expect firm size to shrink over time as more capital is invested in IT. Firms should have fewer managers, and we expect to see revenue per employee increase over time.

ORGANIZATIONAL AND BEHAVIORAL IMPACTS

Theories based in the sociology of complex organizations also provide some understanding about how and why firms change with the implementation of new IT applications.

IT Flattens Organizations

Large, bureaucratic organizations, which primarily developed before the computer age, are often inefficient, slow to change, and less competitive than newly created organizations. Some of these large organizations have downsized, reducing the number of employees and the number of levels in their organizational hierarchies.

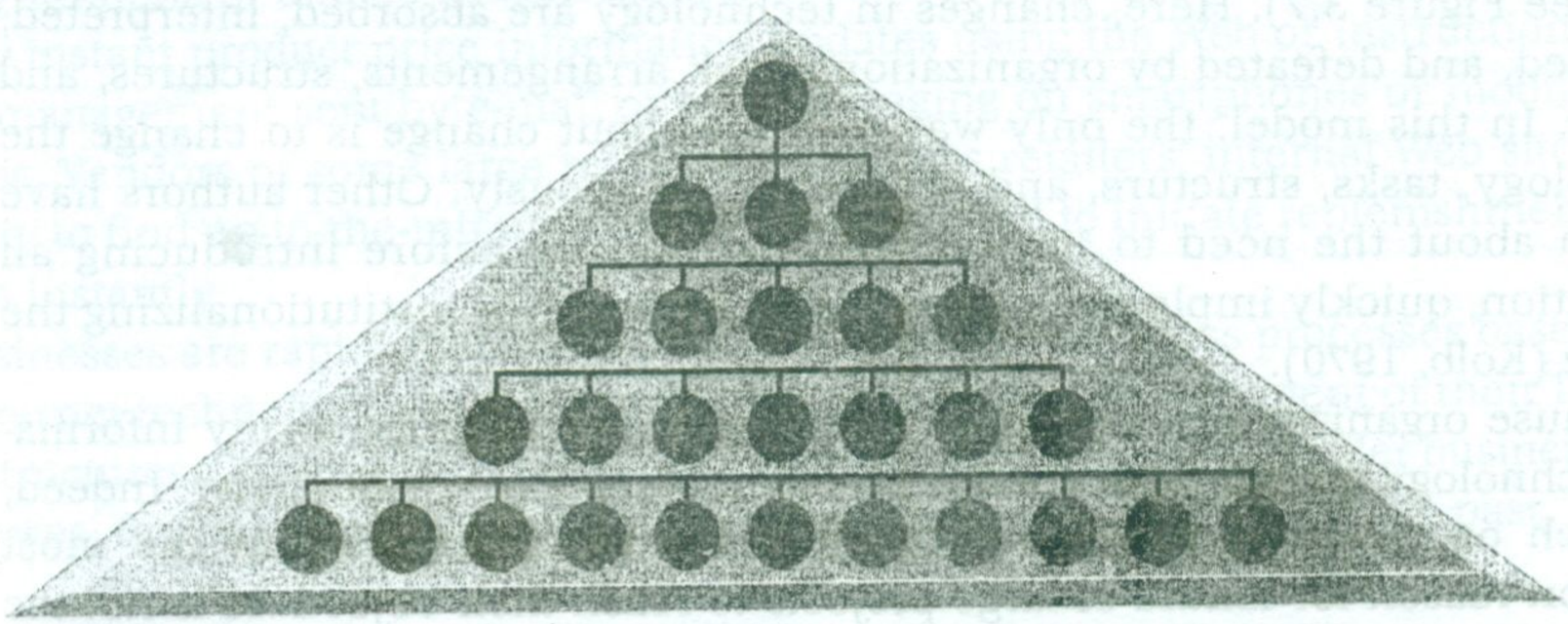
Behavioral researchers have theorized that information technology facilitates flattening of hierarchies by broadening the distribution of information to empower lower-level employees and increase management efficiency (see Figure 3.6). IT pushes decision-making rights lower in the organization because lower-level employees receive the information they need to make decisions without supervision. (This empowerment is also possible because of higher educational levels among the workforce, which give employees the capabilities to make intelligent decisions.) Because managers now receive so much more accurate information on time, they become much faster at making decisions, so fewer managers are required. Management costs decline as a percentage of revenues, and the hierarchy becomes much more efficient.

These changes mean that the management span of control has also been broadened, enabling high-level managers to manage and control more workers spread over greater distances. Many companies have eliminated thousands of middle managers as a result of these changes.

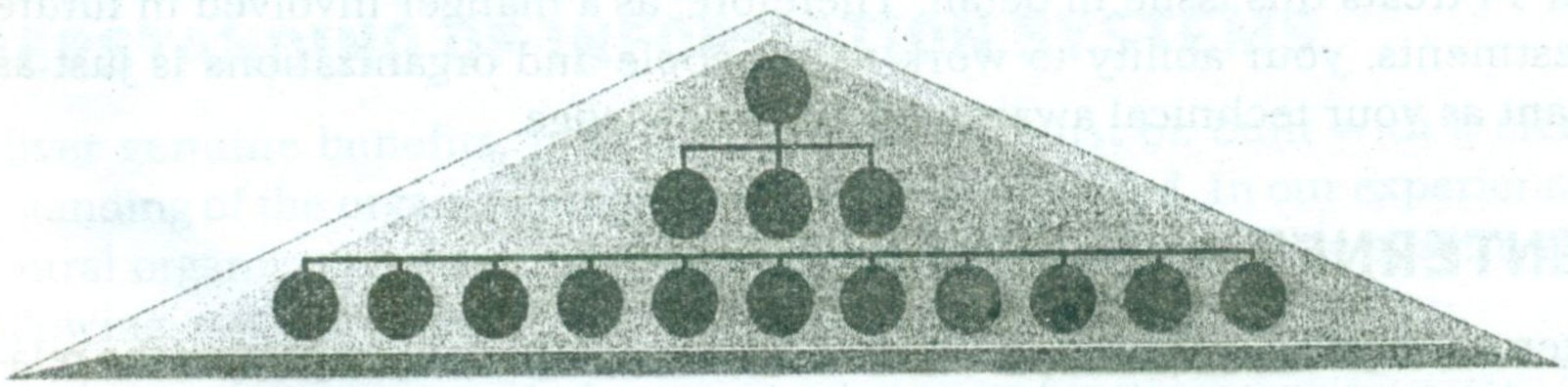
Postindustrial Organizations

Postindustrial theories based more on history and sociology than economics also support the notion that IT should flatten hierarchies. In postindustrial societies, authority increasingly relies on knowledge and competence, and not merely on formal positions. Hence, the shape of organizations flattens because professional workers tend to be self-managing, and decision making should become more decentralized as knowledge and information become more widespread throughout the firm (Drucker, 1988).

FIGURE 3.6 FLATTENING ORGANIZATIONS



A traditional hierarchical organization with many levels of management



An organization that has been "flattened" by removing layers of management

Information systems can reduce the number of levels in an organization by providing managers with information to supervise larger numbers of workers and by giving lower-level employees more decision-making authority.

Information technology may encourage task force-networked organizations in which groups of professionals come together—face to face or electronically—for short periods of time to accomplish a specific task (e.g., designing a new automobile); once the task is accomplished, the individuals join other task forces. The global consulting service Accenture is an example. Many of its 293,000 employees move from location to location to work on projects at client locations in more than 56 different countries.

Who makes sure that self-managed teams do not head off in the wrong direction? Who decides which person works on which team and for how long? How can managers evaluate the performance of someone who is constantly rotating from team to team? How do people know where their careers are headed? New approaches for evaluating, organizing, and informing workers are required, and not all companies can make virtual work effective.

Understanding Organizational Resistance to Change

Information systems inevitably become bound up in organizational politics because they influence access to a key resource—namely, information. Information systems can affect who does what to whom, when, where, and how in an organization. Many new information systems require changes in personal, individual routines that can be painful for those involved and require retraining and additional effort that may or may not be compensated. Because information systems potentially change an organization's structure, culture, business processes, and strategy, there is often considerable resistance to them when they are introduced.

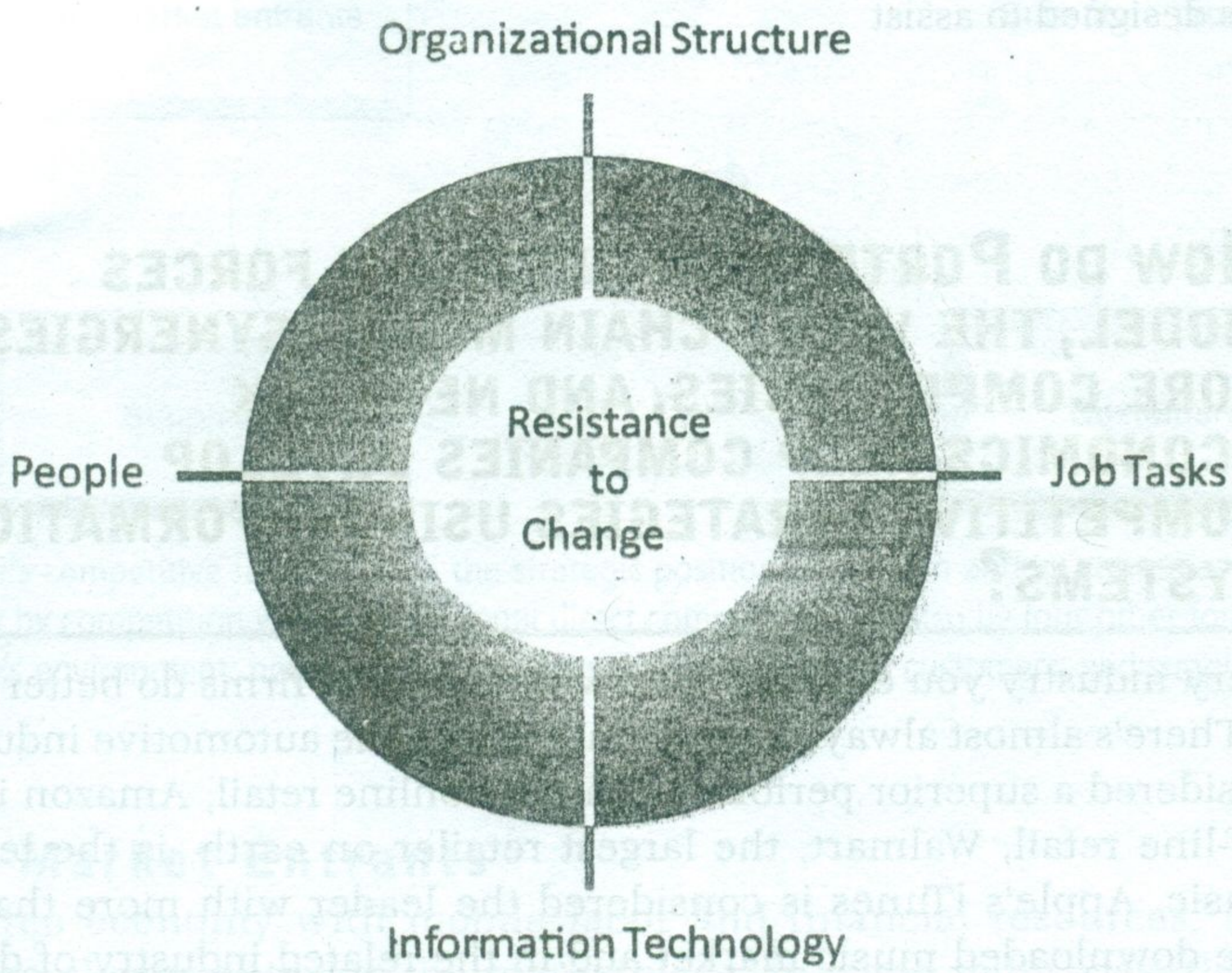
There are several ways to visualize organizational resistance. Research on organizational resistance to innovation suggests that four factors are paramount: the nature of the IT innovation, the organization's structure, the culture of people in the organization, and the tasks impacted by the innovation (see Figure 3.7). Here, changes in technology are absorbed, interpreted, deflected, and defeated by organizational task arrangements, structures, and people. In this model, the only way to bring about change is to change the technology, tasks, structure, and people simultaneously. Other authors have spoken about the need to "unfreeze" organizations before introducing an innovation, quickly implementing it, and "refreezing" or institutionalizing the change (Kolb, 1970).

Because organizational resistance to change is so powerful, many information technology investments flounder and do not increase productivity. Indeed, research on project implementation failures demonstrates that the most common reason for failure of large projects to reach their objectives is not the failure of the technology, but organizational and political resistance to change. Chapter 14 treats this issue in detail. Therefore, as a manger involved in future IT investments, your ability to work with people and organizations is just as important as your technical awareness and knowledge.

THE INTERNET AND ORGANIZATIONS

The Internet, especially the World Wide Web, has an important impact on the relationships between many firms and external entities, and even on the organization of business processes inside a firm. The Internet increases the accessibility, storage, and distribution of information and knowledge for organizations. In essence, the Internet is capable of dramatically lowering the transaction and agency costs facing most organizations. For instance, brokerage firms and banks

FIGURE 3.7 ORGANIZATIONAL RESISTANCE TO INFORMATION SYSTEM INNOVATIONS



Implementing information systems has consequences for task arrangements, structures, and people. According to this model, to implement change, all four components must be changed simultaneously.

in New York can now deliver their internal operating procedures manuals to their employees at distant locations by posting them on the corporate Web site, saving millions of dollars in distribution costs. A global sales force can receive nearly instant product price information updates using the Web or instructions from management sent by e-mail or text messaging on smartphones or mobile laptops. Vendors of some large retailers can access retailers' internal Web sites directly to find up-to-the-minute sales information and to initiate replenishment orders instantly.

Businesses are rapidly rebuilding some of their key business processes based on Internet technology and making this technology a key component of their IT infrastructures. If prior networking is any guide, one result will be simpler business processes, fewer employees, and much flatter organizations than in the past.

IMPLICATIONS FOR THE DESIGN AND UNDERSTANDING OF INFORMATION SYSTEMS

To deliver genuine benefits, information systems must be built with a clear understanding of the organization in which they will be used. In our experience, the central organizational factors to consider when planning a new system are the following:

- The environment in which the organization must function
- The structure of the organization: hierarchy, specialization, routines, and business processes
- The organization's culture and politics
- The type of organization and its style of leadership

- The principal interest groups affected by the system and the attitudes of workers who will be using the system
- The kinds of tasks, decisions, and business processes that the information system is designed to assist

3.3 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?

In almost every industry you examine, you will find some firms do better than most others. There's almost always a stand-out firm. In the automotive industry, Toyota is considered a superior performer. In pure online retail, Amazon is the leader; in off-line retail, Walmart, the largest retailer on earth, is the leader. In online music, Apple's iTunes is considered the leader with more than 60 percent of the downloaded music market and in the related industry of digital music players, the iPod is the leader. In Web search, Google is considered the leader.

Firms that "do better" than others are said to have a competitive advantage over others: They either have access to special resources that others do not, or they are able to use commonly available resources more efficiently—usually because of superior knowledge and information assets. In any event, they do better in terms of revenue growth, profitability, or productivity growth (efficiency), all of which ultimately in the long run translate into higher stock market valuations than their competitors.

But why do some firms do better than others and how do they achieve competitive advantage? How can you analyze a business and identify its strategic advantages? How can you develop a strategic advantage for your own business? And how do information systems contribute to strategic advantages? One answer to that question is Michael Porter's competitive forces model.

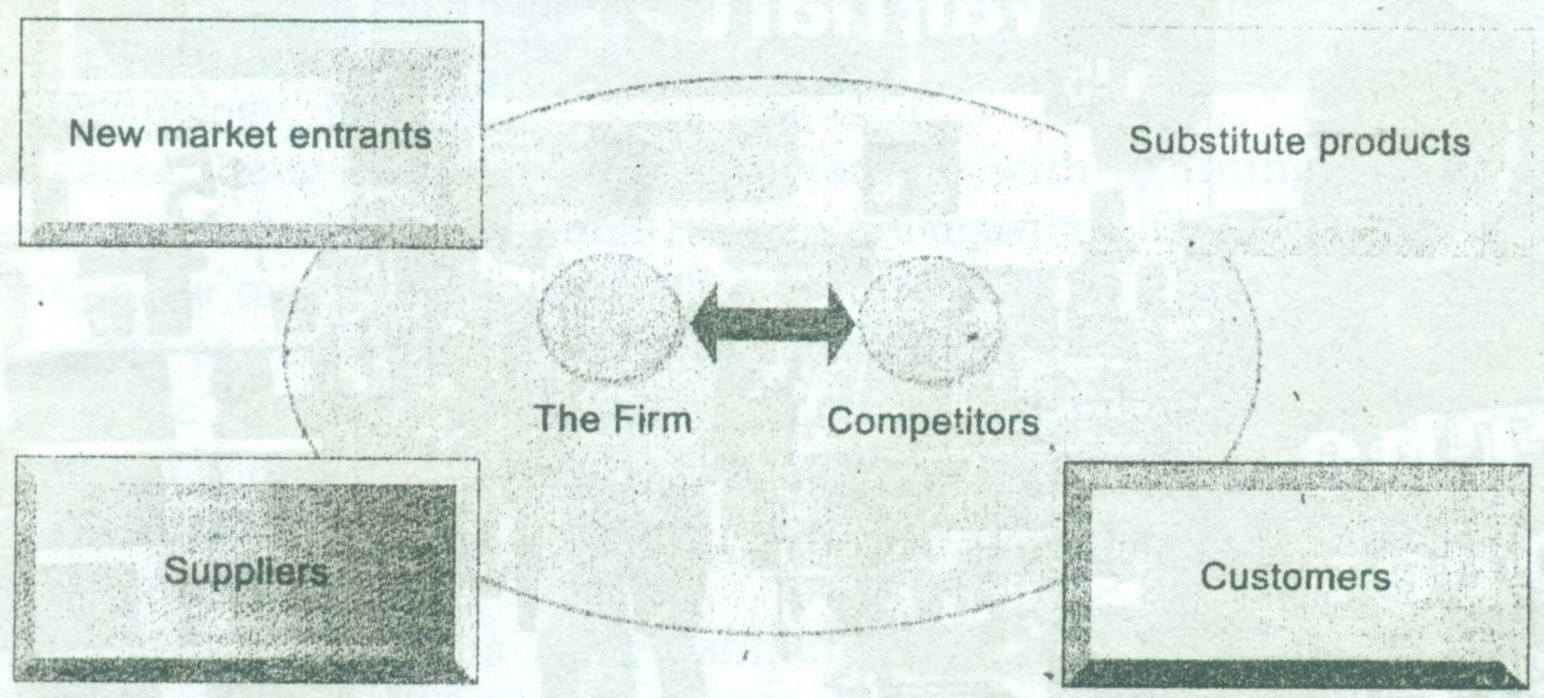
PORTER'S COMPETITIVE FORCES MODEL

Arguably, the most widely used model for understanding competitive advantage is Michael Porter's **competitive forces model** (see Figure 3.8). This model provides a general view of the firm, its competitors, and the firm's environment. Earlier in this chapter, we described the importance of a firm's environment and the dependence of firms on environments. Porter's model is all about the firm's general business environment. In this model, five competitive forces shape the fate of the firm.

Traditional Competitors

All firms share market space with other competitors who are continuously devising new, more efficient ways to produce by introducing new products and services, and attempting to attract customers by developing their brands and imposing switching costs on their customers.

FIGURE 3.8 **PORTER'S COMPETITIVE FORCES MODEL**



In Porter's competitive forces model, the strategic position of the firm and its strategies are determined not only by competition with its traditional direct competitors but also by four other forces in the industry's environment: new market entrants, substitute products, customers, and suppliers.

New Market Entrants

In a free economy with mobile labor and financial resources, new companies are always entering the marketplace. In some industries, there are very low barriers to entry, whereas in other industries, entry is very difficult. For instance, it is fairly easy to start a pizza business or just about any small retail business, but it is much more expensive and difficult to enter the computer chip business, which has very high capital costs and requires significant expertise and knowledge that is hard to obtain. New companies have several possible advantages: They are not locked into old plants and equipment, they often hire younger workers who are less expensive and perhaps more innovative, they are not encumbered by old worn-out brand names, and they are "more hungry" (more highly motivated) than traditional occupants of an industry. These advantages are also their weakness: They depend on outside financing for new plants and equipment, which can be expensive; they have a less-experienced workforce; and they have little brand recognition.

Substitute Products and Services

In just about every industry, there are substitutes that your customers might use if your prices become too high. New technologies create new substitutes all the time. Ethanol can substitute for gasoline in cars; vegetable oil for diesel fuel in trucks; and wind, solar, coal, and hydro power for industrial electricity generation. Likewise, Internet and wireless telephone service can substitute for traditional telephone service. And, of course, an Internet music service that allows you to download music tracks to an iPod or smartphone has become a substitute for CD-based music stores. The more substitute products and services in your industry, the less you can control pricing and the lower your profit margins.

Customers

A profitable company depends in large measure on its ability to attract and retain customers (while denying them to competitors), and charge high prices. The power of customers grows if they can easily switch to a competitor's products and services, or if they can force a business and its competitors to compete on price alone in a transparent marketplace where there is little **product differentiation**,



Supermarkets and large retail stores such as Walmart use sales data captured at the checkout counter to determine which items have sold and need to be reordered. Walmart's continuous replenishment system transmits orders to restock directly to its suppliers. The system enables Walmart to keep costs low while fine-tuning its merchandise to meet customer demands.

© Betty LaRue/Alamy

and all prices are known instantly (such as on the Internet). For instance, in the used college textbook market on the Internet, students (customers) can find multiple suppliers of just about any current college textbook. In this case, online customers have extraordinary power over used-book firms.

Suppliers

The market power of suppliers can have a significant impact on firm profits, especially when the firm cannot raise prices as fast as can suppliers. The more different suppliers a firm has, the greater control it can exercise over suppliers in terms of price, quality, and delivery schedules. For instance, manufacturers of laptop PCs almost always have multiple competing suppliers of key components, such as keyboards, hard drives, and display screens.

INFORMATION SYSTEM STRATEGIES FOR DEALING WITH COMPETITIVE FORCES

What is a firm to do when it is faced with all these competitive forces? And how can the firm use information systems to counteract some of these forces? How do you prevent substitutes and inhibit new market entrants? There are four generic strategies, each of which often is enabled by using information technology and systems: low-cost leadership, product differentiation, focus on market niche, and strengthening customer and supplier intimacy.

Low-Cost Leadership

Use information systems to achieve the lowest operational costs and the lowest prices. The classic example is Walmart. By keeping prices low and shelves well stocked using a legendary inventory replenishment system, Walmart became the leading retail business in the United States. Walmart's continuous replenishment system sends orders for new merchandise directly to suppliers as soon as consumers pay for their purchases at the cash register. Point-of-sale terminals record the bar code of each item passing the checkout counter and send a

purchase transaction directly to a central computer at Walmart headquarters. The computer collects the orders from all Walmart stores and transmits them to suppliers. Suppliers can also access Walmart's sales and inventory data using Web technology.

Because the system replenishes inventory with lightning speed, Walmart does not need to spend much money on maintaining large inventories of goods in its own warehouses. The system also enables Walmart to adjust purchases of store items to meet customer demands. Competitors, such as Sears, have been spending 24.9 percent of sales on overhead. But by using systems to keep operating costs low, Walmart pays only 16.6 percent of sales revenue for overhead. (Operating costs average 20.7 percent of sales in the retail industry.)

Walmart's continuous replenishment system is also an example of an **efficient customer response system**. An efficient customer response system directly links consumer behavior to distribution and production and supply chains. Walmart's continuous replenishment system provides such an efficient customer response.

Product Differentiation

Use information systems to enable new products and services, or greatly change the customer convenience in using your existing products and services. For instance, Google continuously introduces new and unique search services on its Web site, such as Google Maps. By purchasing PayPal, an electronic payment system, in 2003, eBay made it much easier for customers to pay sellers and expanded use of its auction marketplace. Apple created the iPod, a unique portable digital music player, plus a unique online Web music service where songs can be purchased for $.69 to $1.29 each. Apple has continued to innovate with its multimedia iPhone, iPad tablet computer, and iPod video player.

Manufacturers and retailers are using information systems to create products and services that are customized and personalized to fit the precise specifications of individual customers. For example, Nike sells customized sneakers through its NIKEiD program on its Web site. Customers are able to select the type of shoe, colors, material, outsoles, and even a logo of up to eight characters. Nike transmits the orders via computers to specially equipped plants in China and Korea. The sneakers take about three weeks to reach the customer. This ability to offer individually tailored products or services using the same production resources as mass production is called **mass customization**.

In addition to all of the usual bells and whistles, automakers are using technology in other ways to distinguish their products. The Interactive Session on Technology describes some many of the new technology-based products and services offered by car companies.

Table 3.3 lists a number of companies that have developed IT-based products and services that other firms have found difficult to copy, or at least a long time to copy.

Focus on Market Niche

Use information systems to enable a specific market focus, and serve this narrow target market better than competitors. Information systems support this strategy by producing and analyzing data for finely tuned sales and marketing techniques. Information systems enable companies to analyze customer buying patterns, tastes, and preferences closely so that they efficiently pitch advertising and marketing campaigns to smaller and smaller target markets.

INTERACTIVE SESSION: TECHNOLOGY

AUTOMAKERS BECOME SOFTWARE COMPANIES

As the smartphone market continues to expand, another industry has begun getting "smarter" with software and apps: the automobile industry. Ford, BMW, and other automobile companies are enhancing their vehicles with on-board software that improves the customer experience, and the auto industry is working on technology that will allow cars to be managed via the cloud.

Automakers are finding that software is a way of adding more "value" and freshness to their products without having to invest so heavily in new vehicle production. It takes Ford Motor Company, for example, about two and a half years to plan, design, and build a new car. Design and production, including metal stamping equipment and assembly line setup, must be finalized long before the car rolls off the line. But the auto makers can create a new software interface for a car within months and update it again and again over the life of the car without much lead time. This enables Ford and other auto makers to significantly improve the driving experience and add new features to cars years after they are built.

Ford is perhaps the automaker doing the most to innovate with software and apps. Its MyFord Touch interface is an in-dash touchscreen available for select vehicles with controls for navigation, music, phone integration, and temperature. Ford has upgraded this interface and the Sync software behind the interface, adding tablet and smartphone integration and better voice response. In 2010 Ford added support for the online music streaming service Pandora, which is very popular among young potential buyers. This update enables drivers to connect their tablets and smartphones to the Sync system to access music and other apps using voice commands.

