

4

Enabling Business-to-Consumer Electronic Commerce

Preview

This chapter focuses on electronic commerce (e-commerce, or EC), explaining how companies conduct business with customers over the Internet. The Internet and information technology (IT) megatrends, such as increases in mobile devices and social connectivity, have introduced unprecedented opportunities for the marketing of products and services, accompanied by features, functionality, and innovative methods to serve and support consumers. At the same time, conducting business transactions online has introduced various challenges. With e-commerce representing a growing proportion of overall retail sales, an understanding of e-commerce can be a powerful tool in your arsenal. People with e-commerce skills are in high demand in the marketplace; therefore, the more you know about e-commerce, the more valuable you will become.

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MANAGING IN THE DIGITAL WORLD:

Taobao and the World of E-commerce

Most people in this world have heard of eBay and Amazon.com, two U.S.-based online retail sites where one can typically find any desired product. The online shopping fever has spread to China in the form of companies like Taobao and JD.com. Taobao, owned by Alibaba, was founded in 2003 and only 8 years later had 370 million registered users, more than the entire population of the United States. If you have tried any of Taobao's services, you know that it has various branches. There's Taobao Marketplace, China's eBay, which dominates the country's online consumer-to-consumer (C2C) e-commerce business with its 90 percent market share. Then there's Tmall.com, a separate site where renowned brands sell directly to consumers in a business-to-consumer (B2C) manner. In fact, Taobao has fostered such a holistic shopping experience that international names like Gap, Adidas, and Levi's, just to name a few, decided to launch their own official online retail storefronts in the virtual mall. By 2014, Taobao, Tmall.com, and Juhuasuan (another Alibaba site for "flash sales") had more than 231 million active buyers and 8 million sellers and took 11.3 billion orders a year. On the Chinese "Single's Day" alone, the Alibaba Group recorded US\$9.3 billion in sales and shipped 278 million orders.

However, shoppers should beware. Taobao might be the talk of the town, but it is also known as a notorious

**After reading
this chapter,
you will be
able to do the
following:**

1. Describe different approaches to competing in cyberspace as well as different forms of electronic government and e-finance.
2. Describe business-to-consumer electronic commerce strategies.
3. Understand the keys to successful electronic commerce websites and explain the different forms of Internet marketing.
4. Describe mobile commerce, consumer-to-consumer electronic commerce, and consumer-to-business electronic commerce.
5. Describe how to conduct financial transactions and navigate the legal issues of electronic commerce.

market for piracy and counterfeit goods. You may want to try out JD.com instead (short for Jingdong Mall, formerly 360Buy) which has not made it to the list of notorious markets. The company is expanding fast, with an ambitious plan of solving logistics and delivery troubles that are a hallmark of the Chinese market, given the country's size and differences in population density (Figure 4.1). JD.com hopes to build a trucking fleet of close to 300 trucks and enter the logistics and distribution market, specifically to get rid of long-distance transport headaches. The greatest barrier to online shopping in China remains trust; within China, people fear being defrauded or receiving substandard products. Outside China, potential customers often face language barriers when attempting to communicate with the suppliers. While low-priced offers directly from Chinese suppliers may seem tempting, these factors can easily convince overseas consumers to turn to the more familiar Amazon.com or eBay.

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

1. How have Taobao and JD.com evolved their e-commerce strategies to remain competitive in the global marketplace?
2. How does the proliferation of mobile devices change the competitive landscape for these companies?



FIGURE 4.1

Companies serving the Chinese market face tremendous logistical challenges.

3. How can these companies address issues related to trust and fraud?

Based on:

JD.com. (2016, June 16). In Wikipedia, The Free Encyclopedia. Retrieved June 24, 2016, from <https://en.wikipedia.org/wiki/JD.com>

Steimle, J. (2015, January 26). A beginner's guide to Alibaba Group. Forbes. Retrieved May 31, 2016 from <http://www.forbes.com/sites/joshsteimle/2015/01/26/a-beginners-guide-to-alibaba-group>

Taobao. (2016, June 24). In Wikipedia, The Free Encyclopedia. Retrieved June 24, from <https://en.wikipedia.org/wiki/Taobao>

E-Commerce and E-Government

The Internet provides a set of interconnected networks for individuals and businesses to complete transactions electronically. **Electronic commerce (EC)** refers to the exchange of goods, services, and money¹ among firms, between firms and their customers, and between customers, supported by communication technologies and, in particular, the Internet. The Census Bureau of the Department of Commerce reported that while total U.S. annual retail sales in 2015 increased by 1.5 percent from 2014, online retail sales were up by nearly 15 percent and that EC accounted for 7.2 percent of total retail sales, resulting in sales of more than US\$341.8 billion (Figure 4.2). Research firm eMarketer forecasts steady growth, anticipating global business-to-consumer e-commerce sales to exceed US\$3.6 trillion by 2017. Considering all online markets, it is clear that online transactions have become a major segment of the global economy. With this much money at stake, it is little wonder that no other information systems (IS) issue has captured as much attention as has EC. Already during the Berlin airlift in 1948, the foundations for EC transactions between businesses were laid, as the Military Air Transport Service of the U.S. Air Force in Europe realized that the airlifted cargo was important but that *information* about the cargo—such as what exactly was contained in a shipment, where it was located, or when it was scheduled to arrive—was equally important and devised standard universal codes for transmitting these data via teletype (Seideman, 1996). The emergence of the Internet and web further facilitated EC and, in addition, paved the way for marketing and selling products and services to individual consumers. This has led to the creation of an electronic marketplace where a virtually limitless array of services, features, and functionality can be offered. As a result, a presence on the web has become a strategic necessity for most companies.

Types of Electronic Commerce

Contrary to popular belief, EC goes beyond consumers merely buying and selling products online. EC can involve the events leading up to the purchase of a product as well as customer service after the sale. Furthermore, EC is not limited to transactions between businesses and

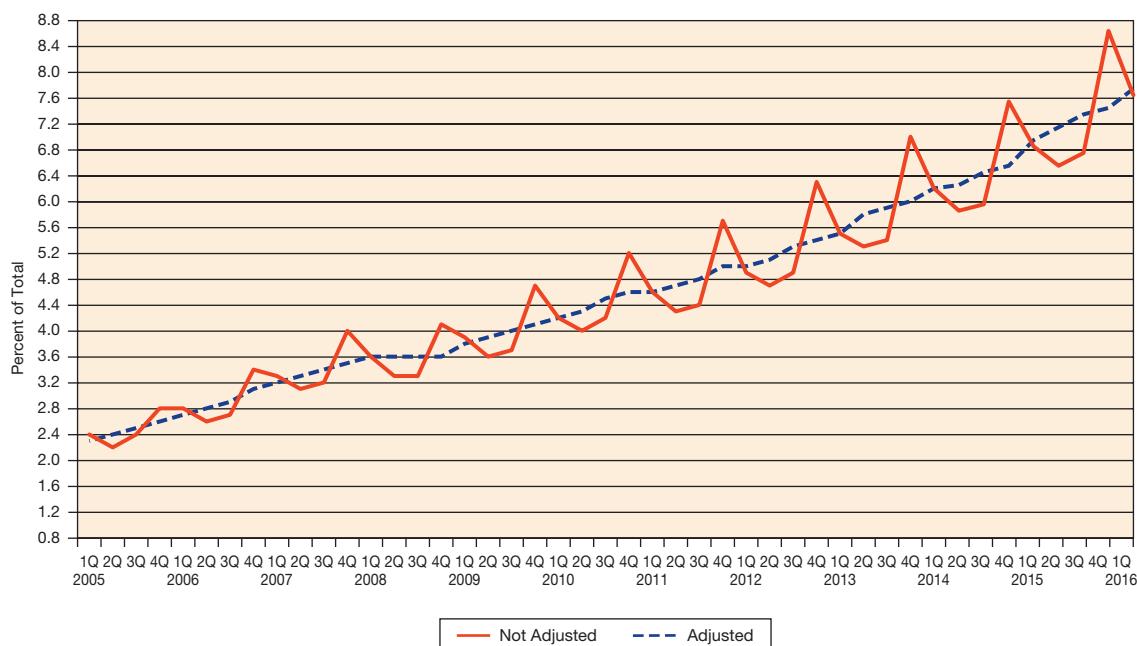


FIGURE 4.2

Online retailing continues to grow rapidly.

Source: U.S. Census Bureau News, U.S. Department of Commerce.

¹EC can also include the distribution of digital products, such as software, e-books, music, movies, and digital images.