Chairman Bill Ford Jr. has championed the use of software to alleviate urban congestion by investing in technology that responds to the problems created by traffic in the biggest cities. Theoretically, technology might help cars to avoid traffic jams, reserve parking spaces in advance, and even drive themselves.

To manage vehicles in this way, cars need to be connected to some kind of central system that would coordinate with public transit and other transportation methods, and to do this, cars need to be equipped with software that can monitor and enhance vehicle function at the most basic levels. The eventual system would require that cars feed increasing amounts of information to systems whose purpose would be to minimize highway congestion. The system would also require an industry standard, which does not exist as of yet. Ford has doubled its investment in vehicle-to-vehicle communication technologies and BMW is also continuing to develop ways for vehicles to communicate with one another on the road to avoid collisions.

With the inclusion of software in their cars, automakers are entering uncharted territory. They must now devote resources to updating and testing their software, as well as establishing ways to provide the updated software to their customers. Car companies need to coordinate their car development cycles more closely with their software development cycles. Also, many of the technologies included in automobile software packages raise the same privacy concerns surrounding location tracking that have often plagued smartphone manufacturers and app developers.

Ford is grappling with the best way to roll out software upgrades to its customers. The company has been mailing USB sticks to 250,000 customers whose cars have an advanced touchscreen control panel running the MyFord Touch interface. The stick contains a software upgrade that will improve navigation controls, the music and phone features, as well as the ability to control car temperature. The upgrade also contains code that will upgrade system speed and improve the interface based on common criticisms from Ford owners.

Although Ford says it plans to continue issuing software upgrades this way, the company hopes that customers will get into the habit of checking the Ford Web site for software upgrades on their own. Though most car owners are used to the technology in their cars remaining constant throughout the life of the car, newer cars are poised to change all of that.

Ford has hired "human-machine interface engineers," whose job is to analyze how their customers interact with the software in their cars. Often, these engineers use customer feedback to make changes to the software. Customers complained that too much information was available on each screen of the interface, so Ford moved the most commonly used features to more prominent positions on screen and increased their font size, relegating the rest to submenus. Feedback has been positive. Ford has also asked dealers to dedicate more time and personnel to

hands-on technology training to help customers master its interface.

GM, Daimler, and other companies are all developing new features for their cars that operate online in the cloud. Users will be able to remotely track their cars (you'll never forget where you parked again) and diagnose problems with the car, such as low tire pressure or the need for an oil change. Corporations will be able to track employee use of company cars by interpreting car sensors and engine readouts. Manufacturers will be able to aggregate and analyze the data from customers' cars to identify quality problems and, if necessary, quickly issue recalls. Just as with apps, the possibilities are limited only by the imagination of automakers.

GM will allow its app developers to access its computer systems to improve app function, which raises a familiar set of privacy concerns. Auto analysts believe that automakers will make mistakes as they learn how to properly handle sensitive customer data and to provide robust privacy options. On the other hand, automakers are hoping that younger customers who have grown up using Facebook are less likely to care about privacy and features that collect highly targeted information about a car's location and driving habits.

BMW is also investing a whopping $100 million in mobile apps, hoping to market them to their customers as "premium services." Some analysts are skeptical of the decision to invest that much money, but BMW believes that mobile apps will become an increasingly attractive selling point for customers of its BMWi electric and hybrid cars. Although the future of cars sharing information with other nearby cars is still years away, automakers are excited by the possibilities afforded by smart software and apps.

Sources: Jaclyn Trop, "Tired of Silicon Valley? Try Motor City," *New York Times*, July 1, 2013; Ian Scherr and Mike Ramsey, "Drive into the Future," *Wall Street Journal*, March 11, 2013; Michelle Maisto, "Ford, Google, Facebook Team Up to Reconsider Mobility," *eWeek*, March 28, 2013; Ian Sherr, "Cars Pump Up IQ To Get Edge," *Wall Street Journal*, January 13, 2012; Chris Murphy, "4 Ways Ford Is Exploring Next-Gen Car Tech," *Information Week*, July 27, 2012; Mike Ramsey, "Avoiding Gridlock with Smart Autos," *Wall Street Journal*, February 27, 2012.

CASE STUDY QUESTIONS

1. How is software adding value to automakers' products?
2. How are the automakers benefiting from software-enhanced cars? How are customers benefiting?
3. What value chain activities are involved in enhancing cars with software?
4. How much of a competitive advantage is software providing for automakers? Explain your answer..

The data come from a range of sources—credit card transactions, demographic data, purchase data from checkout counter scanners at supermarkets and retail stores, and data collected when people access and interact with Web sites. Sophisticated software tools find patterns in these large pools of data and

TABLE 3.3 IT-ENABLED NEW PRODUCTS AND SERVICES PROVIDING COMPETITIVE ADVANTAGE

Amazon: One-click shopping	Amazon holds a patent on one-click shopping that it licenses to other online retailers.
Online music: Apple iPod and iTunes	The iPod is an integrated handheld player backed up with an online library of over 13 million songs.
Golf club customization: Ping	Customers can select from more than 1 million different golf club options; a build-to-order system ships their customized clubs within 48 hours.
Online person-to-person payment: PayPal	PayPal enables the transfer of money between individual bank accounts and between bank accounts and credit card accounts.

infer rules from them to guide decision making. Analysis of such data drives one-to-one marketing that creates personal messages based on individualized preferences. For example, Hilton Hotels' OnQ system analyzes detailed data collected on active guests in all of its properties to determine the preferences of each guest and each guest's profitability. Hilton uses this information to give its most profitable customers additional privileges, such as late checkouts. Contemporary customer relationship management (CRM) systems feature analytical capabilities for this type of intensive data analysis (see Chapters 2 and 9). The Interactive Session on Organizations provides more examples of how companies are benefiting from this fine-grained data analysis.

Credit card companies are able to use this strategy to predict their most profitable cardholders. The companies gather vast quantities of data about consumer purchases and other behaviors and mine these data to construct detailed profiles that identify cardholders who might be good or bad credit risks. We discuss the tools and technologies for data analysis in Chapters 6 and 12.

Strengthen Customer and Supplier Intimacy

Use information systems to tighten linkages with suppliers and develop intimacy with customers. Chrysler Corporation uses information systems to facilitate direct access by suppliers to production schedules, and even permits suppliers to decide how and when to ship supplies to Chrysler factories. This allows suppliers more lead time in producing goods. On the customer side, Amazon keeps track of user preferences for book and CD purchases, and can recommend titles purchased by others to its customers. Strong linkages to customers and suppliers increase **switching costs** (the cost of switching from one product to a competing product), and loyalty to your firm.

Table 3.4 summarizes the competitive strategies we have just described. Some companies focus on one of these strategies, but you will often see companies pursuing several of them simultaneously. For example, Starbucks, the world's largest specialty coffee retailer, offers unique high-end specialty coffees and beverages, but is also trying to compete by lowering costs.

THE INTERNET'S IMPACT ON COMPETITIVE ADVANTAGE

Because of the Internet, the traditional competitive forces are still at work, but competitive rivalry has become much more intense (Porter, 2001). Internet

TABLE 3.4 FOUR BASIC COMPETITIVE STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
Low-cost leadership	Use information systems to produce products and services at a lower price than competitors while enhancing quality and level of service	Walmart
Product differentiation	Use information systems to differentiate products, and enable new services and products	Google, eBay, Apple, Lands' End
Focus on market niche	Use information systems to enable a focused strategy on a single market niche; specialize	Hilton Hotels, Harrah's
Customer and supplier intimacy	Use information systems to develop strong ties and loyalty with customers and suppliers	Chrysler Corporation, Amazon

INTERACTIVE SESSION: ORGANIZATIONS

IDENTIFYING MARKET NICHES IN THE AGE OF BIG DATA

With the amount of data available to companies doubling every year, new sources of data, and innovations in data collection, possibilities for marketers to identify market niches and finely tune campaigns are boundless. In the e-book market, for example, three reading subscription service startups—Scribd, Oyster, and Entitle—aim to turn a profit by discovering exactly what makes readers tick.

A flat monthly fee gives users unlimited access to a broad selection of titles from these companies' digital libraries. Like Barnes and Noble and Amazon, the newcomers will collect an assortment of data from their customers' digital reading devices (e-readers, tablets, smartphones), including whether a book is completed, if pages are skimmed or skipped, and which genres are most often finished. These subscription services intend to disseminate what they have learned. The idea is that writers can use it to better tailor their work to their readership, and book editors can use it to choose which manuscripts to publish.

When customers sign up with these services, they are informed that some of their data will be collected and used but assured that their identities will be protected. Large independent publisher Smashwords is enthusiastic about the value of such data to the authors who use its platform to self-publish and distribute their work. Many contemporary authors have already explored the feedback opportunities available through their own Web sites, social networking sites, and Goodreads, a user-populated database of books, annotations, and reviews now owned by Amazon. The subscription services will take this type of market research to a more quantifiable level.

Preliminary data analysis has already revealed that as the length of a mystery novel increases so does the likelihood that a reader will skip to the end to discover the resolution. Business books are less likely to be finished than biographies, most readers complete just a single chapter of a yoga book, and some of the quickest reading is recorded for romance novels, with erotica leading the pack. Shorter chapters entice readers on e-readers, tablets, and smartphones to finish a book 25 percent more often than books with long chapters.

But does book completion translate to book sales? And how will this knowledge impact the creative process? Will quality be negatively impacted to satisfy reader preferences? Before any of these questions can be answered, authors will need access to comprehensive data. And that depends on the large publishing houses signing deals with the subscription services. After nearly two decades of market disruptions spearheaded by Amazon, publishers are not flocking to supply titles. So far, only Harper Collins has signed with Oyster and Scribd, while Random House, Penguin, and Simon & Schuster remain on the sidelines.

In the airline industry, nearly all carriers collect passenger data, but some are aggressively pursuing data mining to personalize the flying experience. Previously unlinked data sets can now be consolidated to build comprehensive customer profiles. Cabin crews equipped with tablets or smartphones can identify the top five customers on the plane, passengers with special diets or allergies, seat preferences, newlyweds embarking on their honeymoon, and customers whose luggage was misplaced or who experienced flight delays on their previous flights. In-flight browsing history and Facebook likes are even used to fashion relevant marketing pitches.

This "captive audience" aspect of air travel in conjunction with the sheer volume of information airlines collect presents a unique opportunity to marketers. Allegiant Travel company has already been able to sell show tickets, car rentals, and helicopter tours to Las Vegas travelers. United Airlines' revamp of its Web site, kiosks, and mobile app, along with its data integration initiative, have enabled it to target flyers predisposed to upgrading to an economy plus seat.

Not all customers are pleased. A user on Delta's FlyerTalk forum complained that a link from the new DL.com Web site led to a personal profile that included a lot more than her miles accumulated and home airport. Annual income, home value, and the age ranges of her children were included along with expected data such as amount spent on airfare, hotel preference, and type of credit card. The resulting negative publicity prompted Delta to apologize, but it defended its use of demographic data and data not covered under its privacy policy. Credit-card partner American Express had supplied some data, as allowed under the policy. Global information services group Experian supplied the rest, unbeknownst to consumers.

These data-driven marketing approaches are not flawless. Even customers who accept the inevitability

of profiling are miffed when they receive unsuitable offers based on faulty personal information. A Qantas survey of frequent fliers found that most customers want a line drawn between data collection to facilitate useful offers and data collection that is too intrusive. British Airways crossed the line with its "Know Me" program. Google Image searches were used to identify VIP customers as they entered the airport and first class lounge. The practice has since been discontinued. Customers can opt out of British Airways personalization services—but not its data collection. Upon request, a note is added to the customer profile, which nonetheless continues to grow. None of the carriers currently allow customers to opt out of their data programs.

As car companies explore their Big Data opportunities, customer privacy will become an issue for them as well. Ford Motor Company began exploring how integrating databases and using complex algorithms could lead to increased sales three years ago when it developed a program for its dealerships to more closely match car lot inventory to buyer demand. Using buying trends, local and national vehicle supply, and current car lot inventory, Ford devised a program to make purchasing recommendations to dealers. Not only did vehicle turnover rate improve, but net price—the price a consumer pays minus the manufacturer subsidy—rose, fueling an upturn in Ford's profits.

But Ford is thinking even bigger. Performance monitoring using vehicle Internet connections to collect fuel economy, mechanical failure, and other safety and performance metrics could soon be used to improve product engineering. What's more, onboard connections can be used to message drivers about potential breakdown issues, perhaps heading off an expensive recall. Since Ford estimates that by 2016, up to a third of all its consumer communication will occur inside vehicles, possibilities abound. Leased vehicle usage data could inform end-of-lease marketing pitches; driving pattern, schedule, and driving maneuver data could suggest routes most compatible to a driver's habits; car location data could be sent to traffic management systems to control stop lights; data from networked cars could alert other drivers to hazardous conditions and traffic jams, and current car value and payment data can advise drivers of their optimal trade-in date.

It's not hard to foresee the privacy issues that could come into play as drivers realize that not only their location, but their every movement inside their vehicle is being tracked. There are implications for law enforcement—traffic tickets and accident blame attribution. Balancing privacy dilemmas with convenience, security, and expediency of transactions will be the challenge going forward for all companies as they explore emerging big data analysis capabilities.

Sources: Tim Winship, "Big Brother Unmasked as ... Delta Air Lines," smartertravel.com, January 28, 2013; Jack Nicas, "When Is Your Birthday? The Flight Attendant Knows," *Wall Street Journal*, November 7, 2013 and "How Airlines Mine Personal Data In-Flight," *Wall Street Journal*, November 8, 2013; David Streitfeld, "As New Services Track Habits, the E-Books Are Reading You," *New York Times*, December 24, 2013; Ian Sherr and Mike Ramsey, "Drive into the Future," *Wall Street Journal*, March 7, 2013.

CASE STUDY QUESTIONS

1. Describe the kinds of data being analyzed by the companies in this case.
2. How is this fine-grained data analysis improving operations and decision making in the companies described in this case? What business strategies are being supported?
3. Are there any disadvantages to mining customer data? Explain your answer.
4. How do you feel about airlines mining your in-flight data? Is this any different from companies mining your credit card purchases or Web surfing?

technology is based on universal standards that any company can use, making it easy for rivals to compete on price alone and for new competitors to enter the market. Because information is available to everyone, the Internet raises the bargaining power of customers, who can quickly find the lowest-cost provider on the Web. Profits have been dampened. Table 3.5 summarizes some of the potentially negative impacts of the Internet on business firms identified by Porter.

TABLE 3.5 IMPACT OF THE INTERNET ON COMPETITIVE FORCES AND INDUSTRY STRUCTURE

COMPETITIVE FORCE	IMPACT OF THE INTERNET
Substitute products or services	Enables new substitutes to emerge with new approaches to meeting needs and performing functions
Customers' bargaining power	Availability of global price and product information shifts bargaining power to customers
Suppliers' bargaining power	Procurement over the Internet tends to raise bargaining power over suppliers; suppliers can also benefit from reduced barriers to entry and from the elimination of distributors and other intermediaries standing between them and their users
Threat of new entrants	Internet reduces barriers to entry, such as the need for a sales force, access to channels, and physical assets; it provides a technology for driving business processes that makes other things easier to do
Positioning and rivalry among existing competitors	Widens the geographic market, increasing the number of competitors, and reducing differences among competitors; makes it more difficult to sustain operational advantages; puts pressure to compete on price

The Internet has nearly destroyed some industries and has severely threatened more. For instance, the printed encyclopedia industry and the travel agency industry have been nearly decimated by the availability of substitutes over the Internet. Likewise, the Internet has had a significant impact on the retail, music, book, retail brokerage, software, telecommunications, and newspaper industries.

However, the Internet has also created entirely new markets, formed the basis for thousands of new products, services, and business models, and provided new opportunities for building brands with very large and loyal customer bases. Amazon, eBay, iTunes, YouTube, Facebook, Travelocity, and Google are examples. In this sense, the Internet is "transforming" entire industries, forcing firms to change how they do business.

For most forms of media, the Internet has posed a threat to business models and profitability. Growth in book sales other than textbooks and professional publications has been sluggish, as new forms of entertainment continue to compete for consumers' time. Newspapers and magazines have been hit even harder, as their readerships diminish, their advertisers shrink, and more people get their news for free online. The television and film industries have been forced to deal with pirates who are robbing them of some of their profits, as well as with online services streaming videos and TV shows.

THE BUSINESS VALUE CHAIN MODEL

Although the Porter model is very helpful for identifying competitive forces and suggesting generic strategies, it is not very specific about what exactly to do, and it does not provide a methodology to follow for achieving competitive advantages. If your goal is to achieve operational excellence, where do you start? Here's where the business value chain model is helpful.

The **value chain model** highlights specific activities in the business where competitive strategies can best be applied (Porter, 1985) and where information systems are most likely to have a strategic impact. This model identifies specific, critical leverage points where a firm can use information technology most effectively to enhance its competitive position. The value chain model views the firm as a series or chain of basic activities that add a margin of

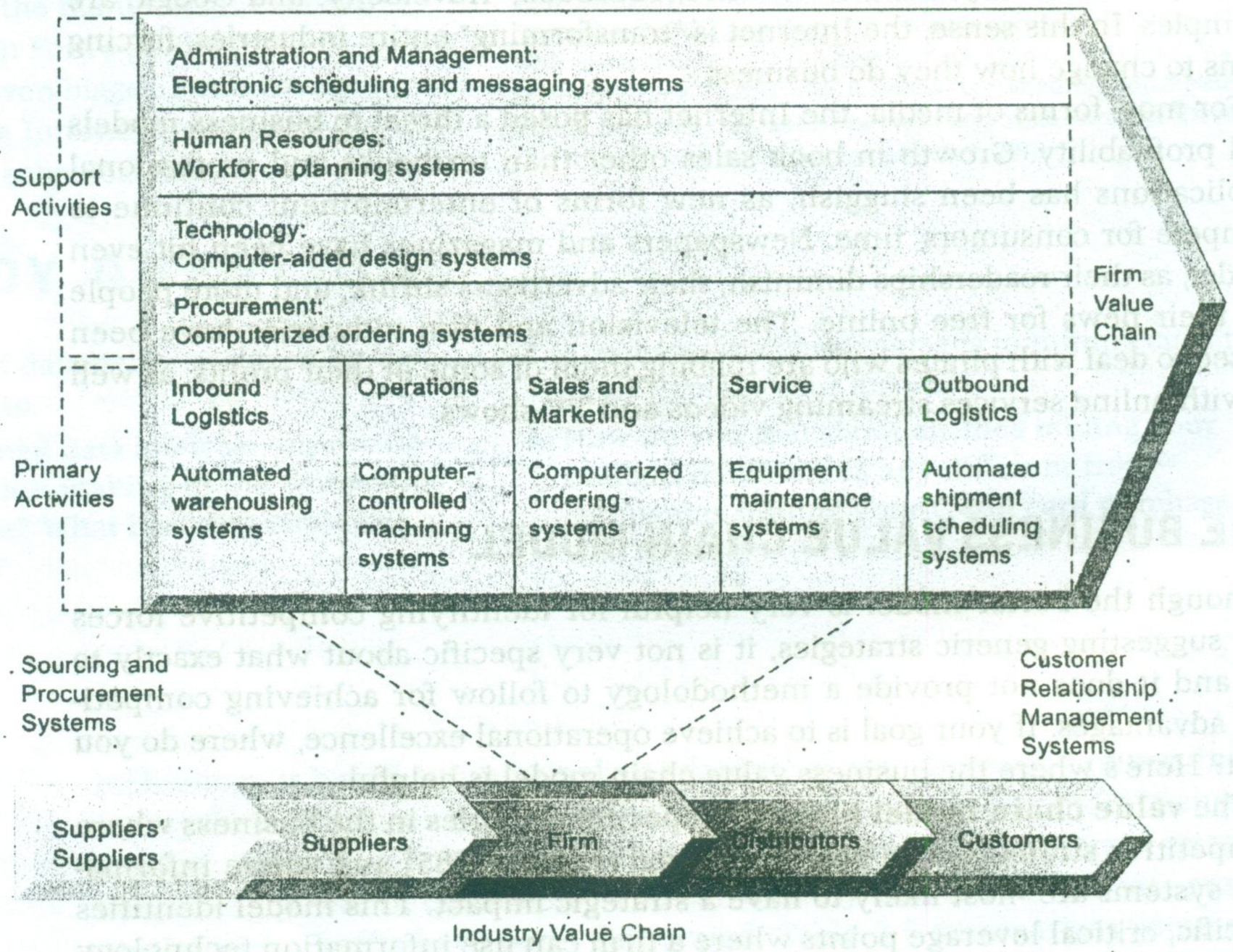
value to a firm's products or services. These activities can be categorized as either primary activities or support activities (see Figure 3.9).

Primary activities are most directly related to the production and distribution of the firm's products and services, which create value for the customer. Primary activities include inbound logistics, operations, outbound logistics, sales and marketing, and service. Inbound logistics includes receiving and storing materials for distribution to production. Operations transforms inputs into finished products. Outbound logistics entails storing and distributing finished products. Sales and marketing includes promoting and selling the firm's products. The service activity includes maintenance and repair of the firm's goods and services.

Support activities make the delivery of the primary activities possible and consist of organization infrastructure (administration and management), human resources (employee recruiting, hiring, and training), technology (improving products and the production process), and procurement (purchasing input).

Now you can ask at each stage of the value chain, "How can we use information systems to improve operational efficiency, and improve customer and supplier intimacy?" This will force you to critically examine how you perform value-adding activities at each stage and how the business processes might be improved. You can also begin to ask how information systems can be used to improve the relationship with customers and with suppliers who lie outside the firm's value chain but belong to the firm's extended value chain where they are

FIGURE 3.9 THE VALUE CHAIN MODEL



This figure provides examples of systems for both primary and support activities of a firm and of its value partners that can add a margin of value to a firm's products or services.

absolutely critical to your success. Here, supply chain management systems that coordinate the flow of resources into your firm, and customer relationship management systems that coordinate your sales and support employees with customers, are two of the most common system applications that result from a business value chain analysis. We discuss these enterprise applications in detail later in Chapter 9.

Using the business value chain model will also cause you to consider benchmarking your business processes against your competitors or others in related industries, and identifying industry best practices. **Benchmarking** involves comparing the efficiency and effectiveness of your business processes against strict standards and then measuring performance against those standards. Industry **best practices** are usually identified by consulting companies, research organizations, government agencies, and industry associations as the most successful solutions or problem-solving methods for consistently and effectively achieving a business objective.

Once you have analyzed the various stages in the value chain at your business, you can come up with candidate applications of information systems. Then, once you have a list of candidate applications, you can decide which to develop first. By making improvements in your own business value chain that your competitors might miss, you can achieve competitive advantage by attaining operational excellence, lowering costs, improving profit margins, and forging a closer relationship with customers and suppliers. If your competitors are making similar improvements, then at least you will not be at a competitive disadvantage—the worst of all cases!

Extending the Value Chain: The Value Web

Figure 3.9 shows that a firm's value chain is linked to the value chains of its suppliers, distributors, and customers. After all, the performance of most firms depends not only on what goes on inside a firm but also on how well the firm coordinates with direct and indirect suppliers, delivery firms (logistics partners, such as FedEx or UPS), and, of course, customers.

How can information systems be used to achieve strategic advantage at the industry level? By working with other firms, industry participants can use information technology to develop industry-wide standards for exchanging information or business transactions electronically, which force all market participants to subscribe to similar standards. Such efforts increase efficiency, making product substitution less likely and perhaps raising entry costs—thus discouraging new entrants. Also, industry members can build industry-wide, IT-supported consortia, symposia, and communications networks to coordinate activities concerning government agencies, foreign competition, and competing industries.

Looking at the industry value chain encourages you to think about how to use information systems to link up more efficiently with your suppliers, strategic partners, and customers. Strategic advantage derives from your ability to relate your value chain to the value chains of other partners in the process. For instance, if you are Amazon.com, you want to build systems that:

- Make it easy for suppliers to display goods and open stores on the Amazon site
- Make it easy for customers to pay for goods
- Develop systems that coordinate the shipment of goods to customers
- Develop shipment tracking systems for customers

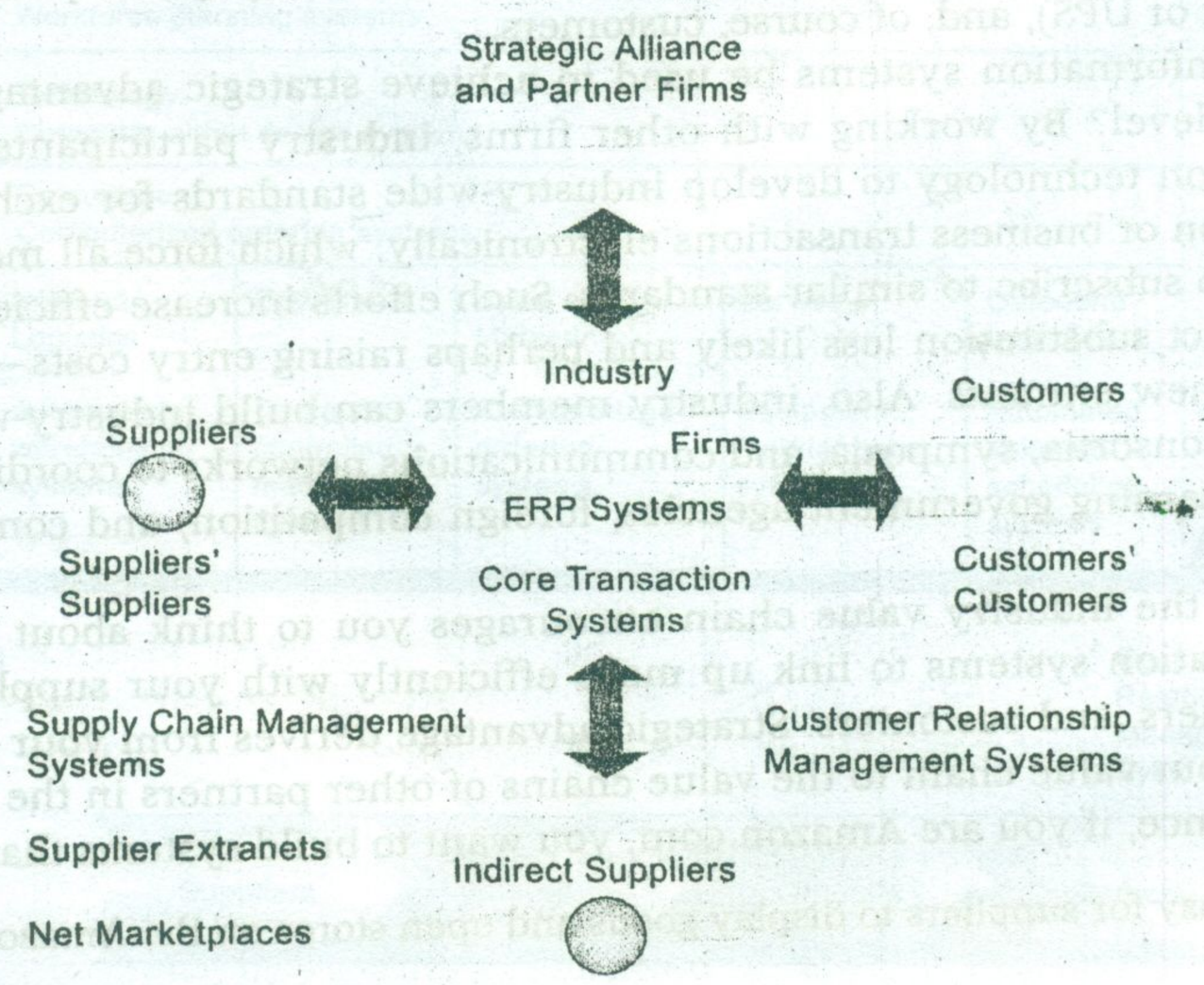
Internet technology has made it possible to create highly synchronized industry value chains called value webs. A **value web** is a collection of independent firms that use information technology to coordinate their value chains to produce a product or service for a market collectively. It is more customer driven and operates in a less linear fashion than the traditional value chain.