TABLE 4.1 Types of EC

Type of EC	Description	Example
Business-to-consumer (B2C)	Transactions between businesses and their customers	A person buys a book from Amazon.com.
Business-to-business (B2B)	Transactions among businesses	A manufacturer conducts business over the web with its suppliers.
Consumer-to-business (C2B)	Transactions between customers and businesses	A person offers his or her photography at shutterstock.com.
Consumer-to-consumer (C2C)	Transactions between people not necessarily working together	A person purchases some memorabilia from another person via eBay.

consumers, which is known as **business-to-consumer (B2C)** EC. EC is also used by organizations to conduct business with business partners such as suppliers and intermediaries. This form of EC, not involving the end consumer, is commonly referred to as **business-to-business (B2B)** EC. As many firms concentrate solely on B2B transactions, B2B EC is by far the largest form of EC in terms of revenues, with U.S manufacturers reporting e-commerce shipments totaling US\$3.6 trillion in 2014 and wholesalers reporting e-commerce sales of US\$2 trillion. Further, almost all companies focusing on the B2C arena, such as the clothing and home furnishing retailer Eddie Bauer, also engage in B2B EC. In the process of producing goods and services, a business typically sources its raw materials from a variety of specialized suppliers (in B2B transactions); after the production, the business sells each finished product to a distributor or wholesaler (in a B2B transaction) or directly to the end consumer (in a B2C transaction). We will discuss B2B EC in Chapter 8, “Strengthening Business-to-Business Relationships via Supply Chain and Customer Relationship Management.”

Some forms of EC do not even involve business firms, as would be the case with transactions between consumers on an online auction site such as eBay; these forms of EC are referred to as **consumer-to-consumer (C2C)** EC. A related EC model is **consumer-to-business (C2B)** EC, where consumers offer products, labor, and services to companies, a complete reversal of the traditional B2C model. These basic types of EC are summarized in Table 4.1.

The five megatrends—social, cloud computing, the Internet of Things, mobile, and Big Data—have influenced various aspects of the digital world, and e-commerce is no exception. Fueled by the rise of social media, organizations are trying to leverage social networks to build lasting customer relationships, advertise products, or otherwise create value—a trend referred to as *social commerce*. Digital products and services are provided through the cloud (think iTunes, Dropbox, or Gmail). The Internet of Things enables companies to offer various innovative products and services that go beyond the initial purchase (such as the Nest thermostat that not only can be controlled from one’s smartphone but also learns the user’s schedules and habits, optimizing home energy use). The tremendous increase in the use of mobile devices has given rise to **mobile commerce (m-commerce)**—that is, any electronic transaction or information interaction conducted using a wireless, mobile device and mobile networks (wireless or switched public network) that leads to the transfer of real or perceived value in exchange for information, services, or goods (MobileInfo, 2016). Forrester Research estimates that U.S. B2C m-commerce sales will exceed US\$142 billion in 2016, accounting for 38 percent of retail e-commerce sales; by 2020, 49 percent of retail e-commerce transactions will be made on mobile devices, for a forecast total of US\$252 billion. In addition, B2B transactions are increasingly taking place on mobile platforms. Together, these megatrends generate a wealth of data, allowing companies to obtain an in-depth understanding of each individual customer so as to deliver individualized value propositions and build long-lasting customer relationships. Next, we examine the use of information systems for interactions with and between governments.

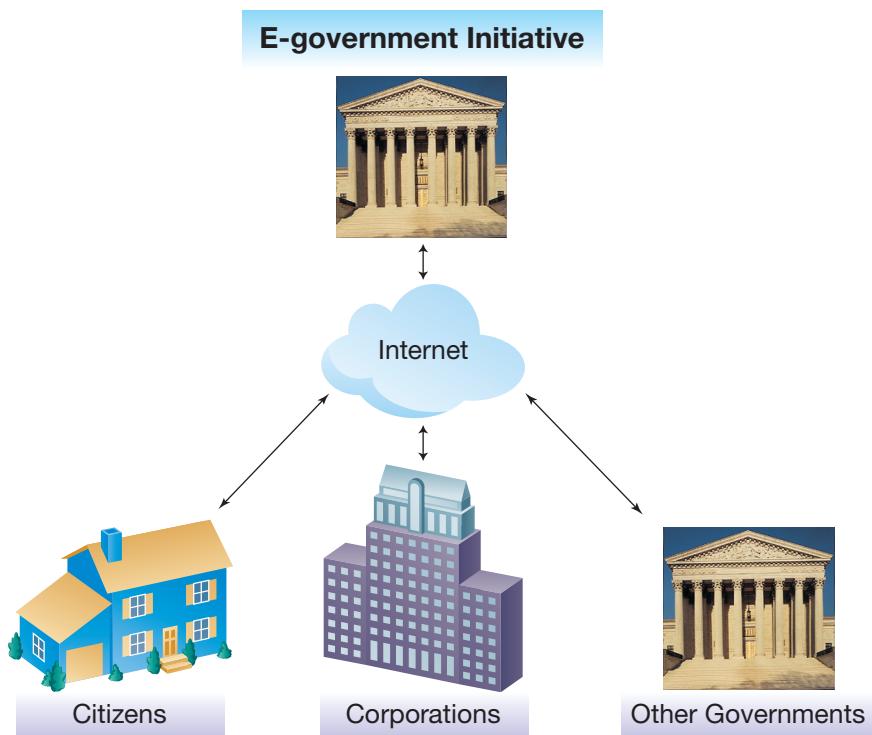
E-government

E-government is the use of information systems to provide citizens, organizations, and other governmental agencies with information about public services and to allow for interaction with

FIGURE 4.3

E-government initiatives include interaction with citizens, corporations, and other governments.

Source: Photographs in the Carol M. Highsmith Archive, Library of Congress, Prints and Photographs Division.



the government. Similar to the EC business models, e-government involves three distinct relationships (Figure 4.3).

GOVERNMENT-TO-CITIZENS. **Government-to-citizen (G2C)** EC allows for interactions between federal, state, and local governments and their constituents. The U.S. Internal Revenue Service's Internet tax filing, or *e-filing*, is one of the more recognizable G2C services, saving resources in terms of time and paper. Other services provided by governments include the online application for ID cards and municipal services, e-voting, or the provision of electronic access to public government data.

GOVERNMENT-TO-BUSINESS. **Government-to-business (G2B)** is similar to G2C, but this form of EC involves businesses' relationships with all levels of government. This includes e-procurement, or a government's streamlining its supply chain by purchasing materials directly from suppliers using proprietary Internet-enabled procurement systems. Also included in G2B initiatives are forward auctions that allow businesses to buy seized goods and surplus government equipment (these transactions can take place on a G2C level as well). Other G2B services include online applications for export licenses, verification of employees' Social Security numbers, and online tax filing.

GOVERNMENT-TO-GOVERNMENT. Finally, **government-to-government (G2G)** EC is used for electronic interactions that take place between countries or between different levels of government within a country. Since 2002, the U.S. government has provided comprehensive e-government tools that allow foreign entities to find government-wide information related to foreign trade or business topics. Other G2G transactions relate to the intergovernmental collaboration at the local, state, federal, and tribal levels.

E-finance

As we move further into the digital age, various products, services, and industries are being disrupted (see Chapter 2, “Gaining Competitive Advantage Through Information Systems”), and the financial industry is no exception. **E-finance** is the use of information systems to provide financial services and markets. Ubiquitous accessibility, the proliferation of mobile devices, advances in cloud computing, and Big Data analytics have brought about many radical changes for the financial services industry, and many foresee further radical changes in the near future. For example, financial companies can now operate on a global scale, and many services traditionally offered by banks can now be offered by other, nontraditional players. Likewise,

disintermediation has enabled firms to provide many financial services directly to the end customers, and the Internet has enabled customers to easily compare prices for financial services. These changes have affected not only traditional banks but also brokerage firms, insurance companies, and other players in the financial market.

E-BANKING AND ONLINE BROKERAGE. One type of services frequently offered online is managing financial transactions. Whereas traditionally consumers had to visit their bank to conduct financial transactions, they can now manage credit card, checking, or savings accounts online using **online banking** or pay their bills using **electronic bill pay** services. Increasingly, financial service providers offer ways for their customers to use their mobile devices for conducting banking transactions. For example, many banks created **mobile banking** apps for checking account balances or initiating transactions. Large banks like Chase, Citibank, USAA, Capital One, and Charles Schwab offer mobile check deposit apps, allowing customers to deposit a check by simply taking a picture of the check with a smartphone's camera. E-finance has also had a large impact on payment services as well as the development of *cryptocurrencies*; we will discuss these later in the chapter.

In addition to online banking, **online brokerage** has seen steady growth over the past several years. For example, many people turn to sites such as MSN Money, Yahoo! Finance, or CNN Money to get the latest information about stock prices, firm performance, or mortgage rates, and use online brokerage firms to buy or sell stocks. Further, most large online brokerage services offer trading apps for various smartphone platforms. In addition, e-finance has brought about tremendous changes to financial markets. For example, many stock markets around the world now use electronic trading, such that stock traders from around the world can trade without having to be at the stock market's physical location. Further, electronic trading greatly increases trading speed and reduces transaction costs. Likewise, foreign exchange markets now operate electronically.

FINTECH. Fintech (financial technology) refers to technologies that support activities in the financial sector. Often, fintech is associated with companies (often startups) that use technologies in innovative ways to disrupt activities in the financial sector; many fintech startups focus on specific types of interactions, segments, or business processes. For example, successful fintech startups range from crowdfunding platforms such as Indiegogo or Kickstarter to mobile payment processors such as Square, peer-to-peer lenders such as Prosper and Lending Club, small-business lenders such as Behalf, or digital investment managers such as FutureAdvisor. Another fintech innovation is the use of artificial intelligence for providing investment advice or managing financial portfolios. However, many of the innovative services provided by fintech startups are not captured by traditional financial regulations. Therefore, many innovations in the fintech sector will necessitate changes in regulation of financial services and public policy, often on a global scale; likewise, for organizations and individuals alike, managing risks becomes paramount, especially when dealing with players who are not established in the market.

Business-To-Consumer E-Commerce

Technological forces are driving business, lowering barriers to entry and leveling the playing field, allowing small and large businesses from around the globe to sell products to a global customer base. For small companies, this opens up vast opportunities. Unlike in international sports tournaments such as the Ironman World Championship, where athletes first have to compete locally to qualify for the big event, online businesses can "participate in the world championships" (i.e., compete on a global scale) right from the start. Companies are exploiting the capabilities of the web to reach a wider customer base, offer a broader range of products, and develop closer relationships with customers by striving to meet their unique needs (Valacich, Parboteeah, & Wells, 2007).

While it is beneficial for many small companies to access a global marketplace, this also means that every company participating in a market faces increased competition, and companies must strategically position themselves. Before the Internet, retailers (except for catalog merchants) operated solely using traditional physical stores; today, this approach is referred to as **brick-and-mortar business strategy**. Companies following this strategy solely operate physical locations such as retail stores and do not offer their products or services online. The advent of the web has enabled companies to move beyond their physical location and engage in the online



COMING ATTRACTIONS

The AI Hedge Fund

For many years hedge funds and money managers have relied on statistical models to improve their trading strategies. Trained in a variety of mathematical disciplines, specialists called “quants” use historical data and other sources of information to develop sophisticated models. However, these models tend to be highly complex and can be challenging to update and adapt to changing market conditions. To speed up the process of developing and refining these models, several startup hedge funds are turning to techniques from artificial intelligence (AI).

The field of AI is vast and varied. Many different approaches have been developed in attempts to emulate the intelligence and capabilities of humans (see Chapter 6, “Enhancing Business Intelligence Using Big Data and Analytics”), with some being very successful and others less so. Recent innovations in the sub-discipline of machine learning have led to widespread practical application; in particular, improvements in genetic algorithms (where many approaches are tried out and only the best survive) and deep learning (where multiple layers of neural networks are trained simultaneously) have enabled applications such as improved image and voice recognition and processing—Siri, Cortana, and Alexa are but a few examples.

Typically, machine learning algorithms are able to bring together data from many sources and use historical outcome information to train and improve their models. Whereas humans can operate in a similar way, the difference is that the machines can consider hundreds of thousands, even millions, of possibilities, evaluate them automatically, and then choose the ones that generate the best outcomes. The settings that

led to the better outcomes, called “parameters,” can then be fed back into the models for another iteration of improvement. While the resulting models can be extremely complex, the question is how to design the models such that the parameters and outcomes are actually useful for making trading decisions. Critics doubt that in the long run, the new machine learning based funds will be any better at this than existing players. For example, David Harding, the billionaire founder and CEO of Winton Capital Management is generally skeptical of the hype over machine learning and AI. “If I squinted a little and looked at Winton, I’d say that’s more or less what we’ve been doing for the past 30 years,” he says. Even believers in AI-based trading foresee other issues. As AI-based trading is expected to level the playing field, in the long run, everyone is likely to have access to the same intelligence. Yet if everyone is having access to the same intelligence, how could anyone outperform the market?

Based on:

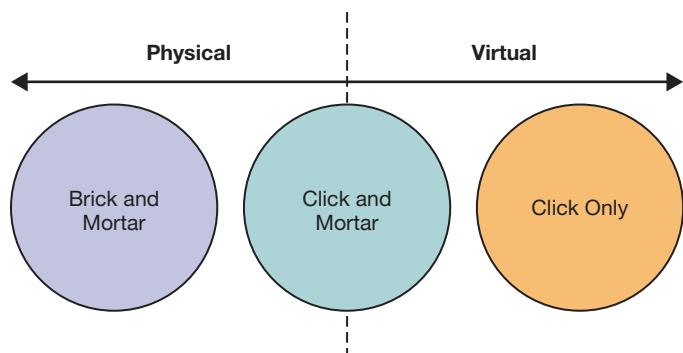
Knight, W. (2016, February 1). Will AI-powered hedge funds outsmart the market? *MIT Technology Review*. Retrieved June 27, 2016, from <https://www.technologyreview.com/s/600695/will-ai-powered-hedge-funds-outsma...>

Metz, C. (2016, January 25). The rise of the artificially intelligent hedge fund. *Wired*. Retrieved June 27, 2016, from <http://www.wired.com/2016/01/the-rise-of-the-artificially-intelligent-hedge-fund>

Wigglesworth, R. (2016, March 25). AI progress fails to convince all investors. *Financial Times*. Retrieved June 27, 2016, from <http://www.ft.com/intl/cms/s/0/1c249b10-ed49-11e5-888e-2eadd5fbca4.html>

sales of goods and services, or e-tailing. In the most extreme form of e-tailing, companies follow a **click-only business strategy** and only conduct business electronically in cyberspace. These firms (sometimes called **virtual companies**) have no physical store locations, allowing them to focus purely on EC. An example of a click-only company is the online retailer Amazon .com, which does not have a physical storefront in the classic sense. In e-business terminology, click-only companies are sometimes called “pure play companies,” focusing on one very distinct way of doing business; other firms, such as the bookseller Barnes & Noble, choose to utilize the Internet to extend their traditional offline retail channels. These firms employ a **click-and-mortar business strategy** approach (also referred to as a **bricks-and-clicks business strategy**). The three general approaches are depicted in Figure 4.4.

THE CLICK-AND-MORTAR STRATEGY. The greatest impact of the web-based EC revolution has occurred in companies adopting the click-and-mortar approach. Click-and-mortars continue to operate their physical locations and have added an EC component to their business activities. With transactions occurring in both physical and virtual environments, it is imperative that click-and-mortars learn how to exploit commercial opportunities in both domains. Conducting physical and virtual operations presents special challenges for these firms, as business activities must be tailored to each of these different environments in order for the firms to compete effectively (e.g., differential pricing or shipping and inventory management can suddenly become huge concerns for companies selling physical products). Traditionally, a company would only offer its customers a single channel, be it the physical retail store, a catalog, or

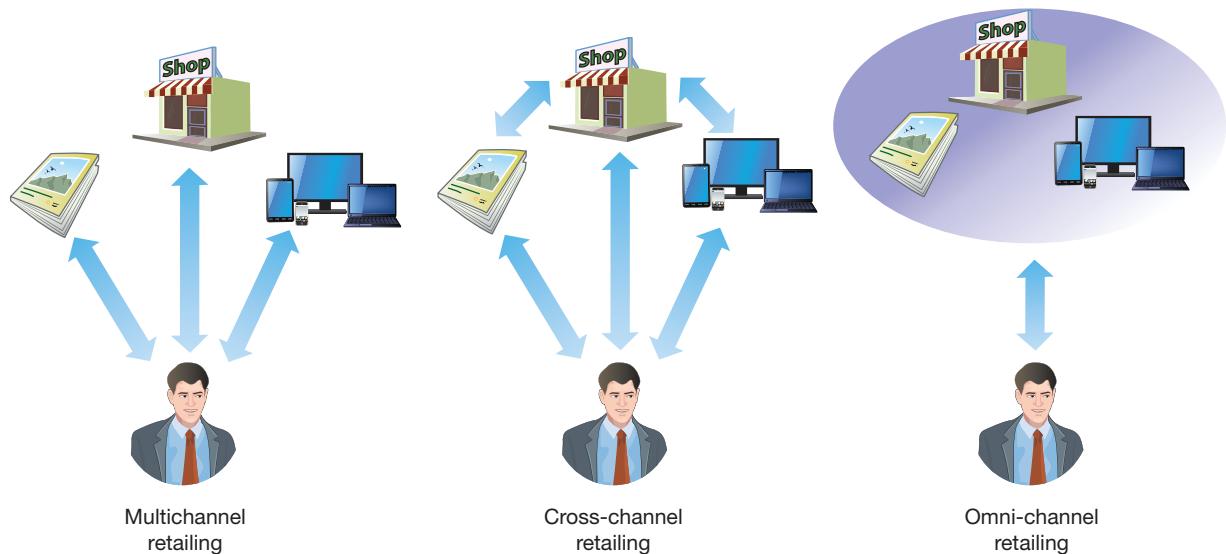
**FIGURE 4.4**

General approaches to conducting commerce.

an online store. As companies grew, many started using a multichannel approach, offering the customer different (independent) touchpoints, such as a retail store and a catalog (a concept referred to as **multichannel retailing**). Increasingly—and especially due to the proliferation of mobile devices—transactions take place *across* multiple environments, a concept referred to as **cross-channel retailing**. For example, in-store pickup refers to situations where a customer orders a product online and picks it up in a retail store; similarly, customers may evaluate products offline and purchase the products through the retailer's website. Finally, **omni-channel retailing** entails providing seamless, simultaneous interactions using different channels, such that a customer does not interact with a single channel but with the brand as a whole (see Figure 4.5). For example, a shopper in a retail store of electronics retailer Best Buy can scan a QR code to receive more information or product reviews, which are located on Best Buy's mobile site. Likewise, **sales beacons**—Bluetooth devices that can detect proximate smartphones and send messages—are likely to become a widely used way to send marketing messages or personalized coupons to the mobile phones of in-store shoppers.