Figure 3.10 shows that this value web synchronizes the business processes of customers, suppliers, and trading partners among different companies in an industry or in related industries. These value webs are flexible and adaptive to changes in supply and demand. Relationships can be bundled or unbundled in response to changing market conditions. Firms will accelerate time to market and to customers by optimizing their value web relationships to make quick decisions on who can deliver the required products or services at the right price and location.

SYNERGIES, CORE COMPETENCIES, AND NETWORK-BASED STRATEGIES

A large corporation is typically a collection of businesses. Often, the firm is organized financially as a collection of strategic business units and the returns to the firm are directly tied to the performance of all the strategic business units. Information systems can improve the overall performance of these business units by promoting synergies and core competencies.

FIGURE 3.10 THE VALUE WEB



The value web is a networked system that can synchronize the value chains of business partners within an industry to respond rapidly to changes in supply and demand.

Synergies

The idea of synergies is that when the output of some units can be used as inputs to other units, or two organizations pool markets and expertise, these relationships lower costs and generate profits. Recent bank and financial firm mergers, such as the merger of JPMorgan Chase and Bank of New York as well as Bank of America and Countrywide Financial Corporation occurred precisely for this purpose.

One use of information technology in these synergy situations is to tie together the operations of disparate business units so that they can act as a whole. For example, acquiring Countrywide Financial enabled Bank of America to extend its mortgage lending business and to tap into a large pool of new customers who might be interested in its credit card, consumer banking, and other financial products. Information systems would help the merged companies consolidate operations, lower retailing costs, and increase cross-marketing of financial products.

Enhancing Core Competencies

Yet another way to use information systems for competitive advantage is to think about ways that systems can enhance core competencies. The argument is that the performance of all business units will increase insofar as these business units develop, or create, a central core of competencies. A **core competency** is an activity for which a firm is a world-class leader. Core competencies may involve being the world's best miniature parts designer, the best package delivery service, or the best thin-film manufacturer. In general, a core competency relies on knowledge that is gained over many years of practical field experience with a technology. This practical knowledge is typically supplemented with a long-term research effort and committed employees.

Any information system that encourages the sharing of knowledge across business units enhances competency. Such systems might encourage or enhance existing competencies and help employees become aware of new external knowledge; such systems might also help a business leverage existing competencies to related markets.

For example, Procter & Gamble, a world leader in brand management and consumer product innovation, uses a series of systems to enhance its core competencies. An intranet called InnovationNet helps people working on similar problems share ideas and expertise. InnovationNet connects those working in research and development (R&D), engineering, purchasing, marketing, legal affairs, and business information systems around the world, using a portal to provide browser-based access to documents, reports, charts, videos, and other data from various sources. It includes a directory of subject matter experts who can be tapped to give advice or collaborate on problem solving and product development, and links to outside research scientists and entrepreneurs who are searching for new, innovative products worldwide.

Network-Based Strategies

The availability of Internet and networking technology have inspired strategies that take advantage of firms' abilities to create networks or network with each other. Network-based strategies include the use of network economics, a virtual company model, and business ecosystems.

Network Economics. Business models based on a network may help firms strategically by taking advantage of **network economics**. In traditional

economics—the economics of factories and agriculture—production experiences diminishing returns. The more any given resource is applied to production, the lower the marginal gain in output, until a point is reached where the additional inputs produce no additional outputs. This is the law of diminishing returns, and it is the foundation for most of modern economics.

In some situations, the law of diminishing returns does not work. For instance, in a network, the marginal costs of adding another participant are about zero, whereas the marginal gain is much larger. The larger the number of subscribers in a telephone system or the Internet, the greater the value to all participants because each user can interact with more people. It is not much more expensive to operate a television station with 1,000 subscribers than with 10 million subscribers. The value of a community of people grows with size, whereas the cost of adding new members is inconsequential.

From this network economics perspective, information technology can be strategically useful. Internet sites can be used by firms to build communities of users—like-minded customers who want to share their experiences. This builds customer loyalty and enjoyment, and builds unique ties to customers. EBay, the giant online auction site, and iVillage, an online community for women, are examples. Both businesses are based on networks of millions of users, and both companies have used the Web and Internet communication tools to build communities. The more people offering products on eBay, the more valuable the eBay site is to everyone because more products are listed, and more competition among suppliers lowers prices. Network economics also provides strategic benefits to commercial software vendors. The value of their software and complementary software products increases as more people use them, and there is a larger installed base to justify continued use of the product and vendor support.

Virtual Company Model. Another network-based strategy uses the model of a virtual company to create a competitive business. A **virtual company**, also known as a virtual organization, uses networks to link people, assets, and ideas, enabling it to ally with other companies to create and distribute products and services without being limited by traditional organizational boundaries or physical locations. One company can use the capabilities of another company without being physically tied to that company. The virtual company model is useful when a company finds it cheaper to acquire products, services, or capabilities from an external vendor or when it needs to move quickly to exploit new market opportunities and lacks the time and resources to respond on its own.

Fashion companies, such as GUESS, Ann Taylor, Levi Strauss, and Reebok, enlist Hong Kong-based Li & Fung to manage production and shipment of their garments. Li & Fung handles product development, raw material sourcing, production planning, quality assurance, and shipping. Li & Fung does not own any fabric, factories, or machines, outsourcing all of its work to a network of more than 15,000 suppliers in 40 countries all over the world. Customers place orders to Li & Fung over its private extranet. Li & Fung then sends instructions to appropriate raw material suppliers and factories where the clothing is produced. The Li & Fung extranet tracks the entire production process for each order. Working as a virtual company keeps Li & Fung flexible and adaptable so that it can design and produce the products ordered by its clients in short order to keep pace with rapidly changing fashion trends.

Business Ecosystems: Keystone and Niche Firms. The Internet and the emergence of digital firms call for some modification of the industry competitive forces model. The traditional Porter model assumes a relatively static

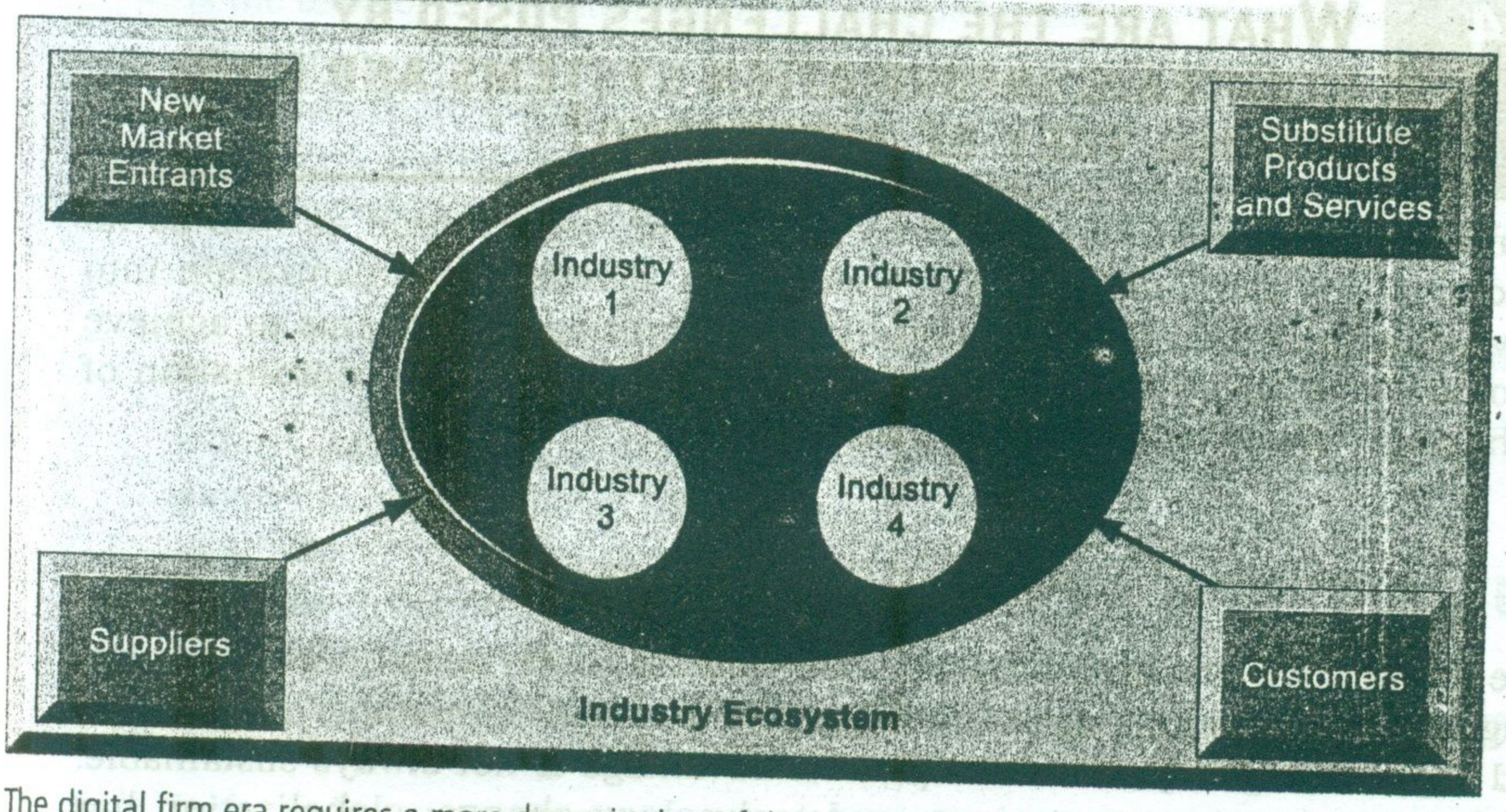
industry environment; relatively clear-cut industry boundaries; and a relatively stable set of suppliers, substitutes, and customers, with the focus on industry players in a market environment. Instead of participating in a single industry, some of today's firms are much more aware that they participate in industry sets—collections of industries that provide related services and products (see Figure 3.11). **Business ecosystem** is another term for these loosely coupled but interdependent networks of suppliers, distributors, outsourcing firms, transportation service firms, and technology manufacturers (Iansiti and Levien, 2004).

The concept of a business ecosystem builds on the idea of the value web described earlier, the main difference being that cooperation takes place across many industries rather than many firms. For instance, both Microsoft and Walmart provide platforms composed of information systems, technologies, and services that thousands of other firms in different industries use to enhance their own capabilities. Microsoft has estimated that more than 40,000 firms use its Windows platform to deliver their own products, support Microsoft products, and extend the value of Microsoft's own firm. Walmart's order entry and inventory management system is a platform used by thousands of suppliers to obtain real-time access to customer demand, track shipments, and control inventories.

Business ecosystems can be characterized as having one or a few keystone firms that dominate the ecosystem and create the platforms used by other niche firms. Keystone firms in the Microsoft ecosystem include Microsoft and technology producers such as Intel and IBM. Niche firms include thousands of software application firms, software developers, service firms, networking firms, and consulting firms that both support and rely on the Microsoft products.

Information technology plays a powerful role in establishing business ecosystems. Obviously, many firms use information systems to develop into keystone firms by building IT-based platforms that other firms can use. In the digital firm era, we can expect greater emphasis on the use of IT to build

FIGURE 3.11 AN ECOSYSTEM STRATEGIC MODEL



The digital firm era requires a more dynamic view of the boundaries among industries, firms, customers, and suppliers, with competition occurring among industry sets in a business ecosystem. In the ecosystem model, multiple industries work together to deliver value to the customer. IT plays an important role in enabling a dense network of interactions among the participating firms.

industry ecosystems because the costs of participating in such ecosystems will fall and the benefits to all firms will increase rapidly as the platform grows.

Individual firms should consider how their information systems will enable them to become profitable niche players in larger ecosystems created by keystone firms. For instance, in making decisions about which products to build or which services to offer, a firm should consider the existing business ecosystems related to these products and how it might use IT to enable participation in these larger ecosystems.

A powerful, current example of a rapidly expanding ecosystem is the mobile Internet platform. In this ecosystem there are four industries: device makers (Apple iPhone, Samsung Galaxy, Motorola, LG, and others), wireless telecommunication firms (AT&T, Verizon, T-Mobile, Sprint, and others), independent software applications providers (generally small firms selling games, applications and ring tones), and Internet service providers (who participate as providers of Internet service to the mobile platform).

Each of these industries has its own history, interests, and driving forces. But these elements come together in a sometimes cooperative, and sometimes competitive, new industry we refer to as the mobile digital platform ecosystem. More than other firms, Apple has managed to combine these industries into a system. It is Apple's mission to sell physical devices (iPhones) that are nearly as powerful as today's personal computers. These devices work only with a high-speed broadband network supplied by the wireless phone carriers. In order to attract a large customer base, the iPhone had to be more than just a cell phone. Apple differentiated this product by making it a "smart phone," one capable of running over one million different, useful applications. Apple could not develop all these applications itself. Instead it relies on generally small, independent software developers to provide these applications, which can be purchased at the iTunes store. In the background is the Internet service provider industry, which makes money whenever iPhone users connect to the Internet.

3.4 WHAT ARE THE CHALLENGES POSED BY STRATEGIC INFORMATION SYSTEMS AND HOW SHOULD THEY BE ADDRESSED?

Strategic information systems often change the organization as well as its products, services, and operating procedures, driving the organization into new behavioral patterns. Successfully using information systems to achieve a competitive advantage is challenging and requires precise coordination of technology, organizations, and management.

SUSTAINING COMPETITIVE ADVANTAGE

The competitive advantages that strategic systems confer do not necessarily last long enough to ensure long-term profitability. Because competitors can retaliate and copy strategic systems, competitive advantage is not always sustainable. Markets, customer expectations, and technology change; globalization has made these changes even more rapid and unpredictable. The Internet can make competitive advantage disappear very quickly because virtually all companies can use this technology. Classic strategic systems, such as American Airlines's SABRE computerized reservation system, Citibank's ATM system, and FedEx's

package tracking system, benefited by being the first in their industries. Then rival systems emerged. Amazon was an e-commerce leader but now faces competition from eBay, Yahoo, and Google. Information systems alone cannot provide an enduring business advantage. Systems originally intended to be strategic frequently become tools for survival, required by every firm to stay in business, or they may inhibit organizations from making the strategic changes essential for future success.

ALIGNING IT WITH BUSINESS OBJECTIVES

The research on IT and business performance has found that (a) the more successfully a firm can align information technology with its business goals, the more profitable it will be, and (b) only one-quarter of firms achieve alignment of IT with the business. About half of a business firm's profits can be explained by alignment of IT with business (Luftman, 2003).

Most businesses get it wrong: Information technology takes on a life of its own and does not serve management and shareholder interests very well. Instead of business people taking an active role in shaping IT to the enterprise, they ignore it, claim not to understand IT, and tolerate failure in the IT area as just a nuisance to work around. Such firms pay a hefty price in poor performance. Successful firms and managers understand what IT can do and how it works, take an active role in shaping its use, and measure its impact on revenues and profits.

Management Checklist: Performing a Strategic Systems Analysis

To align IT with the business and use information systems effectively for competitive advantage, managers need to perform a strategic systems analysis. To identify the types of systems that provide a strategic advantage to their firms, managers should ask the following questions:

1. What is the structure of the industry in which the firm is located?
   - What are some of the competitive forces at work in the industry? Are there new entrants to the industry? What is the relative power of suppliers, customers, and substitute products and services over prices?
   - Is the basis of competition quality, price, or brand?
   - What are the direction and nature of change within the industry? From where are the momentum and change coming?
   - How is the industry currently using information technology? Is the organization behind or ahead of the industry in its application of information systems?
2. What are the business, firm, and industry value chains for this particular firm?
   - How is the company creating value for the customer—through lower prices and transaction costs or higher quality? Are there any places in the value chain where the business could create more value for the customer and additional profit for the company?
   - Does the firm understand and manage its business processes using the best practices available? Is it taking maximum advantage of supply chain management, customer relationship management, and enterprise systems?
   - Does the firm leverage its core competencies?
   - Is the industry supply chain and customer base changing in ways that benefit or harm the firm?
   - Can the firm benefit from strategic partnerships and value webs?

- Where in the value chain will information systems provide the greatest value to the firm?

3. Have we aligned IT with our business strategy and goals?
   - Have we correctly articulated our business strategy and goals?
   - Is IT improving the right business processes and activities to promote this strategy?
   - Are we using the right metrics to measure progress toward those goals?

MANAGING STRATEGIC TRANSITIONS

Adopting the kinds of strategic systems described in this chapter generally requires changes in business goals, relationships with customers and suppliers, and business processes. These sociotechnical changes, affecting both social and technical elements of the organization, can be considered **strategic transitions**—a movement between levels of sociotechnical systems.

Such changes often entail blurring of organizational boundaries, both external and internal. Suppliers and customers must become intimately linked and may share each other's responsibilities. Managers will need to devise new business processes for coordinating their firms' activities with those of customers, suppliers, and other organizations. The organizational change requirements surrounding new information systems are so important that they merit attention throughout this text. Chapter 14 examines organizational change issues in more detail.

Review Summary

1. *Which features of organizations do managers need to know about to build and use information systems successfully?*

   All modern organizations are hierarchical, specialized, and impartial, using explicit routines to maximize efficiency. All organizations have their own cultures and politics arising from differences in interest groups, and they are affected by their surrounding environment. Organizations differ in goals, groups served, social roles, leadership styles, incentives, types of tasks performed, and type of structure. These features help explain differences in organizations' use of information systems. Information systems and the organizations in which they are used interact with and influence each other.

2. *What is the impact of information systems on organizations?*

   The introduction of a new information system will affect organizational structure, goals, work design, values, competition between interest groups, decision making, and day-to-day behavior. At the same time, information systems must be designed to serve the needs of important organizational groups and will be shaped by the organization's structure, business processes, goals, culture, politics, and management. Information technology can reduce transaction and agency costs, and such changes have been accentuated in organizations using the Internet. New systems disrupt established patterns of work and power relationships, so there is often considerable resistance to them when they are introduced.

3. *How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?*

   In Porter's competitive forces model, the strategic position of the firm, and its strategies, are determined by competition with its traditional direct competitors, but they are also greatly affected by new market entrants, substitute products and services, suppliers, and customers. Information systems help companies compete by maintaining low costs, differentiating products or services, focusing on

market niche, strengthening ties with customers and suppliers, and increasing barriers to market entry with high levels of operational excellence.

The value chain model highlights specific activities in the business where competitive strategies and information systems will have the greatest impact. The model views the firm as a series of primary and support activities that add value to a firm's products or services. Primary activities are directly related to production and distribution, whereas support activities make the delivery of primary activities possible. A firm's value chain can be linked to the value chains of its suppliers, distributors, and customers. A value web consists of information systems that enhance competitiveness at the industry level by promoting the use of standards and industry-wide consortia, and by enabling businesses to work more efficiently with their value partners.

Because firms consist of multiple business units, information systems achieve additional efficiencies or enhance services by tying together the operations of disparate business units. Information systems help businesses leverage their core competencies by promoting the sharing of knowledge across business units. Information systems facilitate business models based on large networks of users or subscribers that take advantage of network economics. A virtual company strategy uses networks to link to other firms so that a company can use the capabilities of other companies to build, market, and distribute products and services. In business ecosystems, multiple industries work together to deliver value to the customer. Information systems support a dense network of interactions among the participating firms.

4. *What are the challenges posed by strategic information systems and how should they be addressed?*

Implementing strategic systems often requires extensive organizational change and a transition from one sociotechnical level to another. Such changes are called strategic transitions and are often difficult and painful to achieve. Moreover, not all strategic systems are profitable, and they can be expensive to build. Many strategic information systems are easily copied by other firms so that strategic advantage is not always sustainable.

Key Terms

Agency theory, 122
Benchmarking, 137
Best practices, 137
Business ecosystem, 141
Competitive forces model, 126
Core competency, 139
Disruptive technologies, 119
Efficient customer response system, 129
Mass customization, 129
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Support activities, 136
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Value chain model, 135
Value web, 138
Virtual company, 140

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Review Questions

3-1 Which features of organizations do managers need to know about to build and use information systems successfully?

- Define an organization and compare the technical definition of organizations with the behavioral definition.
- Identify and describe the features of organizations that help explain differences in organizations' use of information systems.

3-2 What is the impact of information systems on organizations?

- Describe the major economic theories that help explain how information systems affect organizations.
- Describe the major behavioral theories that help explain how information systems affect organizations.
- Explain why there is considerable organizational resistance to the introduction of information systems.
- Describe the impact of the Internet and disruptive technologies on organizations.

3-3 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?

- Define Porter's competitive forces model and explain how it works.
- Describe what the competitive forces model explains about competitive advantage.
- List and describe four competitive strategies enabled by information systems that firms can pursue.
- Describe how information systems can support each of these competitive strategies and give examples.
- Explain how management of a firm can achieve alignment of IT with with business objectives.
- Define and describe the value chain model.
- Explain how the value chain model can be used to identify opportunities for information systems.
- Define the value web and show how it is related to the value chain.
- Explain how the value web helps businesses identify opportunities for strategic information systems.
- Describe how the Internet has changed competitive forces and competitive advantage.
- Explain how information systems promote synergies and core competencies.
- Describe how promoting synergies and core competencies enhances competitive advantage.
- Explain how businesses benefit by using network economics.
- Define the law of diminishing returns and describe some situations in which the law does not work.

3-4 What are the challenges posed by strategic information systems and how should they be addressed?

- List and describe the management challenges posed by strategic information systems.
- Explain how to perform a strategic systems analysis.

Discussion Questions

3-5 It has been said that there is no such thing as a sustainable strategic advantage. Do you agree? Why or why not?

3-6 It has been said that the advantage that leading-edge retailers such as Dell and Walmart have over their competition isn't technology; it's their management. Do you agree? Why or why not?

3-7 Why are disruptive technologies so difficult for even the companies that develop them?

Hands-On MIS Projects

The projects in this section give you hands-on experience identifying information systems to support a business strategy and to solve a customer retention problem, using a database to improve decision making about business strategy, and using Web tools to configure and price an automobile.

Management Decision Problems

3-8 Marks & Spencer Group is a leading department store chain in the United Kingdom. Its retail stores sell a range of merchandise. Senior management has decided that Marks & Spencer should tailor merchandise more to local tastes, and that the colors, sizes, brands, and styles of clothing and other merchandise

should be based on the sales patterns in each individual store. How could information systems help management implement this new strategy? What pieces of data should these systems collect to help management make merchandising decisions that support this strategy?

3-9 Despite aggressive campaigns to attract customers with lower mobile phone prices, T-Mobile has been losing large numbers of its most lucrative two-year contract subscribers. Management wants to know why so many customers are leaving T-Mobile and what can be done to entice them back. Are customers deserting because of poor customer service, uneven network coverage, wireless service charges, or competition from carriers with Apple iPhone service? How can the company use information systems to help find the answer? What management decisions could be made using information from these systems?

Improving Decision Making: Using a Database to Clarify Business Strategy

Software skills: Database querying and reporting; database design
Business skills: Reservation systems; customer analysis

3-10 In this exercise, you will use database software to analyze the reservation transactions for a hotel and use that information to fine-tune the hotel's business strategy and marketing activities.

In MyMISLab, you will find a database for hotel reservation transactions developed in Microsoft Access with information about The President's Inn in Cape May, New Jersey. At the Inn, 10 rooms overlook side streets, 10 rooms have bay windows that offer limited views of the ocean, and the remaining 10 rooms in the front of the hotel face the ocean. Room rates are based on room choice, length of stay, and number of guests per room. Room rates are the same for one to four guests. Fifth and sixth guests must pay an additional $20 charge each per person per day. Guests staying for seven days or more receive a 10 percent discount on their daily room rates.

The owners currently use a manual reservation and bookkeeping system, which has caused many problems. Use the database to develop reports on average length of stay, average visitors per room, base revenue per room (i.e., length of visit multiplied by the daily rate), and strongest customer base. After answering these questions write a brief report about the Inn's current business situation and suggest future strategies.

Improving Decision Making: Using Web Tools to Configure and Price an Automobile

Software skills: Internet-based software
Business skills: Researching product information and pricing

3-11 In this exercise, you will use software at car Web sites to find product information about a car of your choice and use that information to make an important purchase decision. You will also evaluate two of these sites as selling tools.

You are interested in purchasing a new Vauxhall Corsa (or some other car of your choice). Go to the Web site of AutoTrader.co.uk (www.autotrader.co.uk) and begin your investigation. Locate the Vauxhall Corsa. Research the various models, choose one you prefer in terms of price, features, and safety ratings. Locate and read at least two reviews. Surf the Web site of the manufacturer, in this case Vauxhall (www.vauxhall.co.uk). Compare the information available on Vauxhall's Web site with that of Autotrader.co.uk for the Vauxhall Corsa. Try to locate the lowest price for the car you want in a local dealer's inventory. Suggest improvements for Autotrader.co.uk and Vauxhall.co.uk.