No matter which approach click-and-mortars pursue, they face various challenges due to increasing IS complexity. Design and development of complex computing systems are required to support each aspect of the click-and-mortar approach, especially when attempting to offer seamless experiences across channels.

THE CLICK-ONLY STRATEGY. Click-only companies can often compete more effectively on price because they do not need to support the physical aspects of the click-and-mortar approach. Thus, these companies can reduce prices to rock-bottom levels (although a relatively small click-only firm may not sell enough products and/or may not order enough from suppliers to be able to

**FIGURE 4.5**

Supported by information systems, companies can interact with their customers using various touchpoints.

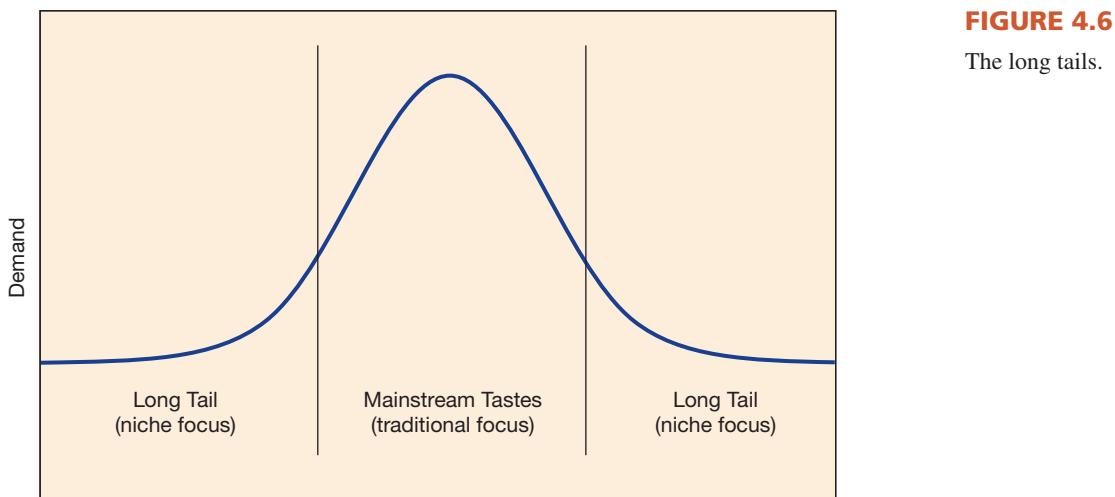
realize economies of scale and thus reduce prices). Click-only firms, such as Amazon.com or eBay, also tend to be highly adept with technology and can innovate very rapidly as new technologies become available. This can enable them to stay one step ahead of their competition. However, conducting business in cyberspace has some problematic aspects. For example, it is more difficult for a customer to return a product to a purely online company than simply to return it to a local department store. In addition, some consumers may not be comfortable making purchases online. Individuals may be leery about the security of giving credit card numbers to a virtual company. We will discuss these potential drawbacks later in this chapter.

E-tailing: Capabilities and Opportunities

Powerful web technologies have given rise to a global platform where firms from across the world can effectively compete for customers and gain access to new markets. Global customers do not have to rely on potentially outdated information from printed catalogs or account statements that arrive in the mail once a month but can access websites that are linked to corporate databases to provide real-time access to personalized information. Likewise, companies in the travel industry, such as airlines, can dynamically adjust fares based on availability, booking time, current and historical demand, forecast demand, and other factors to maximize revenues (a practice referred to as yield management) and disseminate the most current fares in real time on the company's website. Further, the web has opened new avenues for communication between companies and their customers; firms have augmented telephone-based ordering and customer support with web-based support, electronic mail, online text or video chat applications, and social media. In many cases, these are provided to allow customers to communicate with a customer service representative in real time through the corporate website. The web not only has facilitated the dissemination of information and facilitated communication with customers but often is used to facilitate all stages of a transaction, allowing companies to conduct business online without human assistance, greatly reducing transaction costs while enhancing operational efficiency. For example, once a customer places an order, the customer's address and payment information are stored in the company's customer database, the customer's credit card is automatically charged, the inventory is checked, and the order is routed to the fulfillment center, where the shipping label is automatically generated. Aside from picking and packing the actual product, most of the transaction requires little to no human interaction. For the business, this tremendously reduces the costs associated with the transactions by reducing the demand for phone representatives taking the order or back-office staff handling the orders. In addition, the Internet has enabled various new approaches to doing business. These are discussed next.

DISINTERMEDIATION. The web has disrupted many traditional business models by offering the ability to sell products directly to the end customers without the need for distributors or retailers. This phenomenon of cutting out the “middleman” and reaching customers more directly and efficiently is known as **disintermediation**. Disintermediation creates both opportunities and challenges. On the one hand, producers or service providers can offer products at lower prices (or reap greater profits) by bypassing traditional distribution and retail channels; on the other hand, they also have to take on those activities previously performed by these middlemen. For example, when airlines started selling tickets online and dealing directly with customers, they disintermediated travel agents. As a result, the airlines directly had to deal with upset travelers in case of delays or cancellations, while the travel agents had to find ways to make up for lost revenue, such as by charging booking fees when arranging a person's travel. In contrast, **reintermediation** refers to the design of business models that reintroduce middlemen in order to reduce the chaos brought on by disintermediation. For example, without middlemen like Travelocity.com, Orbitz.com, and other travel websites, a consumer would have to check all airline websites in order to find the flight with the best connection or lowest price.

THE LONG TAIL. Another opportunity enabled by the web is the ability to focus on the “long tails.” Coined by Chris Anderson (2004, 2006), the concept of the **long tail** refers to catering to niche markets in addition to (or instead of) purely selling mainstream products. The distribution of consumers' needs and wants can be compared to a statistical normal distribution: The center of the distribution reflects the “mass market,” characterized by relatively similar “mainstream”



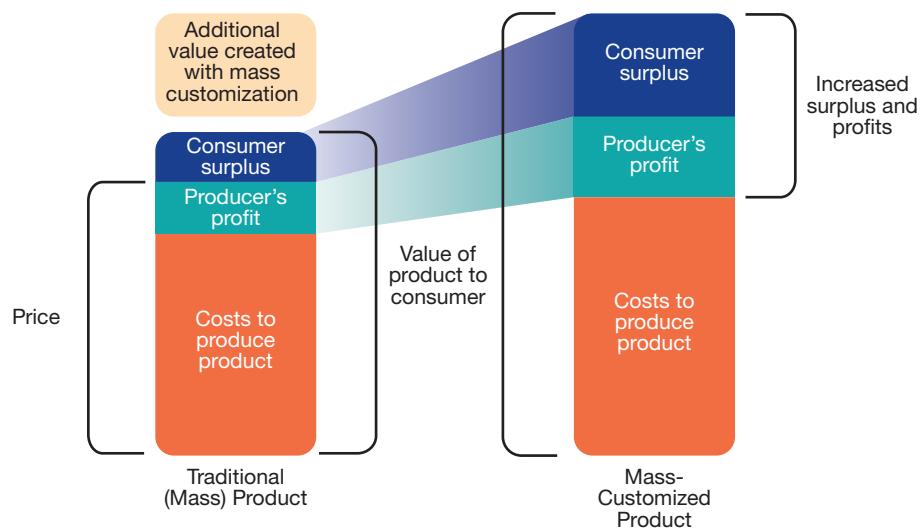
needs and wants shared by many people; the tails are the niche markets, catering to very diverse needs and wants (but comparatively few people share the same needs and wants) (Figure 4.6). Because of high storage and distribution costs, most traditional brick-and-mortar retailers and service providers are forced to limit their product offerings to serving the needs and wants of the mainstream customers in the center of the distribution. For example, large mainstream movie productions typically draw a huge audience and are shown in many movie theaters; in contrast, most independent movie productions are not shown at local cinemas, as they are unlikely to draw a large enough audience to cover the movie theater's costs to show the movie. Similarly, record stores carry only CDs of which a certain number of copies is likely to be sold each year to cover the costs for shelf space, sales personnel, and so on. Given the limited local reach of brick-and-mortar stores, this ultimately limits the stores' product selection.

In contrast, enabled by their extended reach, many e-tailers can focus on the long tails, that is, on products outside the mainstream tastes. For instance, whereas a local video rental store is unlikely to have a large selection of documentaries (because of a lack of local demand), Netflix can afford to have a very large selection of rather unpopular movies and still make a profit with it. Rather than renting a few “blockbusters” to many people, many (often outside the mainstream) titles are rented to a large number of people spread out on the long tails. Similarly, online bookseller Amazon.com can carry a tremendous selection of (often obscure) titles, as the costs for storage are far lower than those of its offline competitors. In fact, more than half of Amazon.com’s book sales are titles that are *not* carried by the average physical bookstore, not even by megastores such as Barnes & Noble. In other words, focusing on those titles that are on the long tails of the distribution of consumers’ wants can be a very successful strategy in the digital world.

MASS CUSTOMIZATION. Mass consumption, one of the hallmarks of modern economic activity, is based on the concept of mass production, which reduces costs by producing large numbers of identical goods. The Ford Model T is one of the earliest successful examples of mass production; all customers were offered the same model, which was produced on an assembly line (instead of being handcrafted, as other automobiles at that time); subsequently, mass production was adopted as the standard way of producing goods to be sold at affordable prices. Web technologies, combined with the ability to interact directly with the end customers, have allowed firms to focus on the long tails by tailoring their products and services specifically to each customer’s particular needs on a large scale, a model referred to as **mass customization**. Linking online product configuration systems with just-in-time production allows companies to assemble each individual product based on a customer’s specifications so that companies are able to provide individualized products while at the same time reaping the economies of scale provided by mass production. For instance, Dell Computer Corporation allows customers to customize their computers based on their specific performance needs. Likewise, customers can design personalized tennis shoes at Nike.com, customize their Mini at miniusa.com, or even

FIGURE 4.7

Mass customization generates additional value for customers and profits for producers.

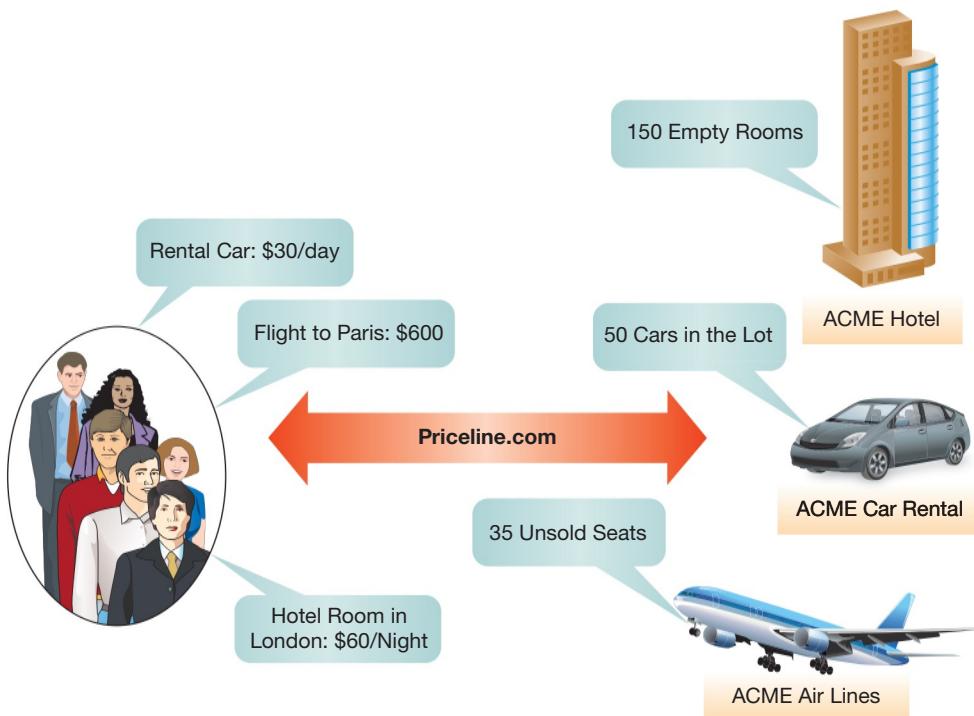


have their personalized cookies baked at kekswerkstatt.de. While manufacturing a customized product tends to be more expensive than traditional mass production, the product's value for the customer increases, allowing the producer to charge a higher price, leading to higher profit margins (Figure 4.7).

GROUP BUYING. Another innovative business model enabled by the Internet is **group buying**. Companies such as Groupon or LivingSocial negotiate special volume discounts with local businesses and offer them to their members in the form of “daily deals”; if enough people agree to purchase the product or service, the customers typically get significant discounts over the original purchase price. The business offering the product or service uses these deals to either reduce unsold inventory or to get new customers “into the door”; yet local businesses face the danger of making significant losses on these deals, as the group purchasing site typically takes a hefty share of the deal’s price (often about 50 percent), or they may not be able to cope with the sudden increase in demand (see Case 1 at the end of Chapter 2 for more on Groupon and its business model).

NEW REVENUE AND PRICING MODELS. As discussed in Chapter 2, the Internet has enabled or facilitated various revenue models, with companies earning revenues not only through traditional sales but also through subscription, licensing, or transaction fees. Further, organizations and individuals alike can generate revenues through web advertisement or affiliate marketing programs. Some companies selling products or services have come up with pricing models that transcend traditional **menu-driven pricing models**. Under a menu-driven pricing model, companies such as Amazon.com or Travelocity.com set the prices that consumers pay for products or services. In contrast, Priceline.com uses a **dynamic pricing model** to offer consumers discounts on airline tickets, hotel rooms, rental cars, and various other products and services. Customers specify the product they are looking for and how much they are willing to pay for it, and Priceline.com matches the customers’ bids with offers from companies (who often use Priceline.com to get rid of excess inventory). After a user searches for a service and submits a bid on Priceline.com, the system routes the information to appropriate brand-name companies, such as United Airlines and Avis Rent a Car, which either accept or reject the customer’s offer (Figure 4.8).

SOCIAL COMMERCE. Companies operating in the digital world have realized that people’s purchasing decisions are increasingly influenced by social media. Using various social media, people explore products or engage with others about their purchasing experiences. Thus, organizations are trying to leverage social networks to advertise products, build lasting relationships, or otherwise create value. **Social commerce** is the use of social media to influence shopping behavior, from the pre-purchase evaluation stage to post-purchase experiences. One use of social media is to incorporate social functionality into a company’s website, allowing customers to engage with the company or others through reviews or comments. For example,

**FIGURE 4.8**

Priceline.com lets consumers name their own price for travel-related services.

Amazon.com presents recommendations based on what other shoppers with similar tastes have viewed or purchased and encourages shoppers to share their recent purchases on social networking sites. Likewise, online retailers incorporate social sharing functionality into their websites so that customers can share their purchases with their social networks, effectively promoting the products they purchased. Another use of social media is to use social networks such as Facebook, Twitter, or Instagram to advertise products, distribute content, or otherwise engage with current or prospective customers. Adding social elements to the online shopping experiences not only helps increase sales but also gives the organizations a wealth of data about their customers, their motivations, and their experiences (see Chapter 8 for a discussion of social media and managing customer relationships).

In addition, several business models are built around social interactions in the online world. Consumer-to-consumer marketplaces such as eBay or Etsy allow individuals to sell products to other individuals. Group-buying sites such as Groupon use the network effect to increase buying power and obtain deals and discounts. Shopping discovery sites such as Pinterest or Polyvore allow users to suggest novel and exciting products and let merchants sell these products on the site (or app). Social shopping site Wanelo features 30 million products from 550,000 stores, allowing users to follow brands, stores, or other users and share their wish lists, allowing them to discover new styles or products. Recently, online customers have created their own form of social commerce; with the aim of bypassing traditional retail channels, online users have formed buying co-ops on social networks such as Facebook in order to purchase goods at wholesale prices. Clearly, while social commerce has various facets, it is certain that social aspects will play an ever-increasing role in e-commerce interactions.

Benefits of E-tailing

For e-tailers and customers alike, e-tailing can provide many benefits over traditional brick-and-mortar retailing in terms of the marketing concepts of product, place, and price. These are discussed next.

PRODUCT. Websites can offer a virtually unlimited number and variety of products because e-tailing is not limited by physical store and shelf space restrictions. For instance, e-tailer Amazon.com offers millions of book titles on the web compared with a local brick-and-mortar-only book retailer, which can offer “only” a few thousand titles in a store because of the restricted physical space.