Collaboration and Teamwork Project

3-12 In MyMISLab, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google+, or other open-source collaboration tools to complete the assignment.

Can This Bookstore Be Saved?

CASE STUDY

Borders Group (including many former Waldenbooks rebranded as Borders Express) liquidated its assets and closed all of its locations in the second half of 2011. The previous year had already seen the demise of B. Dalton, a Barnes & Noble subsidiary since 1987. Since 1991, eleven major U.S. bookstore chains have been whittled down to six, and nearly 3,300 stores to just over 2,200 in 2011.

Still in the lead after over 20 years of domination, Barnes & Noble was often painted as the bully, driving both regional chains and small independent bookstores out of business with its aggressive pricing tactics and unbeatable inventory. Before e-commerce reshaped the landscape, its superstores forced smaller rivals into "most titles offered" wars. As smaller chains struggled to keep pace, support from publishers was not forthcoming. This short-term, bottom-line strategy would come back to haunt publishers.

B&N kicked around the idea of selling books online, experimenting with Trintex, a 1980s Web-retail prototype, selling books on CompuServ in the mid-1990s, and opening an online shop on AOL. However, it was not until 1997, fully two years after the arrival of Amazon, that it launched its first Web site. Data from numerous emerging e-commerce markets now verifies that books are an ideal initial product to draw first-time buyers. B&N was already behind the curve.

Amazon, launched initially as an online bookstore, upended the titles war. While B&N might be able to offer over 200,000 titles in its bricks-and-mortar stores, Amazon offered an inventory limited only by publisher availability. Shrewd financial moves, including selling 50% of its Internet operation to German giant Bertelsmann in 1998, kept B&N in the game. It established a new industry standard of 750,000 titles on-hand and bragged that it could procure over 8 million new, out-of-print, and rare books for customers from suppliers. However, Amazon continued to trump B&N on innovation. When B&N launched its online music store in 1999, several months after taking barnesandnoble.com public and refurbishing its cash reserves, it was again playing catch-up with Amazon, which had pioneered the concept a year earlier.

In early 2009, when B&N purchased Fictionwise, one of the biggest electronic book proprietors in North America, it was again behind the technology curve. Amazon had already unveiled its Kindle e-reader sixteen months earlier. What's more, Amazon would offer New York Times bestsellers and other popular e-books for less than $10.

While publishers fretted that readers would be reconditioned to devalue the worth of the printed word and that offline stores would be strained to their limits discounting print books to compete, B&N scrambled. It took until July 2009 (two months after the Fictionwise purchase) to finally unveil B&N's e-bookstore. Its Nook e-reader was released in October, again more than two years behind Amazon. Ironically, as early as 1998, B&N had partnered with software companies such as Nuvo-Media to develop a prototype e-reader called the Rocket, but it had nixed the project in 2003 because there didn't appear to be any money in it. Now it had to hustle to refashion itself as a seller of e-books, e-readers, and apps to enhance the reading experience.

Critically well-received, the Nook began to scrape market share from the Kindle when it sparked a price war a year later. Dropping the price from $259 to $199 and releasing a WiFi-only model for $149, B&N took aim at the giant. Amazon quickly countered by slashing the Kindle to $189 eight hours later and releasing the WiFi-enabled 3G Kindle3 within a month, again at $10 below the Nook.

With titans such as Apple (iPad) and Google (originally with the iRiver Story and in 2012 with the Nexus 7) providing additional competition, the tables had been turned on the former bookstore baron. Will B&N be able to survive against these tech giants?

The answer remains to be seen. B&N was the only bookseller with the resources to complete the considerable task of developing an e-reader, marketing it, and setting up manufacturing and retail operations for the device. Its closest competitors were already succumbing to the contraction of the chain bookstore market, victims of both B&N and the e-commerce revolution. Books-A-Million, with approximately 250 stores compared to 1,363 (689 retail and 674 college) for B&N, is its closest remaining competitor.

While B&N still depends on its physical, brick-and-mortar stores to drive its business, the e-book market is a horse of a different color. The economics of

e-book sales are very different from traditional book sales. Customers who visit B&N's Web site buy three digital books for every one physical book, but booksellers still make more money on print books than e-books. And while having a competitive e-reader seemed essential to successfully vying for market share, it came at a steep cost. Moreover, it is not the pivotal factor in controlling the e-book market. Content is.

Since the price war, the reality is that in order to compete with Amazon, e-reader hardware must sell at or near cost, with profits derived from the sale of digital content, including e-books, music, videos, apps, and games. Once Amazon had wrung all the profit it could from Kindle hardware, it quickly maneuvered into adding apps and app features and aggressively pursuing a cross-platform strategy. It began marketing its e-books for tablets, smartphones, and PCs using Android, Windows, and OS X operating systems. Moreover, Amazon, along with Apple, and another competitor, Kobo, are global competitors; B&N is not.

Despite spending hundreds of millions of dollars to compete with Amazon.com Inc. and Apple Inc. in the market for tablets and e-readers, B&N continued to lose money on the Nook, as well as e-book market share. Analysts estimated in 2011 that B&N controlled approximately 27% of the U.S. digital book market while Amazon led with 60%. Since then, Amazon has held steady, and B&N has steadily ceded ground to Apple. B&N's digital book market share has dropped to 25%, and is still falling.

On June 25, 2013 B&N announced that losses at its Nook digital business more than doubled in the quarter ending April 27, 2013, wiping out profits generated at its bookstores. As a result, the company decided to stop producing its own color tablets in favor of co-branded devices made by third-party manufacturers. Barnes & Noble will continue to design and make its own black-and-white Nook e-readers, which account for the majority of its e-book sales. But with e-reader sales declining, it is unclear how competitive Barnes & Noble can be long term without its own presence in the tablet market, which is forecast to keep growing.

B&N retail store closings continued to outpace new store openings as had been the case since 2009. CEO Michael Klipper projected a net reduction of one-third of B&N's stores over the next decade, reducing the total by about 20 stores per year until between 450 and 500 remain.

While B&N has its back against the wall, it does have a multipronged strategy for survival. It faces a principal opponent with an estimated value 121 times higher than its own (B&N has a market capitalization of $1.062 billion; Amazon's is $121.5 billion). But it also has allies. Publishing companies have a vested interest in B&N's survival. Physical book retailers are indispensable for effectively marketing and selling books. Bookstores spur publisher sales with the "browsing effect." Surveys show that just one-third of bookstore visitors who make a purchase walked in with a specific book in mind. According to Madeline McIntosh, Random House president of sales, operations, and digital, a bookstore's display space is one of the most valuable places that exists for communicating to the consumer that a book is a big deal. Brick-and-mortar retail stores are not only essential for selling physical books, but also stimulate sales of e-books and audio books, bring traffic into malls, and serve as social gathering places. The more visibility a book has, the more likely readers will want to purchase it. With the demise of B. Dalton, Crown Books, and Borders, B&N is the only retailer offering an extensive inventory of physical books. Book publishers need a physical presence.

Without B&N, the likely candidate to fill the void is Amazon, and publishers are not eager for that to happen. Amazon's goal for e-books is to cut out the publishers and publish books directly, selling books at an extremely steep discount to drive sales of its Kindle devices. Editors, publicists, and other entities within the publishing business view Amazon as an enemy. Selling books at Amazon's discounted prices is not a tenable business model for publishers in the long-term.

If B&N is to survive it must capitalize on its profitable retail stores, develop small, local community-based shops, expand digital content, lead the digital education market, and develop marketing techniques to drive e-book readers to purchase print books. B&N has been experimenting with ways to drive traffic to its physical stores. For example, if you connect to a Wi-Fi network in a B&N store with your Nook, you can get free extras in many apps and games like Angry Birds, where you can unlock a bonus character that normally costs a dollar. B&N has also expanded its store space for toys and games, which have higher profit margins, while reducing the range of book titles it stocks. There are also plans to experiment with slightly smaller stores in malls. Although that strategy is boosting the company's bottom line, publishers worry it may also drive book lovers to Amazon.com Inc., which says its physical book sales are still growing.

What will the future hold? Will B&N be able to succeed as a digital company and is there a future for its brick-and-mortar stores? Is there a way for e-books to help sell print books, just as print books have stimulated demand for their digital versions? Although B&N has made a spirited effort to revamp its business and go toe-to-toe with several tech titans, it's possible that it might be too tall an order for the storied bookseller.

Sources: Jeffrey A. Trachtenberg, "How to Rescue Barnes & Noble? Here Are Ideas from Five Experts," *Wall Street Journal*, July 1, 2013; Leslie Kaufman, "Barnes & Noble Rethinks Its Strategy for the Nook," *New York Times*, February 28, 2013; Tom Gara, "Barnes & Noble: Stores Are Bad, but E-Books Are Worse," *Wall Street Journal*, February 28, 2013; Jeffrey A. Trachtenberg, "B&N Aims to Whittle Its Stores for Years," *Wall Street Journal*, January 28, 2013; Horace Dediu, "Apple iBooks at 24% Worldwide Ebook Market Share? One Analyst Thinks So," *Digital Book World*, February 28, 2013; Michael J. De La Merced and Julie Bosman, "Microsoft Deal Adds to Battle over E-Books," *New York Times*, May 1, 2012; Shira Ovide and Jeffrey A. Trachtenberg, "Microsoft Hooks onto Nook," *Wall Street Journal*, May 1, 2012; Julie Bosnan, "The Bookstore's Last Stand," *New York Times*, January 29, 2012; Paul Vigna, "E-Books, Apple, Amazon: The Deadly Hallows for Publishers," *New York Times*, April 11, 2012; Brian X. Chen, "Barnes & Noble Uses Apps to Lure Customers into Stores," *New York Times*, January 27, 2012; Alexandra Alter, "Blowing Up the Book," *Wall Street Journal*, January 20, 2012; Jim Milliot, "Tracking 20 Years of Bookstore Chains," *Publisher's Weekly*, August 26, 2011; and Jeffrey A. Trachtenberg and Martin Peers, "Barnes and Noble: The Next Chapter," *Wall Street Journal*, January 6, 2011.

CASE STUDY QUESTIONS

3-13 Use the value chain and competitive forces models to evaluate the impact of the Internet on book publishers and book retail stores such as Barnes & Noble.

3-14 How did Barnes and Noble change its business model to deal with the Internet and e-book technology?

3-15 Will Barnes & Noble's new strategy be successful? Explain your answer.

3-16 Is there anything else Barnes & Noble and the book publishers should be doing to stimulate more business?

MyMISLab

Go to **mymislab.com** for the following Assisted-graded writing questions.

3-17 Describe the impact of the Internet on each of the five competitive forces.

3-18 What are the main factors that mediate the relationship between information technology and organizations, and that managers need to take into account when developing new information systems? Give a business example of how each factor would influence the development of new information systems.

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Ethical and Social Issues in Information Systems

CHAPTER 4

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What ethical, social, and political issues are raised by information systems?
2. What specific principles for conduct can be used to guide ethical decisions?
3. Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property?
4. How have information systems affected laws for establishing accountability, liability, and the quality of everyday life?

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CHAPTER CASES

Content Pirates Sail the Web
Wasting Time: The New Digital Divide
Big Data Gets Personal: Behavioral Targeting
Facebook Privacy: There Is No Privacy

VIDEO CASES

What Net Neutrality Means for You
Facebook Privacy
Data Mining for Terrorists and Innocents
Instructional Video:
Viktor Mayer Schönberger on the Right to Be Forgotten

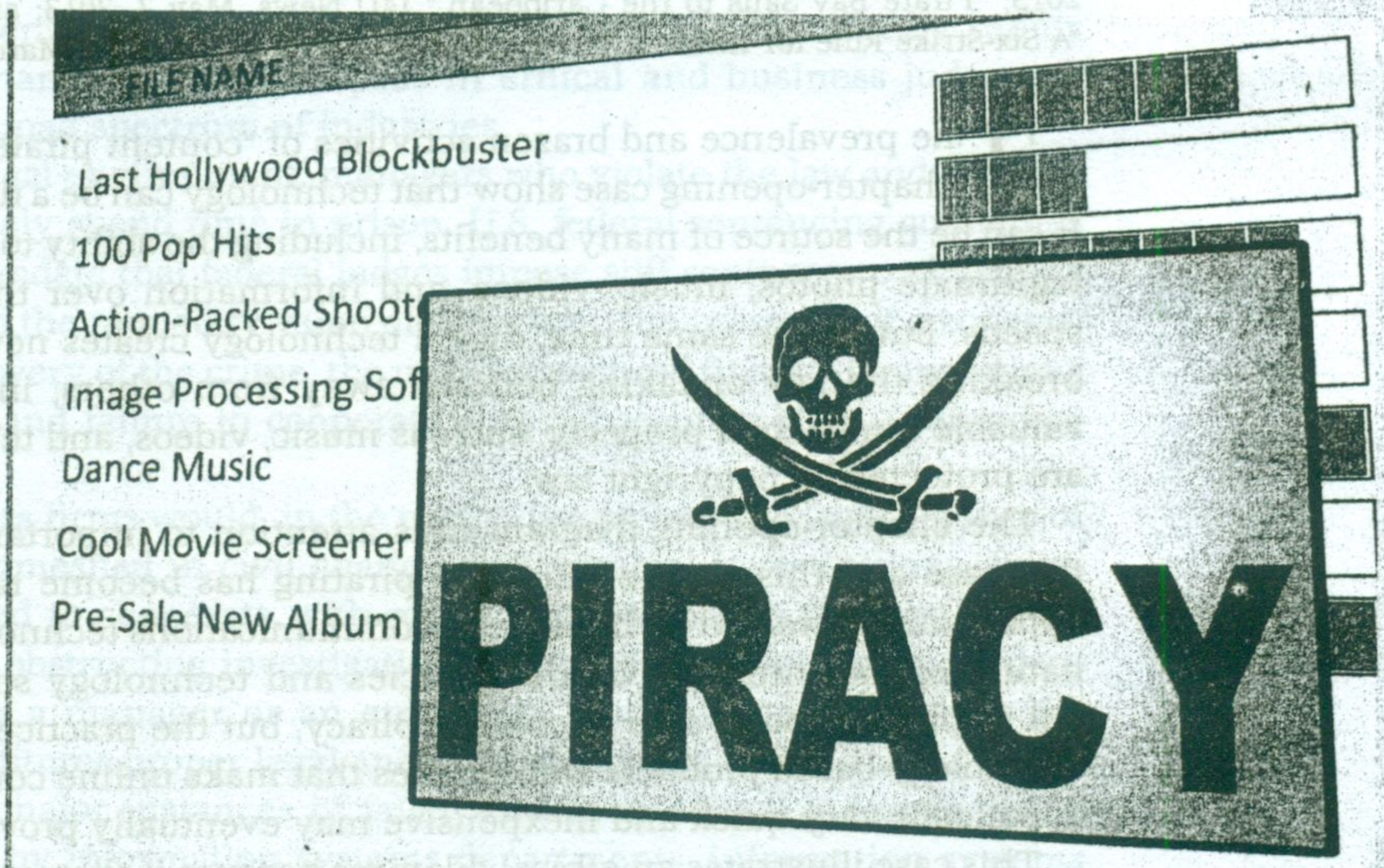
CONTENT PIRATES SAIL THE WEB

More than 11 million HBO subscribers watched each episode of *Game of Thrones* in 2012, but another 3.7 to 4.2 million were able to watch the same shows without paying a cent. They were watching pirated versions of each episode that were made available by companies specializing in distributing digital content for free without paying the owners and creators of that content for using it. Television shows, music, movies, and videogames have all been plundered this way.

Such "content pirates" have sailed the World Wide Web since its earliest days, but today they are bolder, faster and better equipped than ever. The antipiracy and security firm Irdeto detected 14 billion instances of pirated online content in 2012, up from 5.4 billion instances in 2009.

Pirated content threatens television industry profits, much of which comes from subscription fees on cable channels like HBO and USA. Viewers watching pirated versions of shows are less likely to pay for cable subscriptions or to buy movies or rent them from services such as Netflix. According to one estimate, pirated content costs the U.S. economy $58 billion a year, including theft of content, lost entertainment jobs and taxes lost to federal and state governments.

The explosion in pirated TV shows and movies has been made possible by faster Internet speeds. Longer videos can be downloaded within minutes from peer-to-peer networks and online cyberlockers. A great deal of illegal content, including live sports, is also available through instant streaming. Online ad networks also help finance piracy by placing ads on sites that traffic in unauthorized content. A summer 2012 study commissioned in part by Google found that 86 percent of peer-to-peer sharing sites depend on advertising for income.



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One of the biggest content pirate sites is The Pirate Bay, based in Sweden, which offers free access to millions of copyrighted songs and thousands of copyrighted movies. The Pirate Bay uses BitTorrent file-sharing technology, which breaks up large computer files into small pieces so they can zip across the Web. In April 2014, The Pirate Bay had over 6.5 million registered users and was the 87th most trafficked site in the world. There have been many legal efforts to shut it down, but The Pirate Bay finds ways to keep going.

What can be done to stop this pirating? Google adjusted its search algorithm to obscure search results for sites with pirated content. NBCUniversal uses armies of automated "crawlers" to scour the Web for unauthorized videos and also applies "content recognition" technology to its programming, which it then passes on to video sites like YouTube to help block illegal uploads. NBC sends out digital snapshots of its shows to YouTube and other video sites to prevent users from putting up copyrighted shows. The five major Internet service providers, including NBC's parent company, Comcast, initiated an alert system which notifies users suspected of piracy and results in progressive penalties, including slowed Web access in some cases. Digital content owners are taking much harder stance with advertising networks and payment platforms supporting piracy to encourage them to close down ad-funded pirate sites.

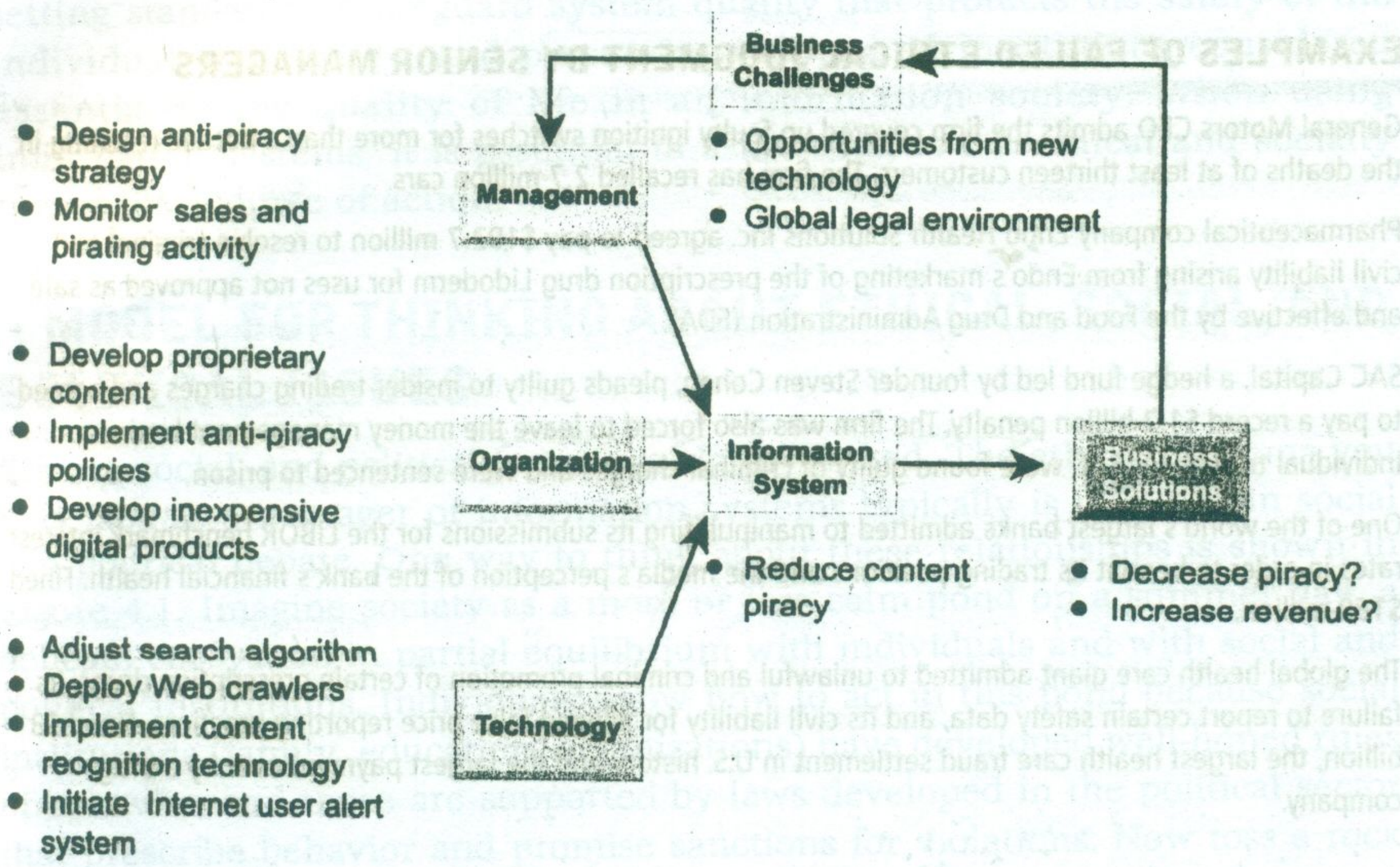
New products and services have made pirated content less attractive. High-quality content now can be streamed for a small fee to both tethered and mobile devices. Apple's iTunes made buying individual songs inexpensive and easy, while new subscription-based services such as Spotify and Rhapsody have attracted 20 million paying subscribers. Netflix and other video services offer access to movies and television shows at low prices. Right now content pirates are still sailing, but new and better ways to listen to music and view videos may eventually put them out of business.

Sources: Jack Marshall, "More Ad Dollars Flow to Pirated Video," *Wall Street Journal*, May 7, 2014; Adam Nightingale, "Will 2014 Be the Year of IPTV Streaming Piracy? RapidTVNews.com, accessed April 11, 2014; www.alexa.com, accessed April 10, 2014; Christopher S. Stuart, "As TV Pirates Run Rampant, TV Studios Dial Up Pursuit," *The Wall Street Journal*, March 3, 2013; "Pirate Bay Sails to the Caribbean," I4U News, May 2, 2013; and L. Gordon Crovitz, "A Six-Strike Rule for Internet Privacy," *The Wall Street Journal*, March 3, 2013.

The prevalence and brazen activities of "content pirates" described in the chapter-opening case show that technology can be a double-edged sword. It can be the source of many benefits, including the ability to share and transmit legitimate photos, music, videos, and information over the Internet at high speeds. But, at the same time, digital technology creates new opportunities for breaking the law or taking benefits away from others, including owners of valuable intellectual property, such as music, videos, and television shows that are protected by copyright law.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. Content pirating has become rampant because of opportunities created by broadband communications technology and the global nature of the Internet. Various policies and technology solutions have been put in place to put a stop to content piracy, but the practice still prevails. New technology-based products and services that make online content purchase and downloads very quick and inexpensive may eventually provide a solution.

This case illustrates an ethical dilemma because it shows two sets of interests at work— the interests of people and organizations that have worked to develop intellectual property and need to be rewarded versus those of groups who fervently believe the Internet should foster the free exchange of content



and ideas. As a manager, you will need to be sensitive to both the positive and negative impacts of information systems for your firm, employees and customers. You will need to learn how to resolve ethical dilemmas involving information systems.

4.1 WHAT ETHICAL, SOCIAL, AND POLITICAL ISSUES ARE RAISED BY INFORMATION SYSTEMS?

In the past 10 years, we have witnessed, arguably, one of the most ethically challenging periods for U.S. and global business. Table 4.1 provides a small sample of recent cases demonstrating failed ethical judgment by senior and middle managers. These lapses in ethical and business judgment occurred across a broad spectrum of industries.

In today's new legal environment, managers who violate the law and are convicted will most likely spend time in prison. U.S. federal sentencing guidelines adopted in 1987 mandate that federal judges impose stiff sentences on business executives based on the monetary value of the crime, the presence of a conspiracy to prevent discovery of the crime, the use of structured financial transactions to hide the crime, and failure to cooperate with prosecutors (U.S. Sentencing Commission, 2004).

Although business firms would, in the past, often pay for the legal defense of their employees enmeshed in civil charges and criminal investigations, firms are now encouraged to cooperate with prosecutors to reduce charges against the entire firm for obstructing investigations. These developments mean that, more than ever, as a manager or an employee, you will have to decide for yourself what constitutes proper legal and ethical conduct.

Although these major instances of failed ethical and legal judgment were not masterminded by information systems departments, information systems were instrumental in many of these frauds. In many cases, the perpetrators of these crimes artfully used financial reporting information systems to bury their decisions from public scrutiny in the vain hope they would never be caught.

TABLE 4.1 RECENT EXAMPLES OF FAILED ETHICAL JUDGMENT BY SENIOR MANAGERS

General Motors Inc. (2014)	General Motors CEO admits the firm covered up faulty ignition switches for more than a decade resulting in the deaths of at least thirteen customers. The firm has recalled 2.7 million cars.
Endo Health Solutions, Inc. (2014)	Pharmaceutical company Endo Health Solutions Inc. agreed to pay $192.7 million to resolve criminal and civil liability arising from Endo's marketing of the prescription drug Lidoderm for uses not approved as safe and effective by the Food and Drug Administration (FDA).
SAC Capital (2013)	SAC Capital, a hedge fund led by founder Steven Cohen, pleads guilty to insider trading charges and agreed to pay a record $1.2 billion penalty. The firm was also forced to leave the money management business. Individual traders for SAC were found guilty of criminal charges and were sentenced to prison.
Barclays Bank PLC (2012)	One of the world's largest banks admitted to manipulating its submissions for the LIBOR benchmark interest rates in order to benefit its trading positions and the media's perception of the bank's financial health. Fined $160 million.
GlaxoSmithKline LLC (2012)	The global health care giant admitted to unlawful and criminal promotion of certain prescription drugs, its failure to report certain safety data, and its civil liability for alleged false price reporting practices. Fined $3 billion, the largest health care fraud settlement in U.S. history and the largest payment ever by a drug company.
Walmart Inc. (2012)	Walmart executives in Mexico accused of paying millions in bribes to Mexican officials in order to receive building permits. Under investigation by the Department of Justice.
Galleon Group (2011)	Founder of the Galleon Group sentenced to 11 years in prison for trading on insider information. Found guilty of paying $250 million to Wall Street banks, and in return received market information that other investors did not get.
Siemens (2009)	The world's largest engineering firm paid over $4 billion to German and U.S. authorities for a decades-long, worldwide bribery scheme approved by corporate executives to influence potential customers and governments. Payments concealed from normal reporting accounting systems.
McKinsey & Company (2011)	CEO Rajat Gupta heard on tapes leaking insider information. The former CEO of prestigious management consulting firm McKinsey & Company was found guilty in 2012 and sentenced to two years in prison.
Bank of America (2012)	Federal prosecutors accused Bank of America and its affiliate Countrywide Financial of defrauding government-backed mortgage agencies by churning out loans at a rapid pace without proper controls. Prosecutors are seeking $1 billion in penalties from the bank as compensation for the behavior that they say forced taxpayers to guarantee billions in bad loans.