ETHICAL DILEMMA

The Ethics of Reputation Management

If you're trying to decide on which book to purchase, which movie to watch at the theater, which hotel to stay at, or which restaurant to go to for dinner, you are likely to use the power of the crowd—that is, you probably consult websites such as Amazon.com (books), Rottentomatoes.com (movies), Tripadvisor.com or Booking.com (hotels), or Yelp.com (restaurants) to read reviews from others. For consumers, online reviews can be a valuable decision aid. On the other hand, online reviews can make or break a business. For example, a restaurant receiving just a few negative reviews on Yelp.com during the pre-opening phase will be much less likely to attract diners in the future, and the restaurant may fail before it even started. For the restaurant owner, who has invested her life's savings, this would mean that she would have to declare bankruptcy; further, she may have to lay off the chef, the waitstaff, and the dishwasher, all of whom have families to feed. The owner is tempted to boost the reputation of the restaurant and thinks about composing a few reviews herself and publishing those under different pseudonyms. Alternatively, she is considering giving out free drinks or desserts to diners as an incentive for posting positive reviews.

Needless to say, websites that publish customer reviews want to provide unbiased reviews and often have (proprietary) mechanisms in place to minimize (or at least reduce) the potential of biased reviews. In addition, under rules of the U.S. Federal Trade Commission, paying someone to post reviews may actually be illegal. Yet you may have noticed extensive,

raving reviews about a 500-page book posted just a day after the book was released or reviews that sound suspiciously like marketing copy.

The restaurant owner thus faces a dilemma. On the one hand, she may just ignore the negative reviews and hope that diners keep coming in spite of these reviews; however, this may result in having to lay off all her staff and close the restaurant if customers are kept away by the reviews. On the other hand, she may engage in "reputation management" and try to provide a more "balanced" picture of her restaurant on the review site.

Questions

1. What would you do? How about not providing any incentives but merely asking all satisfied customers to write reviews?
2. What would happen if the public found out about the owner's reputation management?
3. Imagine the owner knew that the initial negative reviews were posted by a competitor trying to drive her out of business. Would this change your assessment? If so, how?

Based on:

Roggio, A. (2012, January 31). Fake reviews, a despicable practice? *Practical eCommerce*. Retrieved April 25, 2016, from <http://www.practicalecommerce.com/articles/3330-Fake-Reviews-a-Despicable-Practice>

Tijerina, A. (2011, February 11). The ethics of online reviews. *DrivingSales.com*. Retrieved April 25, 2016, from <http://www drivingsales.com/blogs/arnoldtijerina/2011/02/11/the-ethics-of-online-reviews>

For online customers, comparison shopping is much easier on the web. In particular, numerous comparison shopping services that focus on aggregating content are available to consumers. Some companies fulfilling this niche are Google Shopping, Shopping.com, and PriceGrabber (focusing on a wide range of products); AllBookstores.com (books); and Booking.com (hotel rooms). By displaying information about prices, sellers' ratings, or shipping options, these comparison shopping sites can literally force sellers to focus on providing the best value in order to be successful. If sellers do not have the lowest price, they must be able to offer better quality, better service, or some other advantage. These comparison shopping sites generate revenue by charging a small commission on transactions, by charging usage fees to sellers, and/or through advertising on their site.

PLACE. As company storefronts can (virtually) exist on every computer that is connected to the web, e-tailers can compete more effectively for customers, giving e-tailers an advantage. Whereas traditional retailers are bound to physical store locations and open hours, e-tailers can conduct business anywhere at any time.

The ubiquity of the Internet has enabled companies to sell goods and services on a global scale. Consumers looking for a particular product are not limited to merchants from their own city or country; rather, they can search for the product where they are most likely to get it, where they may get the best quality, or where prices may be lowest. This has enabled customers to purchase goods from all over the world (such as various gadgets sold at www.dx.com). At the same time, this has created competition for domestic businesses, as often, overseas e-tailers can offer products much cheaper and may even offer free shipping (due to international postal agreements, as in the case of www.madeinchina.com).

PRICE. E-tailers can also compete on price effectively as they can turn their inventory more often because of the sheer volume of products and customers who purchase them. Companies can sell more products, reducing prices for consumers while at the same time enhancing profits for the company. Further, virtual companies have no need to rent expensive retail space or employ sales clerks, allowing them to further reduce prices.

Drawbacks of E-tailing

Despite all the hype associated with e-tailing, there are some downsides to this approach, in particular, issues associated with trust.

TRUST. One of the main factors keeping many consumers from purchasing goods and services online is trust. Especially for new online businesses, this tends to be challenging, as customers may be hesitant to purchase from companies they have never heard of. Often, trust becomes an issue due to the customer's inability to adequately experience the capabilities and characteristics of a product prior to purchase as well as due to uncertainties surrounding product delivery and returns.

Direct Product Experience For many products, customers desire not only information about product characteristics but also sensory information, such as taste, smell, and feel. When shopping for clothes at Lands' End, how can you be sure that you will like the feel of the material? Or what if you discover that the pair of size 9 EE hockey skates you just purchased online fits you like an 8 D? Likewise, products such as fragrances and foods can be difficult for consumers to assess via the web. Does the strawberry cheesecake offered online actually taste as good as it looks? How do you know if you will really like the smell of a perfume without actually sampling it? Finally, e-tailing eliminates the social aspects of the purchase. Although growing in popularity, e-tailers won't soon replace the local shopping mall because going to the mall with some friends or interacting with a knowledgeable salesperson cannot be replicated online. On the other hand, online shopping provides certain anonymity, allowing people to shop for products they may not feel comfortable buying in a physical retail store.

Product Delivery and Returns Except for digital products, such as music, games, or electronic magazines, e-tailing requires additional time for products to be delivered. If you have run out of ink for your printer and your research paper is due this afternoon, chances are that you will visit your local office supply store to purchase a new ink cartridge rather than ordering it online. The ink cartridge purchased electronically needs to be packaged and shipped, delaying use of the product until it is delivered. To combat these issues, large online retailers now offer 1-day delivery or, as is the case with Amazon.com's Prime Now, 2-hour delivery in select cities. Similarly, many click-and-mortar businesses offer in-store pickup and ship-from-store services to address issues associated with product delivery and to effectively compete with click-only companies. Other issues can also arise. The credit card information that you provided online may not be approved, or the shipper may try to deliver the package when you are not home. Finally, the customer may be unsure about product returns in case the product is not of the expected size or quality. When purchasing goods offline, people can easily return the product to the store; likewise, many click-and-mortar retailers offer in-store returns. However, when interacting with a click-only company, customers will have to carefully follow the merchant's instructions in order to receive a replacement or refund, leading to uncertainties for the customer. These issues become even more problematic when conducting transactions across national borders.

Electronic Commerce Websites and Internet Marketing

The basic rules of commerce are to offer valuable products and services at fair prices; a sound underlying business model is key for a successful business both online and offline. However, as is the case with effects of retail store layout and design on offline purchasing behavior, the design of an online retailer's website influences online purchasing behavior. In addition, to be successful, companies in the digital world have to market their products or services across a variety of online channels. These topics are discussed next.

Designing Websites to Meet Online Consumers' Needs

Successful companies design their websites to enhance their online customers' experience when interacting with the website. Valacich, Parboteeah, and Wells (2007) found that online consumers' needs can be categorized in terms of the site's structural firmness (characteristics that influence the website's security and performance), functional convenience (characteristics that make the interaction with the website easier or more convenient), and representational delight (characteristics that stimulate a consumer's senses). These are discussed next.

Structural Firmness For websites to be successful, structural firmness is a must. Online customers are unlikely to trust and revisit a website (let alone make a transaction) if the website does not function well (at least reasonably well). For example, the website should not have (or at least minimize) bad links, it should provide understandable error messages should something go wrong, and it should ensure privacy and security of the customers' data (EC websites often use trust seals to signal that privacy and security are ensured). Further, the website should be fast; if online customers have to wait for pages to load, they are not apt to stay at the site long or to return. In fact, studies suggest that the average length of time that a web surfer will wait for a web page to load is only a couple of seconds.

Functional Convenience The website must be easy to use. As with nearly all software, websites that are easy to use are more popular. If visitors have trouble finding things on a page or navigating through the website's links, they are unlikely to make a transaction or return to the site. Thus, websites should provide easy navigation for users to find their way (and back),



SECURITY MATTERS

Too Small to Be Hacked?

Stealing secret data is only valuable if someone is willing to pay for it, and one of the challenges facing cybercriminals is how to turn their exploits into hard currency. In recent years, many cybercriminals have turned to stealing data that can be easily converted into hard currency. Credit card numbers can be used directly to purchase merchandise or gift cards until the theft gets reported and the account canceled. Personal data can be used to steal someone's identity in order to apply for loans to get cash. However, as consumers, retailers, and banks get better at recognizing illicit activity and preventing data theft, it is getting more difficult for cybercriminals to monetize their activities. A recent trend has been taking data hostage.

Many small to medium-sized businesses lack the sophistication and resources to adequately protect their information systems. The data contained in these systems, however, are usually of limited value to others outside the business. So, instead of stealing the data, cybercriminals lock it up in such a way that it cannot be accessed. Usually, instead of transferring the data out, criminals simply encrypt the data in place. Without properly designed backup systems, many businesses are unable to access or recover their data. The cybercriminals then demand a ransom payment in order to restore access to the data. A small business's data may not be valuable to others, but the data are often extremely important to the operation of the business. Without extensive IT support or sophistication, the owners of the business may be willing to pay the ransom

to regain access to their data, thus providing immediate income to the criminals. Unfortunately, paying off the criminals may or may not get the data back, and the vulnerabilities that led to the attack in the first place may still be in place.