We deal with the issue of control in information systems in Chapter 8. In this chapter, we will talk about the ethical dimensions of these and other actions based on the use of information systems.

Ethics refers to the principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviors. Information systems raise new ethical questions for both individuals and societies because they create opportunities for intense social change, and thus threaten existing distributions of power, money, rights, and obligations. Like other technologies, such as steam engines, electricity, the telephone, and the radio, information technology can be used to achieve social progress, but it can also be used to commit crimes and threaten cherished social values. The development of information technology will produce benefits for many and costs for others.

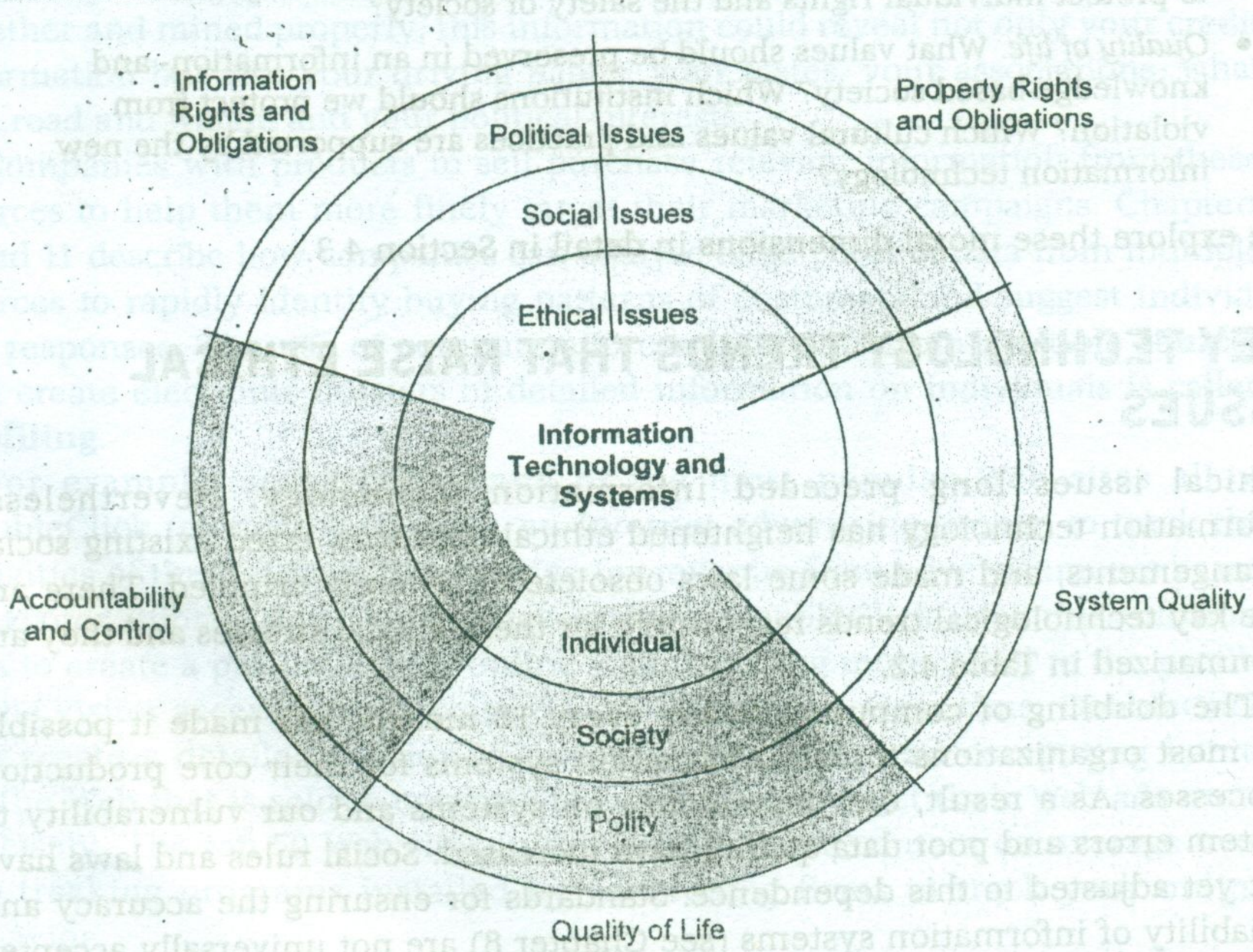
Ethical issues in information systems have been given new urgency by the rise of the Internet and electronic commerce. Internet and digital firm technologies make it easier than ever to assemble, integrate, and distribute information, unleashing new concerns about the appropriate use of customer information, the protection of personal privacy, and the protection of intellectual property.

Other pressing ethical issues raised by information systems include establishing accountability for the consequences of information systems, setting standards to safeguard system quality that protects the safety of the individual and society, and preserving values and institutions considered essential to the quality of life in an information society. When using information systems, it is essential to ask, "What is the ethical and socially responsible course of action?"

A MODEL FOR THINKING ABOUT ETHICAL, SOCIAL, AND POLITICAL ISSUES

Ethical, social, and political issues are closely linked. The ethical dilemma you may face as a manager of information systems typically is reflected in social and political debate. One way to think about these relationships is shown in Figure 4.1. Imagine society as a more or less calm pond on a summer day, a delicate ecosystem in partial equilibrium with individuals and with social and political institutions. Individuals know how to act in this pond because social institutions (family, education, organizations) have developed well-honed rules of behavior, and these are supported by laws developed in the political sector that prescribe behavior and promise sanctions for violations. Now toss a rock into the center of the pond. What happens? Ripples, of course.

FIGURE 4.1 THE RELATIONSHIP BETWEEN ETHICAL, SOCIAL, AND POLITICAL ISSUES IN AN INFORMATION SOCIETY



The introduction of new information technology has a ripple effect, raising new ethical, social, and political issues that must be dealt with on the individual, social, and political levels. These issues have five moral dimensions: information rights and obligations, property rights and obligations, system quality, quality of life, and accountability and control.

Imagine instead that the disturbing force is a powerful shock of new information technology and systems hitting a society more or less at rest. Suddenly, individual actors are confronted with new situations often not covered by the old rules. Social institutions cannot respond overnight to these ripples—it may take years to develop etiquette, expectations, social responsibility, politically correct attitudes, or approved rules. Political institutions also require time before developing new laws and often require the demonstration of real harm before they act. In the meantime, you may have to act. You may be forced to act in a legal gray area.

We can use this model to illustrate the dynamics that connect ethical, social, and political issues. This model is also useful for identifying the main moral dimensions of the information society, which cut across various levels of action—individual, social, and political.

FIVE MORAL DIMENSIONS OF THE INFORMATION AGE

The major ethical, social, and political issues raised by information systems include the following moral dimensions:

- *Information rights and obligations.* What **information rights** do individuals and organizations possess with respect to themselves? What can they protect?
- *Property rights and obligations.* How will traditional intellectual property rights be protected in a digital society in which tracing and accounting for ownership are difficult and ignoring such property rights is so easy?
- *Accountability and control.* Who can and will be held accountable and liable for the harm done to individual and collective information and property rights?
- *System quality.* What standards of data and system quality should we demand to protect individual rights and the safety of society?
- *Quality of life.* What values should be preserved in an information- and knowledge-based society? Which institutions should we protect from violation? Which cultural values and practices are supported by the new information technology?

We explore these moral dimensions in detail in Section 4.3.

KEY TECHNOLOGY TRENDS THAT RAISE ETHICAL ISSUES

Ethical issues long preceded information technology. Nevertheless, information technology has heightened ethical concerns, taxed existing social arrangements, and made some laws obsolete or severely crippled. There are five key technological trends responsible for these ethical stresses and they are summarized in Table 4.2.

The doubling of computing power every 18 months has made it possible for most organizations to use information systems for their core production processes. As a result, our dependence on systems and our vulnerability to system errors and poor data quality have increased. Social rules and laws have not yet adjusted to this dependence. Standards for ensuring the accuracy and reliability of information systems (see Chapter 8) are not universally accepted or enforced.

Advances in data storage techniques and rapidly declining storage costs have been responsible for the multiplying databases on individuals—employees, customers, and potential customers—maintained by private and public organizations. These advances in data storage have made the routine violation

TABLE 4.2 TECHNOLOGY TRENDS THAT RAISE ETHICAL ISSUES

TREND	IMPACT
Computing power doubles every 18 months	More organizations depend on computer systems for critical operations.
Data storage costs rapidly decline	Organizations can easily maintain detailed databases on individuals.
Data analysis advances	Companies can analyze vast quantities of data gathered on individuals to develop detailed profiles of individual behavior.
Networking advances	The cost of moving data and making it accessible from anywhere falls exponentially .
Mobile device growth Impact	Individual cell phones may be tracked without user consent or knowledge.

of individual privacy both cheap and effective. Enormous data storage systems for terabytes and petabytes of data are now available on-site or as online services for firms of all sizes to use in identifying customers.

Advances in data analysis techniques for large pools of data are another technological trend that heightens ethical concerns because companies and government agencies are able to find out highly detailed personal information about individuals. With contemporary data management tools (see Chapter 6), companies can assemble and combine the myriad pieces of information about you stored on computers much more easily than in the past.

Think of all the ways you generate computer information about yourself—credit card purchases, telephone calls, magazine subscriptions, video rentals, mail-order purchases, banking records, local, state, and federal government records (including court and police records), and visits to Web sites. Put together and mined properly, this information could reveal not only your credit information but also your driving habits, your tastes, your associations, what you read and watch, and your political interests.

Companies with products to sell purchase relevant information from these sources to help them more finely target their marketing campaigns. Chapters 6 and 11 describe how companies can analyze large pools of data from multiple sources to rapidly identify buying patterns of customers and suggest individual responses. The use of computers to combine data from multiple sources and create electronic dossiers of detailed information on individuals is called **profiling**.

For example, several thousand of the most popular Web sites allow DoubleClick (owned by Google), an Internet advertising broker, to track the activities of their visitors in exchange for revenue from advertisements based on visitor information DoubleClick gathers. DoubleClick uses this information to create a profile of each online visitor, adding more detail to the profile as the visitor accesses an associated DoubleClick site. Over time, DoubleClick can create a detailed dossier of a person's spending and computing habits on the Web that is sold to companies to help them target their Web ads more precisely. The top 50 Web sites in the United States contain on average over 100 tracking programs installed by advertising firms to track your online behavior.

ChoicePoint gathers data from police, criminal, and motor vehicle records, credit and employment histories, current and previous addresses, professional licenses, and insurance claims to assemble and maintain electronic dossiers on almost every adult in the United States. The company sells this personal information to businesses and government agencies. Demand for personal

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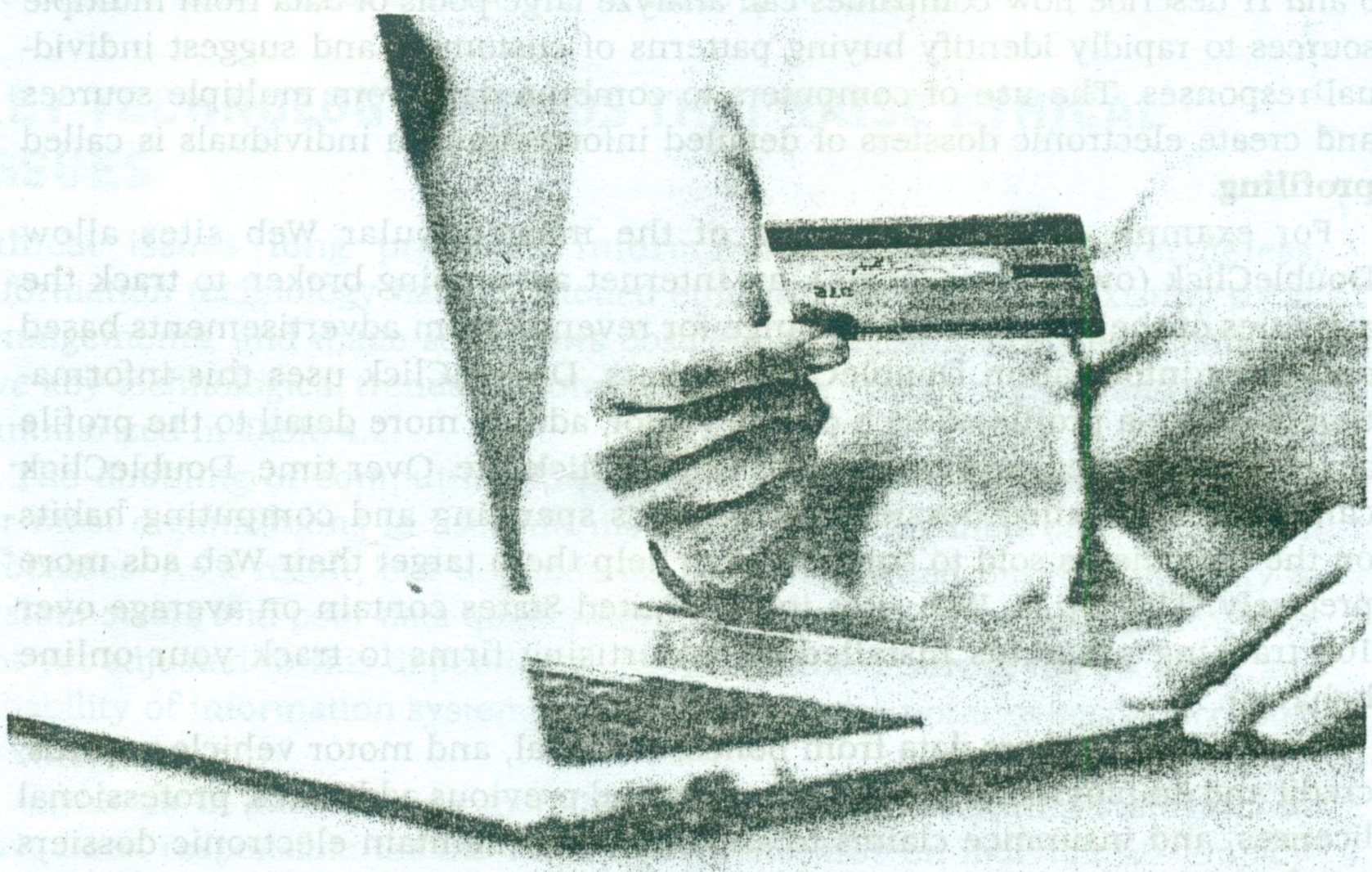
data is so enormous that data broker businesses such as ChoicePoint are flourishing. The two largest credit card networks, Visa Inc. and MasterCard Inc., have agreed to link credit card purchase information with consumer social network and other information to create customer profiles that could be sold to advertising firms. In 2013, Visa processed more than 45 billion transactions a year and MasterCard processed more than 23 billion transactions. Currently, this transactional information is not linked with consumer Internet activities.

A new data analysis technology called **nonobvious relationship awareness (NORA)** has given both the government and the private sector even more powerful profiling capabilities. NORA can take information about people from many disparate sources, such as employment applications, telephone records, customer listings, and "wanted" lists, and correlate relationships to find obscure hidden connections that might help identify criminals or terrorists (see Figure 4.2).

NORA technology scans data and extracts information as the data are being generated so that it could, for example, instantly discover a man at an airline ticket counter who shares a phone number with a known terrorist before that person boards an airplane. The technology is considered a valuable tool for homeland security but does have privacy implications because it can provide such a detailed picture of the activities and associations of a single individual.

An example of how government and private industry not only use the same data mining techniques to identify and track individuals, but in cases of national security, closely cooperate with one another in gathering data, was provided by the unauthorized release of documents describing the electronic surveillance activities of the U.S. National Security Agency (NSA).

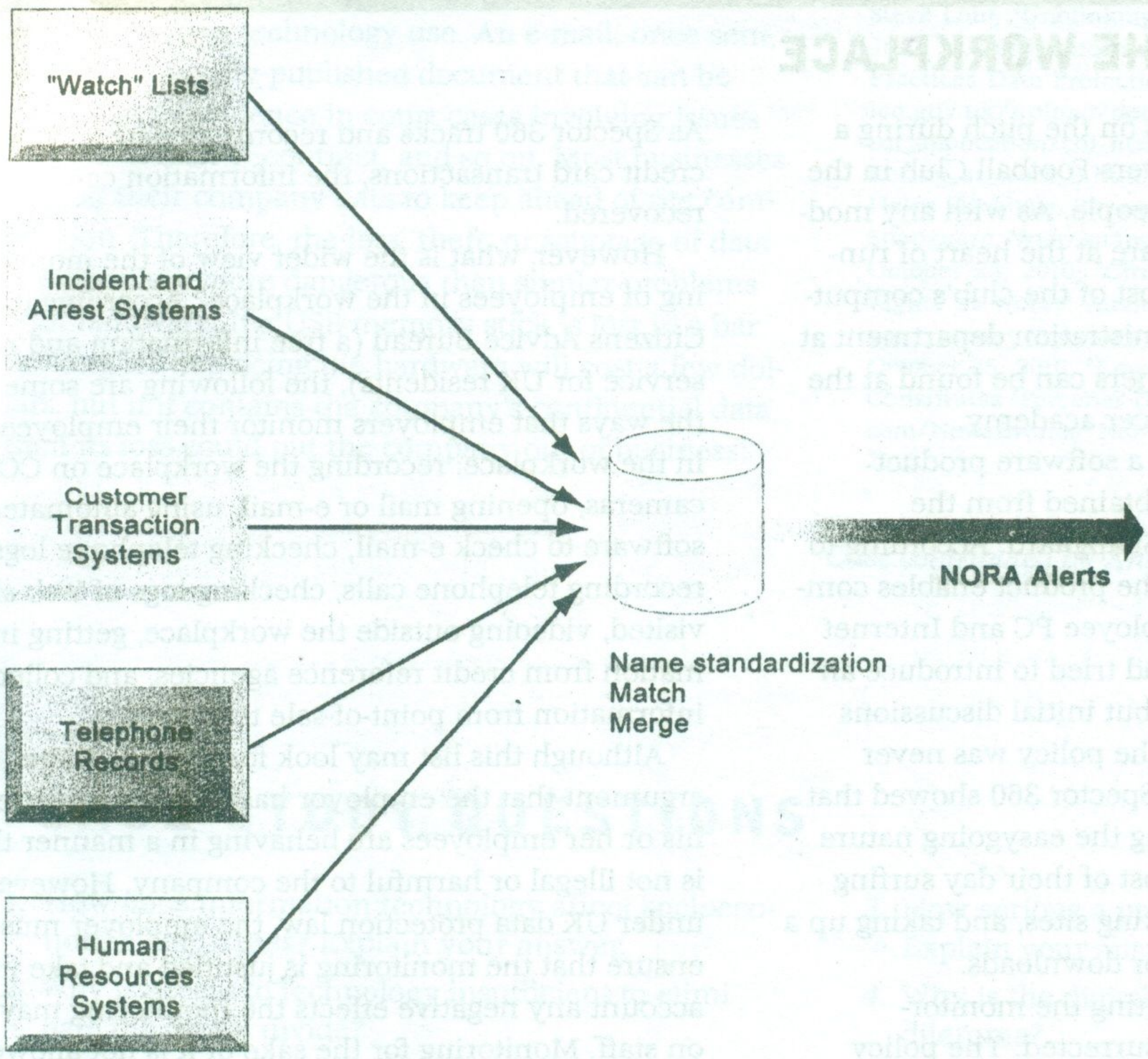
Finally, advances in networking, including the Internet, promise to greatly reduce the costs of moving and accessing large quantities of data and open the possibility of mining large pools of data remotely using small desktop machines, permitting an invasion of privacy on a scale and with a precision



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Credit card purchases can make personal information available to market researchers, telemarketers, and direct mail companies. Advances in information technology facilitate the invasion of privacy.

FIGURE 4.2 NONOBVIOUS RELATIONSHIP AWARENESS (NORA)



NORA technology can take information about people from disparate sources and find obscure, nonobvious relationships. It might discover, for example, that an applicant for a job at a casino shares a telephone number with a known criminal and issue an alert to the hiring manager.

heretofore unimaginable. The Interactive Session on Management describes the ways modern employees' privacy is compromised in the workplace.

4.2 WHAT SPECIFIC PRINCIPLES FOR CONDUCT CAN BE USED TO GUIDE ETHICAL DECISIONS?

Ethics is a concern of humans who have freedom of choice. Ethics is about individual choice: When faced with alternative courses of action, what is the correct moral choice? What are the main features of ethical choice?

BASIC CONCEPTS: RESPONSIBILITY, ACCOUNTABILITY, AND LIABILITY

Ethical choices are decisions made by individuals who are responsible for the consequences of their actions. **Responsibility** is a key element of ethical action. Responsibility means that you accept the potential costs, duties, and obligations for the decisions you make. **Accountability** is a feature of systems and social institutions: It means that mechanisms are in place to determine who took

INTERACTIVE SESSION: MANAGEMENT

MONITORING IN THE WORKPLACE

There may be only 11 players on the pitch during a match, but the Blackburn Rovers Football Club in the UK employs more than 800 people. As with any modern organization, computers are at the heart of running an efficient business. Most of the club's computers are housed with the administration department at the Ewood Park office, but others can be found at the club's training center and soccer academy.

The club decided to install a software product called Spector 360, which it obtained from the Manchester-based company Snapguard. According to Snapguard's sales literature, the product enables company-wide monitoring of employee PC and Internet usage. Previously, the club had tried to introduce an acceptable use policy (AUP), but initial discussions with employees stalled, and the policy was never implemented. Early trials of Spector 360 showed that some employees were abusing the easygoing nature of the workplace to spend most of their day surfing the Web, using social networking sites, and taking up a huge amount of bandwidth for downloads.

Before officially implementing the monitoring software, the AUP was resurrected. The policy was also made part of the terms and conditions of employment. Understandably, some employees were annoyed at the concept of being watched, but the software was installed anyway. According to Ben Hayler, senior systems administrator at Blackburn Rovers, Spector 360 has definitely restored order, increasing productivity and reducing activity on non-business apps.

Reports provided by Spector 360 can show managers the following: excessive use of Facebook, Twitter, and other social networking sites; visits to adult sites or shopping sites; use of chat services; the printing or saving of confidential information; and staff login and logout times. Managers can also use the software to drill-down to look at patterns of usage, generate screen snapshots, or even log individual keystrokes.

The software can also be used to benefit employees. For example, because it can log exactly what an employee is doing, the system can help in staff training and troubleshooting, because it is easy to track exactly what caused a particular problem to occur.

Another important benefit of the software is that it helps the club to stay compliant with the Payment Card Industry (PCI) Data Security Standard. PCI standards require access to credit card information. As Spector 360 tracks and records all data to do with credit card transactions, the information can be easily recovered.

However, what is the wider view of the monitoring of employees in the workplace? According to the Citizens Advice Bureau (a free information and advice service for UK residents), the following are some of the ways that employers monitor their employees in the workplace: recording the workplace on CCTV cameras, opening mail or e-mail, using automated software to check e-mail, checking telephone logs or recording telephone calls, checking logs of Web sites visited, videoing outside the workplace, getting information from credit reference agencies, and collecting information from point-of-sale terminals.

Although this list may look formidable, there is no argument that the employer has a right to ensure that his or her employees are behaving in a manner that is not illegal or harmful to the company. However, under UK data protection law, the employer must ensure that the monitoring is justified and take into account any negative effects the monitoring may have on staff. Monitoring for the sake of it is not allowed. Secret monitoring without employees' knowledge is usually illegal.

In a case that went before the European Court of Human Rights in 2007 (*Copeland v. the United Kingdom*), Ms. Copeland, who was an employee of Carmarthenshire College, claimed that her privacy had been violated. She was a personal assistant to the principal and also worked closely with the deputy principal, who instigated monitoring and analysis of her telephone bills, Web sites visited, and e-mail communication. The deputy principal wanted to determine whether Copeland was making excessive use of the college's services. The European Court ruled in her favor, stating that her personal Internet usage was deemed to be under the definitions of the Convention for the Protection of Rights, covered as "private life."

The major fault of Carmarthenshire College was in not having a usage policy in place. Employers and employees should have an agreed-upon policy as part of the contract of employment that clarifies what is and is not acceptable computer usage in the workplace. The employer can then follow normal disciplinary procedures if an employee is using workplace equipment in a manner that is not permitted in the contract of employment.

Whatever the legal situation, it is clear where potential problems can occur in the workplace regarding information technology use. An e-mail, once sent, becomes a legally published document that can be produced as evidence in court cases involving issues of libel, breach of contract, and so on. Most businesses rely on their company data to keep ahead of the competition. Therefore, the loss, theft, or sabotage of data is potentially more dangerous than similar problems with hardware. If a USB memory stick is lost in a bar parking lot, replacing the hardware will cost a few dollars, but if it contains the company's confidential data, then its loss could put the company out of business!

Sources: Spencer E. Ante and Lauren Weber, "Memo to Workers: The Boss Is Watching," *Wall Street Journal,* October 22, 2014; Steve Lohr, "Unblinking Eyes Track Employees," *New York Times,* June 21, 2014; Information Commissioners Office, "Employment Practices Data Protection Code-Supplementary Guidance," www.ico.gov.uk/upload/documents/library/data_protection/practical_application/coi_html/english/supplementary_guidance/monitoring_at_work_3.html, accessed October 25, 2010; "Spector 360 Helps Blackburn Rovers Show Red Card to PC and Internet Abuse," Snapguard, www.snapguard.co.uk/blackburn_ fc.html, accessed October 25, 2010; "Citizens Advice Bureau Advice Guide, Basic Rights at Work," Adviceguide, www.adviceguide.org.uk/index/your_money/employment/basic_ rights_at_work.htm, accessed October 25, 2010; "Employee Monitoring in the Workplace: What Constitutes 'Personal Data'?" Crowell and Moring, www.crowell.com/NewsEvents/ Newsletter.aspx?id=654, accessed October 25, 2010.