To prevent becoming a victim in the first place, experts recommend paying for a third-party service to audit, enhance, and maintain system security. While a small business may not be able to afford a sophisticated staff and specialized technology to monitor and secure its information systems, there are many outsourcing providers that can provide the required expertise and capabilities for a reasonable fee. As with many types of risks, an ounce of prevention can be worth a pound of cure. Security audits and enhancements are only part of the equation, however. It is also important to ensure that proper backup and disaster recovery policies and procedures are in place and to test them regularly. Finally, users are a key part of the equation. Technology alone cannot protect a business if the system user is the weak link, so it is essential to train users to recognize phishing scams and not to perform risky actions like clicking on unknown links or executing unknown attachments that can contain malware.

Based on:

Gustke, C. (2016, January 13). No business too small to be hacked. *The New York Times*. Retrieved June 26, 2016, from <http://www.nytimes.com/2016/01/14/business/smallbusiness/no-business-too-small-to-be-hacked.html>

provide indications about where the users are on the site, and offer help features. Further, features such as one-click ordering, offering a variety of payment methods, or order tracking can increase the perceived functional convenience of a website.

Representational Delight Finally, the website must be aesthetically pleasing. People are more likely to visit, stay at, and return to a website that looks good, as the design of a website can signal other characteristics of an online business, such as professionalism (Wells, Valacich, & Hess, 2011). Thus, successful firms have web sites that are nice to look at and have a unique look and feel to separate their website from their competition. Aesthetics can include the use of color schemes, fonts, backgrounds, and high-quality images. Furthermore, websites should have a clear, concise, and consistent layout, taking care to avoid unnecessary clutter.

THE ONLINE CONSUMERS' HIERARCHY OF NEEDS. In a perfect world, an organization would strive to maximize all three sets of characteristics. In reality, businesses constantly have to make trade-offs between complexity, resource limitations, and other factors; thus, it is important to understand online consumers' *relative* needs. Valacich and colleagues' (2007) "online consumer's hierarchy of needs" suggests that overall, a site's structural firmness is most critical; once visitors' needs for structural firmness have been met, functional convenience is the next most important set of characteristics, followed by representational delight. In other words, if a website is only nice to look at but difficult to navigate or appears not secure, visitors are unlikely to stay or make a transaction.

Needless to say, a basic level of structural firmness, functional convenience, and representational delight should be provided by any website (in other words, online visitors have a "zone of intolerance"). Beyond this basic level, the importance of the different sets of characteristics depends on the objective of a particular page on a website (Figure 4.9). For example, for a very utilitarian web page, such as the login page of your online banking site, structural firmness should be emphasized to the user (though both functional convenience and representational delight should not be neglected). In contrast, for a relatively more hedonic web page, such as a page designed to engage a visitor into considering a new home loan, representational delight should be emphasized (again, not neglecting the other factors). Hybrid pages, offering both hedonic and utilitarian value, such as those within Amazon.com or eBay, should balance the different factors (though typically checkout pages on such sites emphasize aspects related to structural firmness).

SETTING UP YOUR ONLINE STORE. As numerous examples show, the web allows almost anyone to set up an online store. The first step in starting a B2C e-commerce business is to set up an online storefront that is easy to use, fast, reliable, and aesthetically pleasing. However, especially small companies often lack the resources to set up a professional e-commerce site. One solution for companies wanting to benefit from being associated with large, successful e-businesses is to turn to the e-commerce giants eBay and Amazon.com, which let others sell products on their sites on a large scale. In addition, online businesses can choose from various (often freely available) e-commerce solutions that offer numerous well-designed store templates. E-commerce solutions offered by commercial providers such as Intuit, GoDaddy, Shopify, or Yahoo! or open

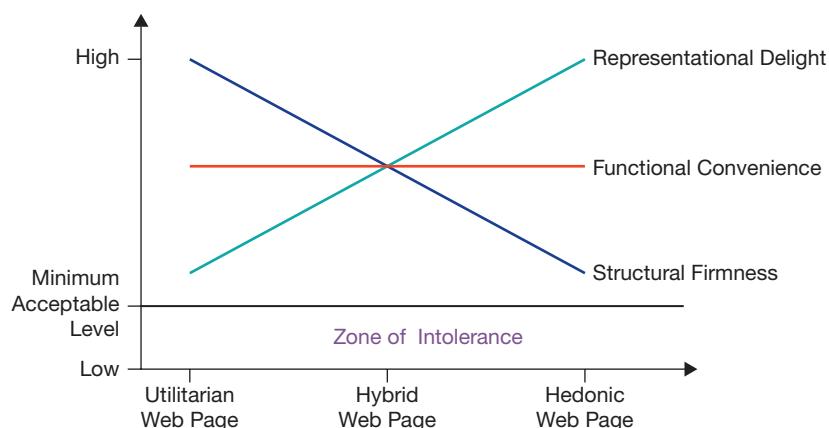


FIGURE 4.9

Different websites (pages) must focus on different design features.
Source: Based on Valacich et al. (2007).

source solutions such as osCommerce or PrestaShop offer various store templates, an integrated shopping cart, and so on; typically, such e-commerce solutions are customizable, giving businesses the option of integrating customer reviews, reward programs, or tracking information.

An additional challenge for fledgling online merchants is the effort involved in picking, packing, and shipping the orders. To address this problem, many smaller companies choose to outsource order fulfillment. For example, Fulfillment by Amazon “rents out” warehouse and information systems infrastructure to anyone wanting to run a successful online business, essentially offering fulfillment as a service, where all a company has to do is ship the products (in bulk) to Amazon’s warehouses, where the products will be stored until an order is received. Employees from the fulfillment service then pick, pack, and ship the order, allowing the companies to concentrate on managing the online business, attracting new customers, and so on.

Internet Marketing

One fundamental mistake companies can make when taking a current business online or creating an online business is assuming that if you build it, they will come. As with an offline business, marketing is a critical activity in any online endeavor, and a website cannot be successful without customers. As companies must attract visitors to their site and away from the thousands of other sites they could be visiting, companies advertise their firm’s web presence by including the website address on all company materials, from business cards and letterheads to advertising copy. Further, it is now common to see a company’s URL listed at the end of its television commercials, and more and more companies integrate QR codes into their offline ads. QR codes are two-dimensional bar codes with a high storage capacity. In a consumer context, QR codes are typically used to point the consumer to a particular web page when he or she scans the bar code with a mobile device’s camera (Figure 4.10). Alternatively, QR codes can trigger certain actions, such as initiating a phone call to a sales representative or sending a text message to a prespecified number.

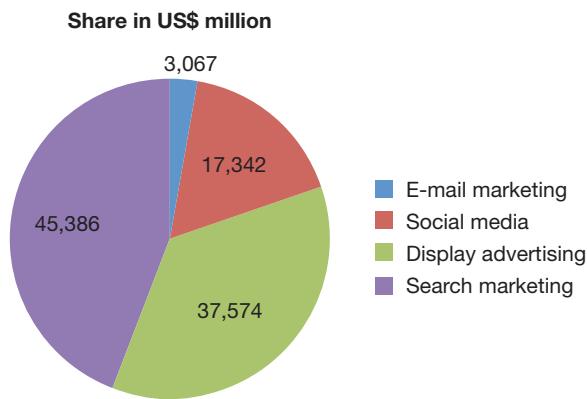
Historically, companies’ advertising budgets were mostly spent on noninteractive advertising campaigns, such as using billboards or newspaper, radio, or television ads. However, as it is becoming the norm to access the Internet multiple times a day from multiple devices and locations, companies are reallocating their advertising budgets; in 2014, organizations spent 24 percent of their advertising budget on Internet marketing; research firm Forrester estimates that by 2019, companies will spend 35 percent of their advertising budget on Internet marketing, including search marketing, display ads, e-mail marketing, social media, and mobile marketing (Van-Boskirk, 2014). All of these are discussed next.

FIGURE 4.10

Scanning a QR code can trigger certain actions, such as opening a web page.

Source: Scanrail1/Shutterstock.