Case contributed by Andy Jones, Staffordshire University.

CASE STUDY QUESTIONS

1. How does information technology affect socioeconomic disparities? Explain your answer.
2. Why is access to technology insufficient to eliminate the digital divide?
3. How serious a problem is the "new" digital divide? Explain your answer.
4. Why is the digital divide problem an ethical dilemma?

responsible action, and who is responsible. Systems and institutions in which it is impossible to find out who took what action are inherently incapable of ethical analysis or ethical action. **Liability** extends the concept of responsibility further to the area of laws. Liability is a feature of political systems in which a body of laws is in place that permits individuals to recover the damages done to them by other actors, systems, or organizations. **Due process** is a related feature of law-governed societies and is a process in which laws are known and understood, and there is an ability to appeal to higher authorities to ensure that the laws are applied correctly.

These basic concepts form the underpinning of an ethical analysis of information systems and those who manage them. First, information technologies are filtered through social institutions, organizations, and individuals. Systems do not have impacts by themselves. Whatever information system

impacts exist are products of institutional, organizational, and individual actions and behaviors. Second, responsibility for the consequences of technology falls clearly on the institutions, organizations, and individual managers who choose to use the technology. Using information technology in a socially responsible manner means that you can and will be held accountable for the consequences of your actions. Third, in an ethical, political society, individuals and others can recover damages done to them through a set of laws characterized by due process.

ETHICAL ANALYSIS

When confronted with a situation that seems to present ethical issues, how should you analyze it? The following five-step process should help:

1. *Identify and describe the facts clearly.* Find out who did what to whom, and where, when, and how. In many instances, you will be surprised at the errors in the initially reported facts, and often you will find that simply getting the facts straight helps define the solution. It also helps to get the opposing parties involved in an ethical dilemma to agree on the facts.
2. *Define the conflict or dilemma and identify the higher-order values involved.* Ethical, social, and political issues always reference higher values. The parties to a dispute all claim to be pursuing higher values (e.g., freedom, privacy, protection of property, and the free enterprise system). Typically, an ethical issue involves a dilemma: two diametrically opposed courses of action that support worthwhile values. For example, the chapter-opening case study illustrates two competing values: the need to improve access to digital content and the need to respect the property rights of the owners of that content.
3. *Identify the stakeholders.* Every ethical, social, and political issue has stakeholders: players in the game who have an interest in the outcome, who have invested in the situation, and usually who have vocal opinions. Find out the identity of these groups and what they want. This will be useful later when designing a solution.
4. *Identify the options that you can reasonably take.* You may find that none of the options satisfy all the interests involved, but that some options do a better job than others. Sometimes arriving at a good or ethical solution may not always be a balancing of consequences to stakeholders.
5. *Identify the potential consequences of your options.* Some options may be ethically correct but disastrous from other points of view. Other options may work in one instance but not in other similar instances. Always ask yourself, "What if I choose this option consistently over time?"

CANDIDATE ETHICAL PRINCIPLES

Once your analysis is complete, what ethical principles or rules should you use to make a decision? What higher-order values should inform your judgment? Although you are the only one who can decide which among many ethical principles you will follow, and how you will prioritize them, it is helpful to consider some ethical principles with deep roots in many cultures that have survived throughout recorded history:

1. Do unto others as you would have them do unto you (the **Golden Rule**). Putting yourself into the place of others, and thinking of yourself as the object of the decision, can help you think about fairness in decision making.
2. If an action is not right for everyone to take, it is not right for anyone (**Immanuel Kant's Categorical Imperative**). Ask yourself, "If everyone did this, could the organization, or society, survive?"

3. If an action cannot be taken repeatedly, it is not right to take at all. This is the slippery-slope rule: An action may bring about a small change now that is acceptable, but if it is repeated, it would bring unacceptable changes in the long run. In the vernacular, it might be stated as "once started down a slippery path, you may not be able to stop."
4. Take the action that achieves the higher or greater value (**Utilitarian Principle**). This rule assumes you can prioritize values in a rank order and understand the consequences of various courses of action.
5. Take the action that produces the least harm or the least potential cost (**Risk Aversion Principle**). Some actions have extremely high failure costs of very low probability (e.g., building a nuclear generating facility in an urban area) or extremely high failure costs of moderate probability (speeding and automobile accidents). Avoid these high-failure-cost actions, paying greater attention to high-failure-cost potential of moderate to high probability.
6. Assume that virtually all tangible and intangible objects are owned by someone else unless there is a specific declaration otherwise. (This is the **ethical "no free lunch" rule**.) If something someone else has created is useful to you, it has value, and you should assume the creator wants compensation for this work.

Actions that do not easily pass these rules deserve close attention and a great deal of caution. The appearance of unethical behavior may do as much harm to you and your company as actual unethical behavior.

PROFESSIONAL CODES OF CONDUCT

When groups of people claim to be professionals, they take on special rights and obligations because of their special claims to knowledge, wisdom, and respect. Professional codes of conduct are promulgated by associations of professionals, such as the American Medical Association (AMA), the American Bar Association (ABA), the Association of Information Technology Professionals (AITP), and the Association for Computing Machinery (ACM). These professional groups take responsibility for the partial regulation of their professions by determining entrance qualifications and competence. Codes of ethics are promises by professions to regulate themselves in the general interest of society. For example, avoiding harm to others, honoring property rights (including intellectual property), and respecting privacy are among the General Moral Imperatives of the ACM's Code of Ethics and Professional Conduct.

SOME REAL-WORLD ETHICAL DILEMMAS

Information systems have created new ethical dilemmas in which one set of interests is pitted against another. For example, many of the large telephone companies in the United States are using information technology to reduce the sizes of their workforces. Voice recognition software reduces the need for human operators by enabling computers to recognize a customer's responses to a series of computerized questions. Many companies monitor what their employees are doing on the Internet to prevent them from wasting company resources on non-business activities. Facebook monitors its subscribers and then sells the information to advertisers and app developers (see the chapter-ending case study).

In each instance, you can find competing values at work, with groups lined up on either side of a debate. A company may argue, for example, that it has a right to use information systems to increase productivity and reduce the size

of its workforce to lower costs and stay in business. Employees displaced by information systems may argue that employers have some responsibility for their welfare. Business owners might feel obligated to monitor employee e-mail and Internet use to minimize drains on productivity. Employees might believe they should be able to use the Internet for short personal tasks in place of the telephone. A close analysis of the facts can sometimes produce compromised solutions that give each side "half a loaf." Try to apply some of the principles of ethical analysis described to each of these cases. What is the right thing to do?

4.3 WHY DO CONTEMPORARY INFORMATION SYSTEMS TECHNOLOGY AND THE INTERNET POSE CHALLENGES TO THE PROTECTION OF INDIVIDUAL PRIVACY AND INTELLECTUAL PROPERTY?

In this section, we take a closer look at the five moral dimensions of information systems first described in Figure 4.1. In each dimension, we identify the ethical, social, and political levels of analysis and use real-world examples to illustrate the values involved, the stakeholders, and the options chosen.

INFORMATION RIGHTS: PRIVACY AND FREEDOM IN THE INTERNET AGE

Privacy is the claim of individuals to be left alone, free from surveillance or interference from other individuals or organizations, including the state. Claims to privacy are also involved at the workplace: Millions of employees are subject to electronic and other forms of high-tech surveillance. Information technology and systems threaten individual claims to privacy by making the invasion of privacy cheap, profitable, and effective.

The claim to privacy is protected in the U.S., Canadian, and German constitutions in a variety of different ways and in other countries through various statutes. In the United States, the claim to privacy is protected primarily by the First Amendment guarantees of freedom of speech and association, the Fourth Amendment protections against unreasonable search and seizure of one's personal documents or home, and the guarantee of due process.

Table 4.3 describes the major U.S. federal statutes that set forth the conditions for handling information about individuals in such areas as credit reporting, education, financial records, newspaper records, and electronic communications. The Privacy Act of 1974 has been the most important of these laws, regulating the federal government's collection, use, and disclosure of information. At present, most U.S. federal privacy laws apply only to the federal government and regulate very few areas of the private sector.

Most American and European privacy law is based on a regime called **Fair Information Practices (FIP)** first set forth in a report written in 1973 by a federal government advisory committee and updated most recently in 2010 to take into account new privacy-invading technology (FTC, 2010; U.S. Department of Health, Education, and Welfare, 1973). FIP is a set of principles governing the collection and use of information about individuals. FIP principles are based on the notion of a mutuality of interest between the record holder and the individual. The individual has an interest in engaging in a transaction, and the record keeper—usually a business or government agency—requires

TABLE 4.3 FEDERAL PRIVACY LAWS IN THE UNITED STATES

GENERAL FEDERAL PRIVACY LAWS	PRIVACY LAWS AFFECTING PRIVATE INSTITUTIONS
Freedom of Information Act of 1966 as Amended (5 USC 552)	Fair Credit Reporting Act of 1970
Privacy Act of 1974 as Amended (5 USC 552a)	Family Educational Rights and Privacy Act of 1974
Electronic Communications Privacy Act of 1986	Right to Financial Privacy Act of 1978
Computer Matching and Privacy Protection Act of 1988	Privacy Protection Act of 1980
Computer Security Act of 1987	Cable Communications Policy Act of 1984
Federal Managers Financial Integrity Act of 1982	Electronic Communications Privacy Act of 1986
Driver's Privacy Protection Act of 1994	Video Privacy Protection Act of 1988
E-Government Act of 2002	The Health Insurance Portability and Accountability Act of 1996 (HIPAA)
	Children's Online Privacy Protection Act (COPPA) of 1998
	Financial Modernization Act (Gramm-Leach-Bliley Act) of 1999

information about the individual to support the transaction. Once information is gathered, the individual maintains an interest in the record, and the record may not be used to support other activities without the individual's consent. In 1998, the FTC restated and extended the original FIP to provide guidelines for protecting online privacy. Table 4.4 describes the FTC's Fair Information Practice principles.

The FTC's FIP principles are being used as guidelines to drive changes in privacy legislation. In July 1998, the U.S. Congress passed the Children's Online Privacy Protection Act (COPPA), requiring Web sites to obtain parental permission before collecting information on children under the age of 13. The FTC has recommended additional legislation to protect online consumer privacy in advertising networks that collect records of consumer Web activity to develop detailed profiles, which are then used by other companies to target online ads. In 2010, the FTC added three practices to its framework for privacy. Firms should adopt "privacy by design," building products and services that protect privacy. Firms should increase the transparency of their data practices. And firms should require consumer consent and provide clear options to opt out of

TABLE 4.4 FEDERAL TRADE COMMISSION FAIR INFORMATION PRACTICE PRINCIPLES

1.	Notice/awareness (core principle). Web sites must disclose their information practices before collecting data. Includes identification of collector; uses of data; other recipients of data; nature of collection (active/inactive); voluntary or required status; consequences of refusal; and steps taken to protect confidentiality, integrity, and quality of the data.
2.	Choice/consent (core principle). There must be a choice regime in place allowing consumers to choose how their information will be used for secondary purposes other than supporting the transaction, including internal use and transfer to third parties.
3.	Access/participation. Consumers should be able to review and contest the accuracy and completeness of data collected about them in a timely, inexpensive process.
4.	Security. Data collectors must take responsible steps to assure that consumer information is accurate and secure from unauthorized use.
5.	Enforcement. There must be in place a mechanism to enforce FIP principles. This can involve self-regulation, legislation giving consumers legal remedies for violations, or federal statutes and regulations.

data collection schemes (FTC, 2010). Other proposed Internet privacy legislation focuses on protecting the online use of personal identification numbers, such as social security numbers; protecting personal information collected on the Internet that deals with individuals not covered by COPPA; and limiting the use of data mining for homeland security.

Beginning in 2009 and continuing through 2012, the FTC extended its FIP doctrine to address the issue of behavioral targeting. The FTC held hearings to discuss its program for voluntary industry principles for regulating behavioral targeting. The online advertising trade group Network Advertising Initiative (discussed later in this section), published its own self-regulatory principles that largely agreed with the FTC. Nevertheless, the government, privacy groups, and the online ad industry are still at loggerheads over two issues. Privacy advocates want both an opt-in policy at all sites and a national Do Not Track list. The industry opposes these moves and continues to insist on an opt-out capability being the only way to avoid tracking. In May 2011, Senator Jay D. Rockefeller (D-WV), Chairman of the Senate Commerce Subcommittee on Consumer Protection, Product Safety, and Insurance, held hearings to discuss consumer privacy concerns and to explore the possible role of the federal government in protecting consumers in the mobile marketplace. Rockefeller supports the Do-Not-Track Online Act of 2011 (reintroduced in 2013), which requires firms to notify consumers they are being tracked and allows consumers to opt out of the tracking (U.S. Senate, 2011). Nevertheless, there is an emerging consensus among all parties that greater transparency and user control (especially making opting out of tracking the default option) is required to deal with behavioral tracking. While there are many studies of privacy issues at the federal level, there has been no significant legislation in recent years.

Privacy protections have also been added to recent laws deregulating financial services and safeguarding the maintenance and transmission of health information about individuals. The Gramm-Leach-Bliley Act of 1999, which repeals earlier restrictions on affiliations among banks, securities firms, and insurance companies, includes some privacy protection for consumers of financial services. All financial institutions are required to disclose their policies and practices for protecting the privacy of nonpublic personal information and to allow customers to opt out of information-sharing arrangements with nonaffiliated third parties.

The Health Insurance Portability and Accountability Act (HIPAA) of 1996, which took effect on April 14, 2003, includes privacy protection for medical records. The law gives patients access to their personal medical records maintained by health care providers, hospitals, and health insurers, and the right to authorize how protected information about themselves can be used or disclosed. Doctors, hospitals, and other health care providers must limit the disclosure of personal information about patients to the minimum amount necessary to achieve a given purpose.

The European Directive on Data Protection

In Europe, privacy protection is much more stringent than in the United States. Unlike the United States, European countries do not allow businesses to use personally identifiable information without consumers' prior consent. On October 25, 1998, the European Commission's Directive on Data Protection went into effect, broadening privacy protection in the European Union (EU) nations. The directive requires companies to inform people when they collect information about them and disclose how it will be stored and used. Customers must provide

their **informed consent** before any company can legally use data about them, and they have the right to access that information, correct it, and request that no further data be collected. Informed consent can be defined as consent given with knowledge of all the facts needed to make a rational decision. EU member nations must translate these principles into their own laws and cannot transfer personal data to countries, such as the United States, that do not have similar privacy protection regulations. In 2009, the European Parliament passed new rules governing the use of third-party cookies for behavioral tracking purposes. These new rules were implemented in May 2011 and require that Web site visitors must give explicit consent to be tracked by cookies. Web sites will be required to have highly visible warnings on their pages if third-party cookies are being used (European Parliament, 2009).

In January 2012, the E.U. issued significant proposed changes to its data protection rules, the first overhaul since 1995 (European Commission, 2012). The new rules would apply to all companies providing services in Europe, and require Internet companies like Amazon, Facebook, Apple, Google, and others to obtain explicit consent from consumers about the use of their personal data, delete information at the user's request (based on the "right to be forgotten"), and retain information only as long as absolutely necessary. In 2014 the European Union is considering significant changes in privacy policies by extending greater control to users of the Internet. While the privacy policies of United States firms are largely voluntary, in Europe privacy policies are mandated, and more consistent across jurisdictions. Among the changes being discussed are a requirement that firms inform users before collecting data, and every time they collect data, and how it will be used. Users would have to give consent to any data collection. Other proposals call for users to have a "right of access" to personal data, and the "right to be forgotten."

Working with the European Commission, the U.S. Department of Commerce developed a safe harbor framework for U.S. firms. A **safe harbor** is a private, self-regulating policy and enforcement mechanism that meets the objectives of government regulators and legislation but does not involve government regulation or enforcement. U.S. businesses would be allowed to use personal data from EU countries if they develop privacy protection policies that meet EU standards. Enforcement would occur in the United States using self-policing, regulation, and government enforcement of fair trade statutes.

Internet Challenges to Privacy

Internet technology has posed new challenges for the protection of individual privacy. Information sent over this vast network of networks may pass through many different computer systems before it reaches its final destination. Each of these systems is capable of monitoring, capturing, and storing communications that pass through it.

Web sites track searches that have been conducted, the Web sites and Web pages visited, the online content a person has accessed, and what items that person has inspected or purchased over the Web. This monitoring and tracking of Web site visitors occurs in the background without the visitor's knowledge. It is conducted not just by individual Web sites but by advertising networks such as Microsoft Advertising, Yahoo, and Google's DoubleClick that are capable of tracking personal browsing behavior across thousands of Web sites. Both Web site publishers and the advertising industry defend tracking of individuals across the Web because doing so allows more relevant ads to be targeted to users, and it pays for the cost of publishing Web sites. In this sense, it's like broadcast television: advertiser-supported content that is free to the user. The commercial demand for this personal

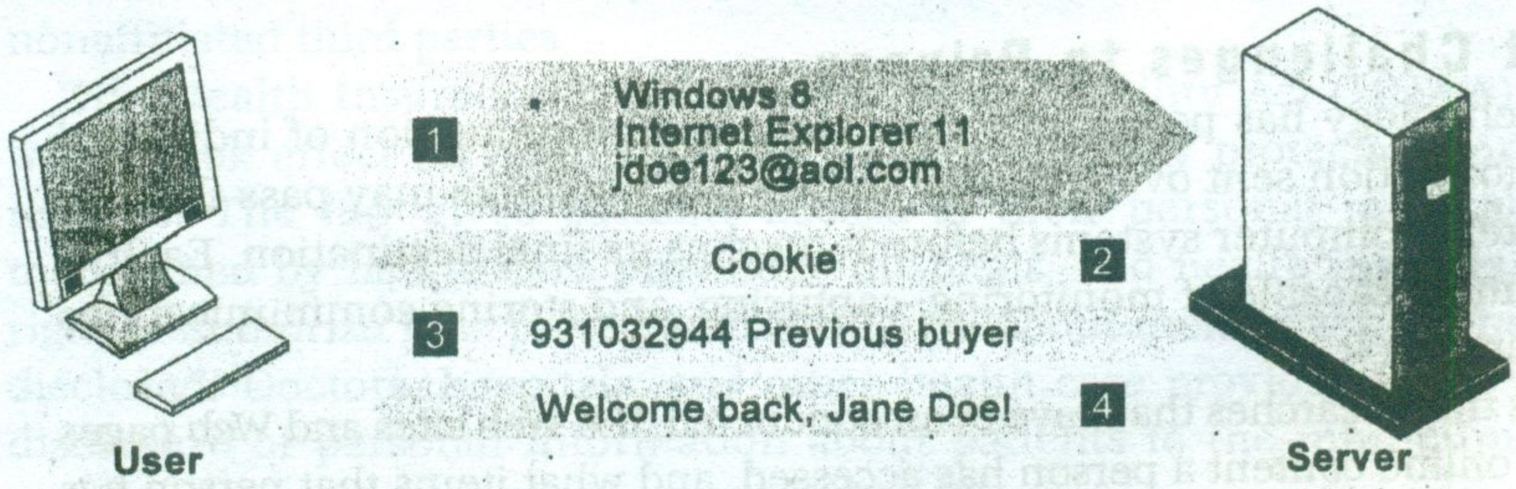
information is virtually insatiable. However, these practices also impinge on individual privacy, as discussed in the Interactive Session on Technology.

Cookies are small text files deposited on a computer hard drive when a user visits Web sites. Cookies identify the visitor's Web browser software and track visits to the Web site. When the visitor returns to a site that has stored a cookie, the Web site software will search the visitor's computer, find the cookie, and know what that person has done in the past. It may also update the cookie, depending on the activity during the visit. In this way, the site can customize its content for each visitor's interests. For example, if you purchase a book on Amazon.com and return later from the same browser, the site will welcome you by name and recommend other books of interest based on your past purchases. DoubleClick, described earlier in this chapter, uses cookies to build its dossiers with details of online purchases and to examine the behavior of Web site visitors. Figure 4.3 illustrates how cookies work.

Web sites using cookie technology cannot directly obtain visitors' names and addresses. However, if a person has registered at a site, that information can be combined with cookie data to identify the visitor. Web site owners can also combine the data they have gathered from cookies and other Web site monitoring tools with personal data from other sources, such as offline data collected from surveys or paper catalog purchases, to develop very detailed profiles of their visitors.

There are now even more subtle and surreptitious tools for surveillance of Internet users. So-called "super cookies" or Flash cookies cannot be easily deleted and can be installed whenever a person clicks on a Flash video. These so-called "Local Shared Object" files are used by Flash to play videos and are put on the user's computer without their consent. Marketers use Web beacons as another tool to monitor online behavior. **Web beacons**, also called *Web bugs* (or simply "tracking files"), are tiny software programs that keep a record of users' online clickstream and report this data back to whomever owns the tracking file invisibly embedded in e-mail messages and Web pages that are designed to monitor the behavior of the user visiting a Web site or sending e-mail. Web

FIGURE 4.3 HOW COOKIES IDENTIFY WEB VISITORS



1. The Web server reads the user's Web browser and determines the operating system, browser name, version number, Internet address, and other information.
2. The server transmits a tiny text file with user identification information called a cookie, which the user's browser receives and stores on the user's computer hard drive.
3. When the user returns to the Web site, the server requests the contents of any cookie it deposited previously in the user's computer.
4. The Web server reads the cookie, identifies the visitor, and calls up data on the user.

Cookies are written by a Web site on a visitor's hard drive. When the visitor returns to that Web site, the Web server requests the ID number from the cookie and uses it to access the data stored by that server on that visitor. The Web site can then use these data to display personalized information.

INTERACTIVE SESSION: TECHNOLOGY

BIG DATA GETS PERSONAL: BEHAVIORAL TARGETING

Ever get the feeling somebody is trailing you on the Web, watching your every click? Do you wonder why you start seeing display ads and pop-ups just after you've been searching the Web for a car, a dress, or cosmetic product? Well, you're right: your behavior is being tracked, and you are being targeted on the Web as you move from site to site in order to expose you to certain "targeted" ads. It's Big Data's dark side.

Individual Web sites and companies whose business is identifying and tracking Internet users for advertisers and marketers are collecting data on your every online move. Google, which handles more than 3.5 billion Web searches each day, knows more about you than your mother does. Many of the tracking tools gather incredibly personal information such as age, gender, race, income, marital status, health concerns (health topics you search on), TV shows and movies viewed, magazines and newspapers read, and books purchased. A $31 billion dollar online ad industry is driving this intense data collection. Facebook, which maintains detailed data on over 1 billion users, employs its Like button to follow users around the Web even if you log off. Its social networking site is one giant tracking system that remembers what you like, what your friends like, and whatever you reveal on your Wall. (See the chapter-ending case study.) Plus, Google's social networking tool, knows about your friendships on Gmail, the places you go on maps, and how you spend your time on the more than two million websites in Google's ad network. It is able to gather this information even though relatively few people use Plus for their social network.

While tracking firms claim the information they gather is anonymous, this is true in name only. Scholars have shown that with just a few pieces of information, such as age, gender, zip code, and marital status, specific individuals can be easily identified. Moreover, tracking firms combine their online data with data they purchase from offline firms who track retail store purchases of virtually all Americans. Here, personal names and other identifiers are used.

Use of real identities across the Web is going mainstream at a rapid clip. A Wall Street Journal examination of nearly 1,000 top Websites found that 75% now include code from social networks, such as Facebook's "Like" or Twitter's "Tweet" buttons. Such code can match people's identities with their Web-browsing activities on an unprecedented scale and can even track a user's arrival on a page if the button is never clicked.

In separate research, the Journal examined what happens when people logged in to roughly 70 popular Websites that request a login and found that more than a quarter of the time, the sites passed along a user's real name, email address or other personal details to third-party companies.

Online advertising titans like Google, Microsoft, and Yahoo are all looking for ways to monetize their huge collections of online behavioral data. While search engine marketing is arguably the most effective form of advertising in history, untargeted banner display ad marketing is highly inefficient because it displays ads to everyone regardless of their interests. As a result, these firms cannot charge much for display ads. However, by tracking the online movements of 245 million U.S. Internet users, they can develop a very clear picture of who you are, and use that information to show you ads that might be of interest to you. This would make the marketing process more efficient, and more profitable for all the parties involved.

You're also being tracked closely when you use your mobile phone to access the Internet, visit your Facebook page, get Twitter feeds, watch video, and listen to music. The mobile Web is working hard to keep track of your whereabouts, locations, habits, and friends in the hope of selling you even more products and services.

New technologies found on smartphones can identify where you are located within a few yards. Performing routine actions using your smart phone makes it possible to locate you throughout the day, to report this information to corporate databases, retain and analyze the information, and then sell it to advertisers. Most of the popular apps report your location. Law enforcement agencies certainly have an interest in knowing the whereabouts of criminals and suspects. There are, of course, many times when you would like to report your location either automatically or on your command. If you were injured, for instance, you might like your cell phone to be able to automatically report your location to authorities, or, if you were in a restaurant, you might want to notify your friends where you are and what you

are doing. But what about occasions when you don't want anyone to know where you are, least of all advertisers and marketers?

Location data gathered from cell phones has extraordinary commercial value because advertising companies can send you highly targeted advertisements, coupons, and flash bargains, based on where you are located. This technology is the foundation for many location-based services, which include smartphone maps and charts, shopping apps, and social apps that you can use to let your friends know where you are and what you are doing. Revenues from the global location-based services market are projected to reach reach $10.3 billion in 2015, according to Gartner.

Both Apple's iPhone and Google's Android phones collect personal, private location data, and both firms are building massive databases that can pinpoint your location. Advertising firms pay Apple and Google for that information and for distributing their mobile ads, and they are becoming increasingly important sources of revenue. In 2012, Google earned $2.2 billion from its mobile ads. Smartphone apps that provide location-based services are also sources of personal, private location information based on the smartphone GPS capability.

Expect those eyes to follow your movements even more in the future as behavioral targeting becomes even more precise. New software is being developed to help advertisers track users across devices by establishing cross-screen identities. That means that companies will be able to serve ads to your mobile phone based on what they learned about you from surfing the Web on your PC.

Sources: Claire Cain Miller, "The Plus in Google Plus? It's Mostly for Google," *New York Times*, February 14, 2014; Elizabeth Dwoskin, "Internet Users Tap Tech Tools That Protect Them From Prying Eyes," *Wall Street Journal*, March 23, 2014; Claire Cain Miller and Somni Sengupta, "Selling Secrets of Phone Users to Advertisers," *New York Times*, October 5, 2013; Natasha Singer, "Their Apps Track You, Will Congress Track Them?" *The New York Times*, January 5, 2013; Spencer E. Ante, "Online Ads Can Now Follow Your Home," *The Wall Street Journal*, April 29, 2013; Jennifer Valentino-Devries and Jeremy Singer, "*They Know What You're Shopping For*," *The Wall Street Journal*, December 7 , 2013.

CASE STUDY QUESTIONS

1. Why is behavioral tracking such an important ethical dilemma today? Identify the stakeholders and interest groups in favor of and opposed to behavioral tracking.
2. How do businesses benefit from behavioral tracking? Do people benefit? Explain your answer.
3. What would happen if there were no behavioral tracking on the Internet?

beacons are placed on popular Web sites by third-party firms who pay the Web sites a fee for access to their audience. So how common is Web tracking? In a path-breaking series of articles in the *Wall Street Journal* in 2010 and 2011, researchers examined the tracking files on 50 of the most popular U.S Web sites. What they found revealed a very widespread surveillance system. On the 50 sites, they discovered 3,180 tracking files installed on visitor computers. Only one site, Wikipedia, had no tracking files. Some popular sites such as Dictionary.com, MSN, and Comcast, installed more than 100 tracking files! Two-thirds of the tracking files came from 131 companies whose primary business is identifying and tracking Internet users to create consumer profiles that can be sold to advertising firms looking for specific types of customers. The biggest trackers were Google, Microsoft, and Quantcast, all of whom are in the business of selling ads to advertising firms and marketers. A follow-up study in 2012 found the situation had worsened: tracking on the 50 most popular sites had risen nearly five fold! The cause: growth of online ad auctions where advertisers buy the data about users' Web browsing behavior.

Other **spyware** can secretly install itself on an Internet user's computer by piggybacking on larger applications. Once installed, the spyware calls out to

Web sites to send banner ads and other unsolicited material to the user, and it can report the user's movements on the Internet to other computers. More information is available about intrusive software in Chapter 8.

Nearly 80 percent of global Internet users use Google Search and other Google services, making Google the world's largest collector of online user data. Whatever Google does with its data has an enormous impact on online privacy. Most experts believe that Google possesses the largest collection of personal information in the world—more data on more people than any government agency. The nearest competitor is Facebook.

After Google acquired the advertising network DoubleClick in 2007, Google has been using behavioral targeting to help it display more relevant ads based on users' search activities and to target individuals as they move from one site to another in order to show them display or banner ads. Google allows tracking software on its search pages, and using DoubleClick, it is able to track users across the Internet. One of its programs enables advertisers to target ads based on the search histories of Google users, along with any other information the user submits to Google such as age, demographics, region, and other Web activities (such as blogging). Google's AdSense program enables Google to help advertisers select keywords and design ads for various market segments based on search histories, such as helping a clothing Web site create and test ads targeted at teenage females. A recent study found that 88 percent of 400,000 Web sites had at least one Google tracking bug.

Google has also been scanning the contents of messages received by users of its free Web-based e-mail service called Gmail. Ads that users see when they read their e-mail are related to the subjects of these messages. Profiles are developed on individual users based on the content in their e-mail. Google now displays targeted ads on YouTube and on Google mobile applications, and its DoubleClick ad network serves up targeted banner ads.

The United States has allowed businesses to gather transaction information generated in the marketplace and then use that information for other marketing purposes without obtaining the informed consent of the individual whose information is being used. An **opt-out** model of informed consent permits the collection of personal information until the consumer specifically requests that the data not be collected. Privacy advocates would like to see wider use of an **opt-in** model of informed consent in which a business is prohibited from collecting any personal information unless the consumer specifically takes action to approve information collection and use. Here, the default option is no collection of user information.

The online industry has preferred self-regulation to privacy legislation for protecting consumers. The online advertising industry formed the Online Privacy Alliance to encourage self-regulation to develop a set of privacy guidelines for its members. The group promotes the use of online seals, such as that of TRUSTe, certifying Web sites adhering to certain privacy principles. Members of the advertising network industry, including Google's DoubleClick, have created an additional industry association called the Network Advertising Initiative (NAI) to develop its own privacy policies to help consumers opt out of advertising network programs and provide consumers redress from abuses.

Individual firms like Microsoft, Mozilla Foundation, Yahoo, and Google have recently adopted policies on their own in an effort to address public concern about tracking people online. Microsoft's Internet Explorer 10 Web browser was shipped with the opt-out option as the default in 2013. Other browsers have opt out options but users need to turn them on, and most users fail to do this. AOL established an opt-out policy that allows users of its site to not be tracked. Yahoo

follows NAI guidelines and also allows opt-out for tracking and Web beacons (Web bugs). Google has reduced retention time for tracking data.

In general, most Internet businesses do little to protect the privacy of their customers, and consumers do not do as much as they should to protect themselves. For commercial Web sites that depend on advertising to support themselves, most revenue derives from selling customer information. Of the companies that do post privacy polices on their Web sites, about half do not monitor their sites to ensure they adhere to these policies. The vast majority of online customers claim they are concerned about online privacy, but less than half read the privacy statements on Web sites. In general, Web site privacy policies require a law degree to understand and are ambiguous about key terms (Laudon and Traver, 2015). In 2014 what firms like Facebook and Google call a "Privacy Policy" is in fact a "Data Use Policy." The concept of privacy is associated with consumer rights, which firms do not wish to recognize. A Data Use Policy simply tells customers how the information will be used without any mention of rights.

In one of the more insightful studies of consumer attitudes towards Internet privacy, a group of Berkeley students conducted surveys of online users, and of complaints filed with the FTC involving privacy issues. Here are some of their results: people feel they have no control over the information collected about them, and they don't know who to complain to. Web sites collect all this information, but do not let users have access, the Web site policies are unclear, and they share data with "affiliates" but never identify who the affiliates are and how many there are. Web bug trackers are ubiquitous and users are not informed of trackers on the pages they visit. The results of this study and others suggest that consumers are not saying "Take my privacy, I don't care, send me the service for free." They are saying "We want access to the information, we want some controls on what can be collected, what is done with the information, the ability to opt out of the entire tracking enterprise, and some clarity on what the policies really are, and we don't want those policies changed without our participation and permission." (The full report is available at knowprivacy.org.)

Technical Solutions

In addition to legislation, there are a few technologies that can protect user privacy during interactions with Web sites. Many of these tools are used for encrypting e-mail, for making e-mail or surfing activities appear anonymous, for preventing client computers from accepting cookies, or for detecting and eliminating spyware. For the most part, technical solutions have failed to protect users from being tracked as they move from one site to another.

Because of growing public criticism of behavioral tracking, targeting of ads, and the failure of industry to self-regulate, attention has shifted to browsers. Many browsers have Do Not Track options. For users who have selected the Do Not Track browser option, their browser will send a request to Web sites requesting the user's behavior not be tracked. But Web sites are not obligated to honor their visitors' requests not to be tracked. There is no online advertising industry agreement on how to respond to Do Not Track requests, and currently no legislation requiring Web sites to stop tracking.

PROPERTY RIGHTS: INTELLECTUAL PROPERTY

Contemporary information systems have severely challenged existing laws and social practices that protect private **intellectual property**. Intellectual property is considered to be intangible property created by

individuals or corporations. Information technology has made it difficult to protect intellectual property because computerized information can be so easily copied or distributed on networks. Intellectual property is subject to a variety of protections under three different legal traditions: trade secrets, copyright, and patent law.

Trade Secrets

Any intellectual work product—a formula, device, pattern, or compilation of data—used for a business purpose can be classified as a **trade secret**, provided it is not based on information in the public domain. Protections for trade secrets vary from state to state. In general, trade secret laws grant a monopoly on the ideas behind a work product, but it can be a very tenuous monopoly.

Software that contains novel or unique elements, procedures, or compilations can be included as a trade secret. Trade secret law protects the actual ideas in a work product, not only their manifestation. To make this claim, the creator or owner must take care to bind employees and customers with nondisclosure agreements and to prevent the secret from falling into the public domain.

The limitation of trade secret protection is that, although virtually all software programs of any complexity contain unique elements of some sort, it is difficult to prevent the ideas in the work from falling into the public domain when the software is widely distributed.

Copyright

Copyright is a statutory grant that protects creators of intellectual property from having their work copied by others for any purpose during the life of the author plus an additional 70 years after the author's death. For corporate-owned works, copyright protection lasts for 95 years after their initial creation. Congress has extended copyright protection to books, periodicals, lectures, dramas, musical compositions, maps, drawings, artwork of any kind, and motion pictures. The intent behind copyright laws has been to encourage creativity and authorship by ensuring that creative people receive the financial and other benefits of their work. Most industrial nations have their own copyright laws, and there are several international conventions and bilateral agreements through which nations coordinate and enforce their laws.

In the mid-1960s, the Copyright Office began registering software programs, and in 1980, Congress passed the Computer Software Copyright Act, which clearly provides protection for software program code and for copies of the original sold in commerce, and sets forth the rights of the purchaser to use the software while the creator retains legal title.

Copyright protects against copying of entire programs or their parts. Damages and relief are readily obtained for infringement. The drawback to copyright protection is that the underlying ideas behind a work are not protected, only their manifestation in a work. A competitor can use your software, understand how it works, and build new software that follows the same concepts without infringing on a copyright.

"Look and feel" copyright infringement lawsuits are precisely about the distinction between an idea and its expression. For instance, in the early 1990s, Apple Computer sued Microsoft Corporation and Hewlett-Packard for infringement of the expression of Apple's Macintosh interface, claiming that the defendants copied the expression of overlapping windows. The defendants countered that the idea of overlapping windows can be expressed only in a single way

and, therefore, was not protectable under the merger doctrine of copyright law. When ideas and their expression merge, the expression cannot be copyrighted.

In general, courts appear to be following the reasoning of a 1989 case—*Brown Bag Software v. Symantec Corp*—in which the court dissected the elements of software alleged to be infringing. The court found that similar concept, function, general functional features (e.g., drop-down menus), and colors are not protectable by copyright law (*Brown Bag Software v. Symantec Corp.*, 1992).

Patents

A **patent** grants the owner an exclusive monopoly on the ideas behind an invention for 20 years. The congressional intent behind patent law was to ensure that inventors of new machines, devices, or methods receive the full financial and other rewards of their labor and yet make widespread use of the invention possible by providing detailed diagrams for those wishing to use the idea under license from the patent's owner. The granting of a patent is determined by the United States Patent and Trademark Office and relies on court rulings.

The key concepts in patent law are originality, novelty, and invention. The Patent Office did not accept applications for software patents routinely until a 1981 Supreme Court decision that held that computer programs could be a part of a patentable process. Since that time, hundreds of patents have been granted and thousands await consideration.

The strength of patent protection is that it grants a monopoly on the underlying concepts and ideas of software. The difficulty is passing stringent criteria of nonobviousness (e.g., the work must reflect some special understanding and contribution), originality, and novelty, as well as years of waiting to receive protection.

In what some call the patent trial of the century, in 2011, Apple sued Samsung for violating its patents for iPhones, iPads, and iPods. On August 24, 2012, a California jury in federal district court delivered a decisive victory to Apple and a stunning defeat to Samsung. The jury awarded Apple $1 billion in damages. The decision established criteria for determining just how close a competitor can come to an industry-leading and standard-setting product like Apple's iPhone before it violates the design and utility patents of the leading firm. The same court ruled that Samsung could not sell its new tablet computer (Galaxy 10.1) in the United States. In a later patent dispute, Samsung won an infringement case against Apple. In June 2013, the United States International Trade Commission issued a ban for a handful of older iPhone and iPad devices because they violated Samsun patents from years ago. In 2014 Apple sued Samsung again, claiming infringement of five patents. The patents cover hardware and software techniques for handling photos, videos, and lists used on the popular Galaxy 5. Apple is seeking $2 billion in damages.

To make matters more complicated, Apple has been one of Samsung's largest customers for flash memory processors, graphic chips, solid-state drives and display parts that are used in Apple's iPhones, iPads, iPod Touch devices, and MacBooks. The Samsung and Apple patent cases are indicative of the complex relationships among the leading computer firms.

Challenges to Intellectual Property Rights

Contemporary information technologies, especially software, pose severe challenges to existing intellectual property regimes and, therefore, create significant ethical, social, and political issues. Digital media differ from books, periodicals, and other media in terms of ease of replication; ease of transmission;

ease of alteration; difficulty in classifying a software work as a program, book, or even music; compactness--making theft easy; and difficulties in establishing uniqueness.

The proliferation of electronic networks, including the Internet, has made it even more difficult to protect intellectual property. Before widespread use of networks, copies of software, books, magazine articles, or films had to be stored on physical media, such as paper, computer disks, or videotape, creating some hurdles to distribution. Using networks, information can be more widely reproduced and distributed. The Ninth Annual Global Software Piracy Study conducted by International Data Corporation and the Business Software Alliance reported that the rate of global software piracy climbed to 42 percent in 2013, representing $73 billion in global losses from software piracy. Worldwide, for every $100 worth of legitimate software sold that year, an additional $75 worth was obtained illegally (Business Software Alliance, 2014).

The Internet was designed to transmit information freely around the world, including copyrighted information. With the World Wide Web in particular, you can easily copy and distribute virtually anything to thousands and even millions of people around the world, even if they are using different types of computer systems. Information can be illicitly copied from one place and distributed through other systems and networks even though these parties do not willingly participate in the infringement.

Individuals have been illegally copying and distributing digitized music files on the Internet for several decades. File-sharing services such as Napster, and later Grokster, Kazaa, and Morpheus, Megaupload, The Pirate Bay, sprung up to help users locate and swap digital music and video files, including those protected by copyright. Illegal file sharing became so widespread that it threatened the viability of the music recording industry and, at one point, consumed 20 percent of Internet bandwidth. The recording industry won several legal battles for shutting these services down, but it has not been able to halt illegal file sharing entirely. The motion picture and cable television industries are waging similar battles, as described in the chapter-opening case study. Several European nations have worked with U.S. authorities to shut down illegal sharing sites, with mixed results. In France, illegal downloaders can lose access to the Internet for a year or more.

As legitimate online music stores like the iTunes Store expanded, and more recently as Internet radio services like Pandora expanded, some forms of illegal file sharing have declined. Technology has radically altered the prospects for intellectual property protection from theft, at least for music, videos, and television shows (less so for software). The Apple iTunes Store legitimated paying for music and entertainment, and created a closed environment where music and videos could not be easily copied and widely distributed unless played on Apple devices. Amazon's Kindle also protects the rights of publishers and writers because its books cannot be copied to the Internet and distributed. Streaming of Internet radio, on services such as Pandora and Spotify, and Hollywood movies (at sites such as Hulu and Netflix) also inhibits piracy because the streams cannot be easily recorded on separate devices and videos can be downloaded so easily. Moreover, the large Web distributors like Apple, Google, and Amazon do not want to encourage piracy in music or videos simply because they need these properties to earn revenue.

The Digital Millennium Copyright Act (DMCA) of 1998 also provides some copyright protection. The DMCA implemented a World Intellectual Property Organization Treaty that makes it illegal to circumvent technology-based protections of copyrighted materials. Internet service

providers (ISPs) are required to take down sites of copyright infringers they are hosting once the ISPs are notified of the problem. Microsoft and other major software and information content firms are represented by the Software and Information Industry Association (SIIA), which lobbies for new laws and enforcement of existing laws to protect intellectual property around the world. The SIIA runs an antipiracy hotline for individuals to report piracy activities, offers educational programs to help organizations combat software piracy, and has published guidelines for employee use of software.

4.4 HOW HAVE INFORMATION SYSTEMS AFFECTED LAWS FOR ESTABLISHING ACCOUNTABILITY, LIABILITY, AND THE QUALITY OF EVERYDAY LIFE?

Along with privacy and property laws, new information technologies are challenging existing liability laws and social practices for holding individuals and institutions accountable. If a person is injured by a machine controlled, in part, by software, who should be held accountable and, therefore, held liable? Should a social network site like Facebook or Twitter be held liable and accountable for the posting of pornographic material or racial insults, or should they be held harmless against any liability for what users post (as is true of common carriers, such as the telephone system)? What about the Internet? If you outsource your information processing, to the Cloud, and the Cloud provider fails to provide adequate service, what can you do? Cloud providers often claim the software you are using is the problem, not the Cloud servers. Some real-world examples may shed light on these questions.

COMPUTER-RELATED LIABILITY PROBLEMS

In the final days of the 2013 holiday shopping season, Target, one of the largest U.S. retailers, confirmed publicly that credit and debit card information for 40 million of its customers had been compromised. A few weeks later, the company said additional personal information, like email and mailing addresses, from some 70 to 110 million customers, had been exposed as well. In the meantime, security analysts noticed a huge spike in the number of credit card numbers for sale on hacker Web sites. Target's sales took an immediate hit from which it has still not recovered. The company claims that east European hackers entered their point of sale systems by using brute force techniques to crack their security. Federal officials believe that six other large retailers also were hacked by the same group, including Nieman Marcus. Later in 2014, Target's senior technology officer resigned from Target. Target says it has spent over $60 million to strengthen its systems. It has paid an even greater price through the loss of sales and trust. (You can find out more about Target's hacking problems in the Chapter 8 Interactive Session on Management.)

Who is liable for any economic harm caused to individuals or businesses that had their credit cards compromised? Is Target responisble for allowing the breach to occur despite efforts it did make to secure the information? Or is this just a cost of doing business in a credit card world where customers and businesses have insurance policies to protect them against losses? Customers, for instance, have a maximum liability of $50 for credit card theft under federal banking law.

This case reveals the difficulties faced by information systems executives who ultimately are responsible for any harm done by systems they have selected and installed. Beyond IT managers, insofar as computer software is part of a machine, and the machine injures someone physically or economically, the producer of the software and the operator can be held liable for damages. Insofar as the software acts like a book, storing and displaying information, courts have been reluctant to hold authors, publishers, and booksellers liable for contents (the exception being instances of fraud or defamation), and hence courts have been wary of holding software authors liable for software.

In general, it is very difficult (if not impossible) to hold software producers liable for their software products that are considered to be like books, regardless of the physical or economic harm that results. Historically, print publishers of books and periodicals have not been held liable because of fears that liability claims would interfere with First Amendment rights guaranteeing freedom of expression. And the kind of harm caused by software failures is rarely fatal and typically inconveniences users but does not physically harm them (the exception being medical devices).

What about software as a service? ATM machines are a service provided to bank customers. Should this service fail, customers will be inconvenienced and perhaps harmed economically if they cannot access their funds in a timely manner. Should liability protections be extended to software publishers and operators of defective financial, accounting, simulation, or marketing systems?

Software is very different from books. Software users may develop expectations of infallibility about software; software is less easily inspected than a book, and it is more difficult to compare with other software products for quality; software claims to perform a task rather than describe a task, as a book does; and people come to depend on services essentially based on software. Given the centrality of software to everyday life, the chances are excellent that liability law will extend its reach to include software even when the software merely provides an information service.

Telephone systems have not been held liable for the messages transmitted because they are regulated common carriers. In return for their right to provide telephone service, they must provide access to all, at reasonable rates, and achieve acceptable reliability. But broadcasters and cable television stations are subject to a wide variety of federal and local constraints on content and facilities. In the United States, with few exceptions, Web sites are not held liable for content posted on their sites regardless if it was placed their by the Web site owners or users.

SYSTEM QUALITY: DATA QUALITY AND SYSTEM ERRORS

White Christmas turned into a black out for millions of Netflix customers, and social network users, on December 25th, 2012. The blackout was caused by the failure of Amazon's cloud computing service, which provides storage and computing power for all kinds of Web sites and services, including Netflix. The loss of service lasted for a day. Amazon blamed it on "Elastic Load Balancing," a software program that balances the loads on all its cloud servers to prevent overload. Amazon's cloud computing services have had several subsequent outages, although not as long-lasting as the Christmas Eve outage. Outages at cloud computing services are rare, but are recurring. These outages have

called into question the reliability and quality of cloud services. Are these outages acceptable?

The debate over liability and accountability for unintentional consequences of system use raises a related but independent moral dimension: What is an acceptable, technologically feasible level of system quality? At what point should system managers say, "Stop testing, we've done all we can to perfect this software. Ship it!" Individuals and organizations may be held responsible for avoidable and foreseeable consequences, which they have a duty to perceive and correct. The gray area is that some system errors are foreseeable and correctable only at very great expense, an expense so great that pursuing this level of perfection is not feasible economically—no one could afford the product.

For example, although software companies try to debug their products before releasing them to the marketplace, they knowingly ship buggy products because the time and cost of fixing all minor errors would prevent these products from ever being released. What if the product was not offered on the marketplace, would social welfare as a whole not advance and perhaps even decline? Carrying this further, just what is the responsibility of a producer of computer services—should it withdraw the product that can never be perfect, warn the user, or forget about the risk (let the buyer beware)?

Three principal sources of poor system performance are (1) software bugs and errors, (2) hardware or facility failures caused by natural or other causes, and (3) poor input data quality. A Chapter 8 Learning Track discusses why zero defects in software code of any complexity cannot be achieved and why the seriousness of remaining bugs cannot be estimated. Hence, there is a technological barrier to perfect software, and users must be aware of the potential for catastrophic failure. The software industry has not yet arrived at testing standards for producing software of acceptable but imperfect performance.

Although software bugs and facility catastrophes are likely to be widely reported in the press, by far the most common source of business system failure is data quality. Few companies routinely measure the quality of their data, but individual organizations report data error rates ranging from 0.5 to 30 percent.

QUALITY OF LIFE: EQUITY, ACCESS, AND BOUNDARIES

The negative social costs of introducing information technologies and systems are beginning to mount along with the power of the technology. Many of these negative social consequences are not violations of individual rights or property crimes. Nevertheless, these negative consequences can be extremely harmful to individuals, societies, and political institutions. Computers and information technologies potentially can destroy valuable elements of our culture and society even while they bring us benefits. If there is a balance of good and bad consequences of using information systems, who do we hold responsible for the bad consequences? Next, we briefly examine some of the negative social consequences of systems, considering individual, social, and political responses.

Balancing Power: Center Versus Periphery

An early fear of the computer age was that huge, centralized mainframe computers would centralize power in the nation's capital, resulting in a Big Brother society, as was suggested in George Orwell's novel 1984. The shift toward highly decentralized client-server computing, coupled with an ideology of empowerment of Twitter and social media users, and the decentralization

of decision making to lower organizational levels, up until recently reduced the fears of power centralizatior in government institutions. Yet much of the empowerment described in popular business magazines is trivial. Lower-level employees may be empowered to make minor decisions, but the key policy decisions may be as centralized as in the past. At the same time, corporate Internet behemoths like Google, Apple, Yahoo, Amazon, and Microsoft have come to dominate the collection and analysis of personal private information of all citizens. Since the terrorist attacks against the United States on September 11, 2001, the federal government has greatly expanded its use of this private sector information, as well as other forms of digital communication, in pursuit of national security. In this sense, power has become more centralized into the hands of a few private oligopolies and large government agencies.

Rapidity of Change: Reduced Response Time to Competition

Information systems have helped to create much more efficient national and international markets. Today's more efficient global marketplace has reduced the normal social buffers that permitted businesses many years to adjust to competition. Time-based competition has an ugly side: The business you work for may not have enough time to respond to global competitors and may be wiped out in a year, along with your job. We stand the risk of developing a "just-in-time society" with "just-in-time jobs" and "just-in-time" workplaces, families, and vacations.

Maintaining Boundaries: Family, Work, and Leisure

Parts of this book were produced on trains and planes, as well as on vacations and during what otherwise might have been "family" time. The danger to ubiquitous computing, telecommuting, nomad computing, mobile computing, and the "do anything anywhere" computing environment is that it is actually coming true. The traditional boundaries that separate work from family and just plain leisure have been weakened.

Although authors have traditionally worked just about anywhere, the advent of information systems, coupled with the growth of knowledge-work occupations, means that more and more people are working when traditionally they would have been playing or communicating with family and friends. The work umbrella now extends far beyond the eight-hour day into commuting time, vacation time, and leisure time. The explosive growth and use of smart phones has only heightened the sense of many employees that they are never "away from work."

Even leisure time spent on the computer threatens these close social relationships. Extensive Internet and cell phone use, even for entertainment or recreational purposes, takes people away from their family and friends. Among middle school and teenage children, it can lead to harmful anti-social behavior, such as the recent upsurge in cyberbullying.

Weakening these institutions poses clear-cut risks. Family and friends historically have provided powerful support mechanisms for individuals, and they act as balance points in a society by preserving private life, providing a place for people to collect their thoughts, allowing people to think in ways contrary to their employer, and dream.

Dependence and Vulnerability

Today, our businesses, governments, schools, and private associations, such as churches, are incredibly dependent on information systems and

are, therefore, highly vulnerable if these systems fail. Secondary schools, for instance, increasingly use and rely on educational software. Test results are often stored off campus. If these systems were to shut down, there is no backup educational structure or content that can make up for the loss of the system. With systems now as ubiquitous as the telephone system, it is startling to remember that there are no regulatory or standard-setting forces in place that are similar to telephone, electrical, radio, television, or other public utility technologies. The absence of standards and the criticality of some system applications will probably call forth demands for national standards and perhaps regulatory oversight.

Computer Crime and Abuse

New technologies, including computers, create new opportunities for committing crime by creating new valuable items to steal, new ways to steal them, and new ways to harm others. **Computer crime** is the commission of illegal acts through the use of a computer or against a computer system. Computers or computer systems can be the object of the crime (destroying a company's computer center or a company's computer files), as well as the instrument of a crime (stealing computer lists by illegally gaining access to a computer system using a home computer). Simply accessing a computer system without authorization or with intent to do harm, even by accident, is now a federal crime. How common is computer crime? One source of information is the Internet Crime Complaint Center ("IC3"), a partnership between the National White Collar Crime Center and the Federal Bureau of Investigation. The IC3 data is useful for gauging the types of e-commerce crimes most likely to be reported by consumers. In 2012, the IC3 processed about 290,000 Internet crime complaints, the second-highest number in its 11-year history. Over half the complainants reported a financial loss, with the total reported amount at $525 million. The average amount of loss for those who reported a financial loss was more



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Although some people enjoy the convenience of working at home, the "do anything anywhere" computing environment can blur the traditional boundaries between work and family time.

than $4,573. The most common complaints were for scams involving the FBI, identity theft, and advance fee fraud (National White Collar Crime Center and the Federal Bureau of Investigation, 2013). The Computer Security Institute's annual *Computer Crime and Security Survey* is another source of information. In 2011, its most recent report, the survey was based on the responses of 351 security practitioners in U.S. corporations, government agencies, financial institutions, medical institutions, and universities. The survey reported that 46 percent of responding organizations experienced a computer security incident within the past year. The most common type of attack experienced was a malware infection (67%), followed by phishing fraud (39%), laptop and mobile hardware theft (34%), attacks by botnets (29%), and insider abuse (25%). The true cost of all computer crime is estimated to be in the billions of dollars. On average, the cost to a firm of a single computer crime averages about $8.9 million (Ponemon Institute, 2012).

Computer abuse is the commission of acts involving a computer that may not be illegal but that are considered unethical. The popularity of the Internet and e-mail has turned one form of computer abuse—spamming—into a serious problem for both individuals and businesses. Originally, **Spam** is junk e-mail sent by an organization or individual to a mass audience of Internet users who have expressed no interest in the product or service being marketed. But as cell phone use has mushroomed, spam was certain to follow. Identity and financial theft cyber criminals are turning their attention to smart phones as users check mail, do online banking, pay bills, and reveal personal information. Cell phone spam usually comes in the form of SMS text messages, but increasingly users are receiving spam in their Facebook Newsfeed and messaging service as well. Verizon estimates that it blocks about 200 million spam messages a month using its filters and security checks. Spammers tend to market pornography, fraudulent deals and services, outright scams, and other products not widely approved in most civilized societies. Some countries have passed laws to outlaw spamming or to restrict its use. In the United States, it is still legal if it does not involve fraud and the sender and subject of the e-mail are properly identified.

Spamming has mushroomed because it costs only a few cents to send thousands of messages advertising wares to Internet users. The percentage of all e-mail that is spam was estimated at around 66 percent in 2014 (Symantec, 2014). Most spam originates from bot networks, which consist of thousands of captured PCs that can initiate and relay spam messages. Spam volume has declined somewhat since authorities took down the Rustock botnet in 2011. Spam is seasonally cyclical, and varies monthly due to the impact of new technologies (both supportive and discouraging of spammers), new prosecutions, and seasonal demand for products and services. Spam costs for businesses are very high (estimated at over $50 billion per year) because of the computing and network resources consumed by billions of unwanted e-mail messages and the time required to deal with them.

Internet service providers and individuals can combat spam by using spam filtering software to block suspicious e-mail before it enters a recipient's e-mail inbox. However, spam filters may block legitimate messages. Spammers know how to skirt around filters by continually changing their e-mail accounts, by incorporating spam messages in images, by embedding spam in e-mail attachments and electronic greeting cards, and by using other people's computers that have been hijacked by botnets (see Chapter 8). Many spam messages are sent from one country while another country hosts the spam Web site.

Spamming is more tightly regulated in Europe than in the United States. In 2002, the European Parliament passed a ban on unsolicited commercial messaging. Electronic marketing can be targeted only to people who have given prior consent.

The U.S. CAN-SPAM Act of 2003, which went into effect in 2004, does not outlaw spamming but does ban deceptive e-mail practices by requiring commercial e-mail messages to display accurate subject lines, identify the true senders, and offer recipients an easy way to remove their names from e-mail lists. It also prohibits the use of fake return addresses. A few people have been prosecuted under the law, but it has had a negligible impact on spamming in large part because of the Internet's exceptionally poor security and the use of offshore servers and botnets. In 2008, Robert Soloway, the so-called Seattle "Spam King," was sentenced to 47 months in prison for sending over 90 million spam messages in just three months off two servers. In 2011, the so-called Facebook "Spam King," Sanford Wallace, was indicted for sending over 27 million spam messages to Facebook users. He is facing a 40-year sentence because of prior spamming convictions. In 2014 most large scale spamming has moved offshore to Russia and Eastern Europe where hackers control global botnets capable of generating billions of spam messages. The largest spam network in 2013 was the Russian network Festi based in St. Petersburg. Festi is best known as the spam generator behind the global Viagra-spam industry which stretches from Russia to Indian pharmaceutical firms selling counterfeit Viagra. The spam industry in Russia generates an estimated $60 million for criminal groups (Kramer, 2013).

Employment: Trickle-Down Technology and Reengineering Job Loss

Reengineering work is typically hailed in the information systems community as a major benefit of new information technology. It is much less frequently noted that redesigning business processes has caused millions of mid-level factory managers, and clerical workers to lose their jobs. One economist has raised the possibility that we will create a society run by a small "high tech elite of corporate professionals . . . in a nation of the permanently unemployed" (Rifkin, 1993). In 2011, some economists have sounded new alarms about information and computer technology threatening middle-class, white-collar jobs (in addition to blue-collar factory jobs). Erik Brynjolfsson and Andrew P. McAfee argue that the pace of automation has picked up in recent years because of a combination of technologies including robotics, numerically controlled machines, computerized inventory control, pattern recognition, voice recognition, and online commerce. One result is that machines can now do a great many jobs heretofore reserved for humans including tech support, call center work, X-ray examiners, and even legal document review (Brynjolfsson and McAfee, 2011). These views contrast with earlier assessments by economists that both labor and capital would receive stable shares of income, and that new technologies created as many or more new jobs as they destroyed old ones. But there is no guarantee this will happen in the future, and the income wealth share of labor may continue to fall relative to capital, resulting in a loss of high paying jobs and further declines in wages.

Other economists are much more sanguine about the potential job losses. They believe relieving bright, educated workers from reengineered jobs will result in these workers moving to better jobs in fast-growth industries. Missing from this equation are unskilled, blue-collar workers and older,

less well-educated middle managers. It is not clear that these groups can be retrained easily for high-quality (high-paying) jobs.

Equity and Access: Increasing Racial and Social Class Cleavages

Does everyone have an equal opportunity to participate in the digital age? Will the social, economic, and cultural gaps that exist in the United States and other societies be reduced by information systems technology? Or will the cleavages be increased, permitting the better off to become even more better off relative to others?

These questions have not yet been fully answered because the impact of systems technology on various groups in society has not been thoroughly studied. What is known is that information, knowledge, computers, and access to these resources through educational institutions and public libraries are inequitably distributed along ethnic and social class lines, as are many other information resources. Several studies have found that poor and minority groups in the United States are less likely to have computers or online Internet access even though computer ownership and Internet access have soared in the past five years. Although the gap is narrowing, higher-income families in each ethnic group are still more likely to have home computers and Internet access than lower-income families in the same group.

A similar **digital divide** exists in U.S. schools, with schools in high-poverty areas less likely to have computers, high-quality educational technology programs, or Internet access availability for their students. Left uncorrected, the digital divide could lead to a society of information haves, computer literate and skilled, versus a large group of information have-nots, computer illiterate and unskilled. Public interest groups want to narrow this digital divide by making digital information services—including the Internet—available to virtually everyone, just as basic telephone service is now.

Health Risks: RSI, CVS, and Technostress

A common occupational disease today is **repetitive stress injury (RSI)**. RSI occurs when muscle groups are forced through repetitive actions often with high-impact loads (such as tennis) or tens of thousands of repetitions under low-impact loads (such as working at a computer keyboard). The incidence of repetitive stress syndrome is estimated to be 3% to 6% of the workforce (LeBlanc and Cestia, 2011).

The single largest source of RSI is computer keyboards. The most common kind of computer-related RSI is **carpal tunnel syndrome (CTS)**, in which pressure on the median nerve through the wrist's bony structure, called a carpal tunnel, produces pain. The pressure is caused by constant repetition of keystrokes: in a single shift, a word processor may perform 23,000 keystrokes. Symptoms of carpal tunnel syndrome include numbness, shooting pain, inability to grasp objects, and tingling. Millions of workers have been diagnosed with carpal tunnel syndrome.

RSI is avoidable. Designing workstations for a neutral wrist position (using a wrist rest to support the wrist), proper monitor stands, and footrests all contribute to proper posture and reduced RSI. Ergonomically correct keyboards are also an option. These measures should be supported by frequent rest breaks and rotation of employees to different jobs.

RSI is not the only occupational illness computers cause. Back and neck pain, leg stress, and foot pain also result from poor ergonomic designs of workstations.

Repetitive stress injury (RSI) is the leading occupational disease today. The single largest cause of RSI is computer keyboard work.



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Computer vision syndrome (CVS) refers to any eyestrain condition related to display screen use in desktop computers, laptops, e-readers, smartphones, and handheld video games. CVS affects about 90 percent of people who spend three hours or more per day at a computer (Beck, 2010). Its symptoms, which are usually temporary, include headaches, blurred vision, and dry and irritated eyes.

The newest computer-related malady is **technostress**, which is stress induced by computer and cell phone use. Its symptoms include aggravation, hostility toward humans, impatience, and fatigue. According to experts, humans working continuously with computers come to expect other humans and human institutions to behave like computers, providing instant responses, attentiveness, and an absence of emotion. Technostress is thought to be related to high levels of job turnover in the computer industry, high levels of early retirement from computer-intense occupations, and elevated levels of drug and alcohol abuse.

The incidence of technostress is not known but is thought to be in the millions and growing in the United States. Computer-related jobs now top the list of stressful occupations based on health statistics in several industrialized countries.

In addition to these maladies, computer technology may be harming our cognitive functions or at least changing how we think and solve problems. Although the Internet has made it much easier for people to access, create, and use information, some experts believe that it is also preventing people from focusing and thinking clearly.

The computer has become a part of our lives—personally as well as socially, culturally, and politically. It is unlikely that the issues and our choices will become easier as information technology continues to transform our world. The growth of the Internet and the information economy suggests that all the ethical and social issues we have described will be heightened further as we move into the first digital century.

Review Summary

1. *What ethical, social, and political issues are raised by information systems?*

Information technology is introducing changes for which laws and rules of acceptable conduct have not yet been developed. Increasing computing power, storage, and networking capabilities—including the Internet—expand the reach of individual and organizational actions and magnify their impacts. The ease and anonymity with which information is now communicated, copied, and manipulated in online environments pose new challenges to the protection of privacy and intellectual property. The main ethical, social, and political issues raised by information systems center around information rights and obligations, property rights and obligations, accountability and control, system quality, and quality of life.

2. *What specific principles for conduct can be used to guide ethical decisions?*

Six ethical principles for judging conduct include the Golden Rule, Immanuel Kant's Categorical Imperative, Descartes' rule of change, the Utilitarian Principle, the Risk Aversion Principle, and the ethical "no free lunch" rule. These principles should be used in conjunction with an ethical analysis.

3. *Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property?*

Contemporary data storage and data analysis technology enables companies to easily gather personal data about individuals from many different sources and analyze these data to create detailed electronic profiles about individuals and their behaviors. Data flowing over the Internet can be monitored at many points. Cookies and other Web monitoring tools closely track the activities of Web site visitors. Not all Web sites have strong privacy protection policies, and they do not always allow for informed consent regarding the use of personal information. Traditional copyright laws are insufficient to protect against software piracy because digital material can be copied so easily and transmitted to many different locations simultaneously over the Internet.

4. *How have information systems affected laws for establishing accountability, liability, and the quality of everyday life?*

New information technologies are challenging existing liability laws and social practices for holding individuals and institutions accountable for harm done to others. Although computer systems have been sources of efficiency and wealth, they have some negative impacts. Computer errors can cause serious harm to individuals and organizations. Poor data quality is also responsible for disruptions and losses for businesses. Jobs can be lost when computers replace workers or tasks become unnecessary in reengineered business processes. The ability to own and use a computer may be exacerbating socioeconomic disparities among different racial groups and social classes. Widespread use of computers increases opportunities for computer crime and computer abuse. Computers can also create health problems, such as repetitive stress injury, computer vision syndrome, and technostress.

Key Terms

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Review Questions

4-1 What ethical, social, and political issues are raised by information systems?

- Define ethics and explain why information systems raise new ethical questions
- List and describe the key technological trends that heighten ethical concerns.
- Differentiate between responsibility, accountability, and liability.

4-2 What specific principles for conduct can be used to guide ethical decisions?

- List and describe the issues raised by the five moral dimensions of the information age.

4-3 Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property?

- Define privacy and fair information practices.
- Describe the European Directive on Data Protection and the 2012 proposed changes to EU data protection rules.
- Explain how informed consent, legislation, industry self-regulation, and technology tools help protect the individual privacy of Internet users.
- Define intellectual property and explain how contemporary information technologies pose challenges to the protection of intellectual property.

4-4 How have information systems affected laws for establishing accountability, liability, and the quality of everyday life?

- Explain why it is so difficult to hold software services liable for failure or injury.
- List and describe the principal causes of system quality problems.
- Name and describe four quality of life impacts of computers and information systems.
- Define and describe technostress and repetitive stress injury (RSI) and explain their relationship to information technology.

Discussion Questions

✪ **4-5** Should producers of software-based services, such as ATMs, be held liable for economic injuries suffered when their systems fail?

✪ **4-6** Is there a digital divide? If so, why does it matter?

✪ **4-7** Discuss the pros and cons of allowing companies to amass personal data for behavioral targeting.

Hands-On MIS Projects

The projects in this section will give you hands-on experience in analyzing the privacy implications of information system usage in hospitals, developing a corporate policy for employee Web usage, using blog creation tools to create a simple blog, and using the Internet for market research in an ethically sensitive area.

Management Decision Problems

4-8 The Malaysian government is a major healthcare provider. The government It plans to have 33 paperless public hospitals in Malaysia in the next few years. These paperless hospitals will be enabled backed by information systems that will collect, process, and retrieve data. This will not only help to increase the operating efficiency of these hospitals but will also be environment-friendly. Until recently, Till now, the government has been successful in making two public hospitals paperless, and they are working with the work on other 31 hospitals to transform them into paperless hospitals is in progress. Although the government has formulated a code of conduct for doctors to be good practitioners, there is no code in place for information ethics. There is an urgent need to regulate the collection, storage, processing and communication of medical data and patient information to prevent misuse. What concerns might patients have? What can hospitals do to prevent misuse? Given the scenario outlined above, what do you think should be part of an ethical code of conduct for securing the sensitive information gathered by healthcare service providers?

4-9 As the head of a small insurance company with six employees, you are concerned about how effectively your company is using its networking and human resources. Budgets are tight, and you are struggling to meet payrolls because employees are reporting many overtime hours. You do not believe that the employees have a sufficiently heavy work load to warrant working longer hours and are looking into the amount of time they spend on the Internet.

Each employee uses a computer with Internet access on the job. Review a sample of your company's weekly report of employee Web usage, which can be found in MyMISLab™.

- Calculate the total amount of time each employee spent on the Web for the week and the total amount of time that company computers were used for this purpose. Rank the employees in the order of the amount of time each spent online.
- Do your findings and the contents of the report indicate any ethical problems employees are creating? Is the company creating an ethical problem by monitoring its employees' use of the Internet?
- Use the guidelines for ethical analysis presented in this chapter to develop a solution to the problems you have identified.

Achieving Operational Excellence: Creating a Simple Blog

Software skills: Blog creation
Business skills: Blog and Web page design

4-10 In this project, you will learn how to build a simple blog. Using the blog creation software at Blogger.com, follow the instructions to create a blog. Give your blog a suitable name; choose a template and a background image. Create a blog that reports on non-governmental organizations (NGOs). NGOs are organizations that are not associated with a specific government, and they are non-profit. Generally, NGOs are privately funded and engage in charitable activities throughout the world. Search the Internet for different NGOs and charity organizations operating in Southeast Asia. Categorise the NGOs based on their operations and post this information on your blog. Also use blogging controls available to grant access to different users to comment on your blog. How could your blog help to motivate students to volunteer at NGOs? What could it do in terms of raising awareness among the general public about the activities of various organizations in the region?

Improving Decision Making: Analyzing Web Browser Privacy

Software Skills: Web browser software
Business Skills: Analyzing Web browser privacy protection features

4-11 This project will help develop your Internet skills for using the privacy protection features of leading Web browser software.

Examine the privacy protection features and settings for two leading Web browsers, such as Internet Explorer, Mozilla Firefox or Google Chrome. Make a table comparing the features of two of these brows in terms of functions provided and ease of use.

- How do these privacy protection features protect individuals?
- How do these privacy protection features impact what businesses can do on the Internet?
- Which does the best job of protecting privacy. Why?

Collaboration and Teamwork Project

4-12 In MyMISLab, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google +, or other open source collaboration tools to complete the assignment.

Facebook Privacy: There Is No Privacy

CASE STUDY

Over the course of less than a decade, Facebook has morphed from a small, niche networking site for mostly Ivy League college students into a publicly traded company with a market worth of $148 billion in 2014 (up from $59 billion in 2013). Facebook boasts that it is free to join and always will be, so where's the money coming from to service 1 billion worldwide subscribers? Just like its fellow tech titan and rival Google, Facebook's revenue comes almost entirely from advertising. Facebook does not have a diverse array of hot new gadgets, a countrywide network of brick-and-mortar retail outlets, or a full inventory of software for sale; instead, it has your personal information, and the information of hundreds of millions of others with Facebook accounts.

Advertisers have long understood the value of Facebook's unprecedented trove of personal information. They can serve ads using highly specific details, like relationship status, location, employment status, favorite books, movies, or TV shows, and a host of other categories. For example, an Atlanta woman who posts that she has become engaged might be offered an ad for a wedding photographer on her Facebook page. When advertisements are served to finely targeted subsets of users, the response is much more successful than traditional types of advertising. A growing number of companies both big and small have taken notice: In 2014, Facebook generated $7.8 billion in revenue, 88 percent of which ($7 billion) was from selling ads, and the remainder from selling games, and virtual goods. Facebook's ad revenues in 2012 grew by 63 percent over the previous year, driven mostly by adding new users. Existing users are not clicking on more ads.

That was good news for Facebook, which launched its IPO (initial public stock offering) in May 2012, and is expected to continue to increase its revenue in coming years. But is it good news for you, the Facebook user? More than ever, companies like Facebook and Google, which made approximately $55 billion in advertising revenue in 2013, are using your online activity to develop a frighteningly accurate picture of your life. Facebook's goal is to serve advertisements that are more relevant to you than anywhere else on the Web, but the personal information they gather about you both with and without your consent can also be used against you in other ways.

Facebook has a diverse array of compelling and useful features. Facebook's partnership with the Department of Labor helps to connect job seekers and employers; Facebook has helped families find lost pets after natural disasters, such as when

tornadoes hit the Midwest in 2012; Facebook allows active-duty soldiers to stay in touch with their families; it gives smaller companies a chance to further their e-commerce efforts and larger companies a chance to solidify their brands; and, perhaps most obviously, Facebook allows you to more easily keep in touch with your friends. These are the reasons why so many people are on Facebook.

However, Facebook's goal is to get its users to share as much data as possible, because the more Facebook knows about you, the more accurately it can serve relevant advertisements to you. Facebook CEO Mark Zuckerberg often says that people want the world to be more open and connected. It's unclear whether that is truly the case, but it is certainly true that Facebook wants the world to be more open and connected, because it stands to make more money in that world. Critics of Facebook are concerned that the existence of a repository of personal data of the size that Facebook has amassed requires protections and privacy controls that extend far beyond those that Facebook currently offers.

Facebook wanting to make more money is not a bad thing, but the company has a checkered past of privacy violations and missteps that raise doubts about whether it should be responsible for the personal data of hundreds of millions of people. There are no laws in the United States that give consumers the right to know what data companies like Facebook have compiled. You can challenge information in credit reports, but you can't even see what data Facebook has gathered about you, let alone try to change it. It's different in Europe: you can request Facebook to turn over a report of all the information it has about you. More than ever, your every move, every click, on social networks is being used by outside entities to assess your interests, and behavior, and then pitch you an ad based on this knowledge. Law enforcement agencies use social networks to gather evidence on tax evaders, and other criminals; employers use social networks to make decisions about prospective candidates for jobs; and data aggregators are gathering as much information about you as they can sell to the highest bidder.

In a recent study, Consumer Reports found that of 150 million Americans on Facebook everyday, at least 4.8 million are willingly sharing information that could be used against them in some way. That includes plans to travel on a particular day, which burglars could use to time robberies, or Liking a page about a particular health condition or treatment, which insurers could use to deny coverage. Thirteen million users have never adjusted Facebook's privacy controls, which allow friends using Facebook applications to unwittingly transfer your data to a third party without your knowledge. Credit card companies and other similar organizations have begun engaging in "weblining", taken from the phrase redlining, by altering their treatment of you based on the actions of other people with profiles similar to yours.

Ninety-three percent of people polled believe that Internet companies should be forced to ask for permission before using your personal information, and 72 percent want the ability to opt out of online tracking. Why, then, do so many people share sensitive details of their life on Facebook? Often it's because users do not realize that their data are being collected and transmitted in this way. A Facebook user's friends are not notified if information about them is collected by that user's applications. Many of Facebook's features and services are enabled by default when they are launched without notifying users. And a study by Siegel+Gale found that Facebook's privacy policy is more difficult to comprehend than government notices or typical bank credit card agreements, which are notoriously dense. Next time you visit Facebook, click on Privacy Settings, and see if you can understand your options.

Facebook's value and growth potential is determined by how effectively it can leverage the personal data it aggregated about its users to attract advertisers. Facebook also stands to gain from managing and avoiding the privacy concerns raised by its users and government regulators. For Facebook users that value the privacy of their personal data, this situation appears grim. But there are some signs that Facebook might become more responsible with its data collection processes, whether by its own volition or because it is forced to do so. As a publicly traded company, Facebook now invites more scrutiny from investors and regulators because, unlike in the past, their balance sheets, assets, and financial reporting documents are readily available.

In August 2012, Facebook settled a lawsuit with the FTC in which they were barred from misrepresenting the privacy or security of users' personal information. Facebook was charged with deceiving its users by telling them they could keep their information on Facebook private, but then repeatedly allowing it to be shared and made public. Facebook agreed to obtain user consent before making any change to that user's privacy preferences, and to submit to bi-annual privacy audits by an independent firm for the next 20 years. Privacy advocate groups like the Electronic Privacy Information Center

(EPIC) want Facebook to restore its more robust privacy settings from 2009, as well as to offer complete access to all data it keeps about its users. Facebook has also come under fire from EPIC for collecting information about users who are not even logged into Facebook or may not even have accounts on Facebook. Facebook keeps track of activity on other sites that have Like buttons or "recommendations" widgets, and records the time of your visit and your IP address when you visit a site with those features, regardless of whether or not you click on them.

While U.S. Facebook users have little recourse to access data that Facebook has collected on them; users from other countries have made inroads in this regard. An Austrian law student was able to get a full copy of his personal information from Facebook's Dublin office, due to the more stringent consumer privacy protections in Ireland. The full document was 1,222 pages long and covered three years of activity on the site, including deleted Wall posts and messages with sensitive personal information and deleted e-mail addresses. In Europe, 40,000 Facebook users have already requested their data, and European law requires that Facebook respond to these requests within 40 days.

It isn't just text-based data that Facebook is stockpiling, either. Facebook is also compiling a biometric database of unprecedented size. The company stores more than 60 billion photos on its servers and that number grows by 250 million each day. A recent feature launched by Facebook called Tag Suggest scans photographs using facial recognition technology. When Tag Suggest was launched, it was enabled for many users without opting in. This database has value to law enforcement and other organizations looking to compile profiles of users for use in advertising. EPIC also has demanded that Facebook stop creating facial recognition profiles without user consent.

In 2012, as part of the settlement of another class-action lawsuit, Facebook agreed to allow users to opt in to its Sponsored Stories service, which serves advertisements in the user's News Feed that highlight products and businesses that your Facebook friends are using. This allowed users to control which of their actions on Facebook generate advertisements that their friends will see. Sponsored Stories are one of the most effective forms of advertising on Facebook because they don't seem like advertisements at all to most users. Facebook had previously argued that users were giving "implied consent" every time they clicked a Like button on a page. Despite this earlier settlement, in January 2014, Facebook closed down its Sponsored Stories feature entirely, after many lawsuits, attempted settlements, and criticism from privacy groups, the FTC, and annoyed parents whose children's photos were being used throughout Facebook to sell products. In August 2013, Facebook had agreed to a settlement in a class action lawsuit brought by parents of teenagers caught up in the Facebook information machine. Every time their children liked a product on Facebook, their photos were used to promote the product not just to their friends, but to everyone on Facebook who potentially might be interested. The legal settlement only enraged privacy advocates and Congress, leading to Facebook's abandonment of Sponsored Stories.

While Facebook has shut down one of its more egregious privacy-invading features, the company's Data Use policies make it very clear that, as a condition of using the service, users grant the company wide latitude in using their information in advertising. This includes a person's name, photo, comments, and other information. Facebook's existing policies make clear that users are required to grant the company wide permission to use their personal information in advertising as a condition of using the service. This includes "social advertising" where your personal information is broadcast to your friends, and indeed, the entire Facebook service if the company sees fit. While users can limit some uses, an advanced degree in Facebook data features is required.

Despite consumer protests and government scrutiny, Facebook continues to challenge its customers' sense of control over their personal information. In January 2013, Facebook launched its Graph Search program, a social network search engine intended to rival Google but based on a totally different approach. Rather than scour the Internet for information related to a user's search term, Graph Search responds to user queries with information produced by all Facebook users on their personal pages, and their friends personal pages. For instance, Graph Search, without consent of the user, allows any Facebook user to type in your name, and click the link "Photos of..." which appears underneath the search bar. Complete strangers can find pictures of you. The person searched may not be able to control who sees personal photos: it depends on the privacy settings of other users with whom the photos were shared. If you shared your photos with friends who had less strict privacy settings, then those lesser settings determine who will have access to your photos. Graph Search results in new pages being created that contain the search results. These pages present Facebook with additional

opportunities to sell ads, and to monetize the activities and information of its users.

The future of Facebook as a private corporation, and its stock price, will depend on its ability to monetize its most valuable asset: personal, private information.

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CASE STUDY QUESTIONS

4-13 Perform an ethical analysis of Facebook. What is the ethical dilemma presented by this case?

4-14 What is the relationship of privacy to Facebook's business model?

4-15 Describe the weaknesses of Facebook's privacy policies and features. What management, organization, and technology factors have contributed to those weaknesses?

4-16 Will Facebook be able to have a successful business model without invading privacy? Explain your answer. Are there any measures Facebook could take to make this possible?

MyMISLab

Go to **mymislab.com** for the following Assisted-graded writing questions:

4-17 What are the five principles of Fair Information Practices? For each principle, describe a business situation where the principle comes into play, and how you think managers should react.

4-18 What are five digital technology trends that characterize American business today that raise ethical issues for business firms and managers? Provide an example from business or personal experience where an ethical issue resulted from each of these trends.

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