**FIGURE 4.11**

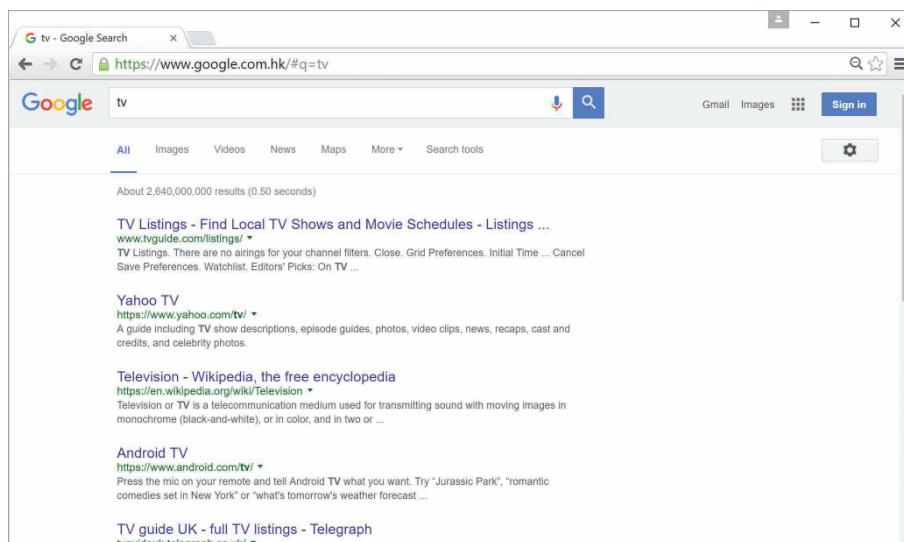
Search marketing is forecast to have the largest share of interactive marketing by 2019.

Source: Based on VanBoskirk, S. (2014, November 18). *US Digital Marketing Forecast, 2014 to 2019*. Cambridge, MA: Forrester Research.

SEARCH MARKETING. Whereas people would traditionally obtain information about products or companies from offline sources, many web surfers now just enter the name of a product into a search engine such as Google or Bing and then visit the resulting pages. Given this trend, it is not surprising that search marketing is now big business. Research firm Forrester reports that by 2019, companies in the United States will spend US\$45.4 billion on search marketing (Figure 4.11). Included in search marketing are search engine optimization and paid search, both of which are discussed next.

Search Engine Optimization The results presented by search engines such as Google or Bing are typically separated into organic results (i.e., based on the page's content) and sponsored results. The organic results of a user's search are presented based on complex, proprietary formulas, and the ranking (position of the link to a particular page) in the search results is largely outside the control of the web page's owner (Figure 4.12). Given the incredible numbers of results that are returned for common searches such as "apparel," "sportswear," or "digital camera," most surfers visit only the first few links that are presented and rarely venture beyond the first page of the search results; thus, companies use **search engine optimization (SEO)** in an attempt to boost their ranking in the organic search engine results. Although the exact formulas for a web page's rank in the organic results of a search engine are kept as trade secrets, the major search engines give tips on how to optimize a page's ranking, including providing unique and valuable content, keeping the content updated, and including key words for which a user might query.

There are a multitude of companies promising to improve a page's ranking, but because search engines' algorithms are usually proprietary and are frequently changed and there can be literally hundreds of factors influencing a page's rank, the success of using such services is often limited. Further, search engines such as Google try to detect whether a page is using unethical

**FIGURE 4.12**

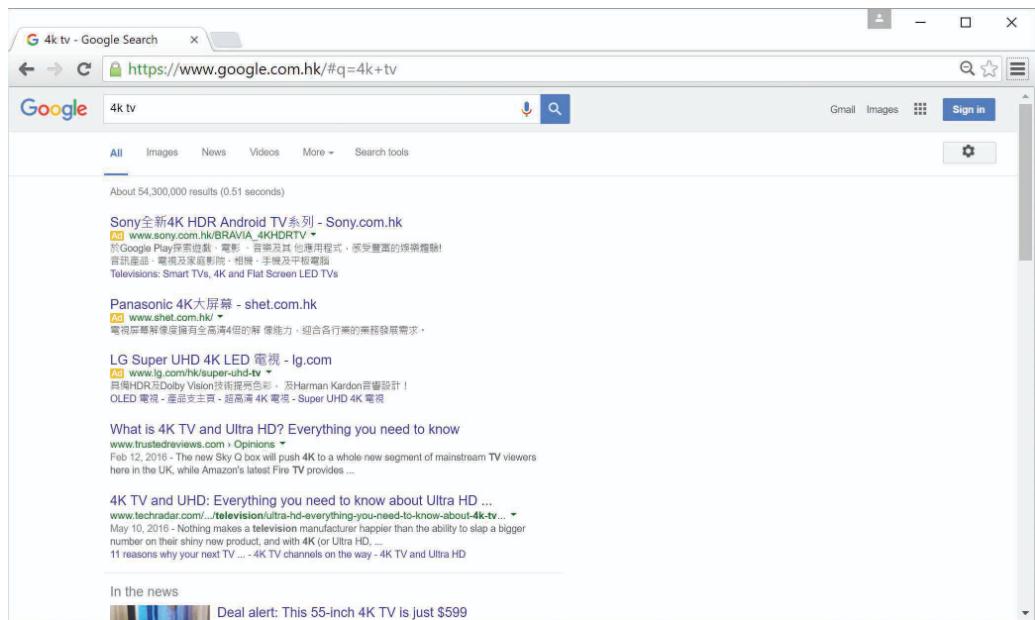
It is hard to influence the ranking of your company's page in the organic search results.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.

FIGURE 4.13

Companies pay per click for being included in the sponsored listings.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.



“tricks” (such as “hidden” key words) to improve its ranking and ban sites using such tricks from the listing altogether. Nevertheless, even slight modifications to a page can have a large impact on the page’s ranking in search results, and investments in SEO are often worthwhile, especially in times of tight marketing budgets.

Paid Search A way to ensure that your company’s page appears on the first page users see when searching for a specific term is using **search advertising** (or **sponsored search**). For example, using Google’s “AdWords,” a company can bid for being listed in the sponsored search results for the term “4K TV” (Figure 4.13). In order to present the most relevant ads to its users, Google then determines the relevance of the ad and the content of the linked page to the search term, and, depending on the amount of the bid, the company’s web page is listed in the sponsored results; Google is paid on a pay-per-click basis (see the following discussion of pricing models). As you can imagine, this can quickly become very expensive for advertisers, especially when the sponsored link is associated with a popular search term, and the advertiser has to bid against many competitors. On the other hand, a system such as Google’s AdWords ensures high-quality leads, as the ads are presented only to users actually searching for a specific key word (in contrast to traditional ads, which are presented to anyone). As programs such as AdWords can be tweaked in myriad ways (such as by key words, negative key words, region, time of day, and so on), many companies turn to professional consultants who help to optimize sponsored search campaigns. Alternatively, some search engines offer to elevate a page’s position in the organic results after paying a fee (**paid inclusion**). Many search engines that pride themselves on offering unbiased results (such as Google), however, do not offer paid inclusion. Overall, Forrester Research estimates that spending on paid search will increase from US\$25.2 billion to US\$41.3 billion between 2014 and 2019.

DISPLAY ADS. In the early days of the web, display advertising was the prevalent form of online advertising. Similar to traditional newspaper ads, companies would advertise their presence on other popular websites, such as nytimes.com, using static banner ads, video ads, or interactive banner ads, which allow users to interact with the advertisement. A recent trend in display advertising has been contextual advertising, where the ads placed on a page are in some way related to the content of that page. If, for example, you are reading tournament results from a PGA golf event at a popular sports website such as espn.com, you will also likely see an advertisement to buy new golf equipment or to visit a golf resort. A variety of interactive features, rich media ads, and the ability to place ads in online videos as well as the ability to accurately measure an ad’s impact contribute to display advertising’s increasing popularity.

E-MAIL MARKETING. E-mail marketing has been, and continues to be, a very popular aspect of advertisers’ overall interactive marketing mix (VanBoskirk, 2014). Given the low cost of less

than US\$1 per 1,000 e-mails, advertisers are increasingly trying to move away from direct-mail advertising and replace it with e-mail advertising. In addition to low cost, the effectiveness of e-mail advertising campaigns can be measured directly (such as by including special links or images in the e-mail that allow the sender to track which e-mails the recipients have opened or reacted to). Further, e-mail marketing saves tremendous amounts of paper over traditional direct mail advertising, allowing a company to build a positive green image.

SOCIAL MEDIA MARKETING. One continuing trend in Internet marketing is harnessing the power of social media, such as Facebook or Twitter. More and more people rely on social media to stay in contact with their friends or business associates, so including such sites in the interactive marketing mix is a natural move for companies. In addition to placing display ads on such sites, companies increasingly use social networking sites for interactive communication with their customers. For example, the Coca-Cola Company has created a page on Facebook, allowing it to interact with its more than 97 million “fans” (i.e., Facebook users who “like” the page) in various ways; Coke’s fans can download free virtual goodies, can upload pictures related to everything Coke, or can use interactive apps. By creating this page (which is free for Coke, except for the time needed to set it up, monitor, and maintain it), Coke can build strong relationships with a large group of its target customers. Similarly, people can follow Coke on Twitter or visit Coke’s channel on the video-sharing site YouTube. A recent trend for companies is establishing “social media listening centers” to feel the pulse of public opinion across a variety of social media. We discuss social media marketing in more detail in Chapter 5, “Enhancing Organizational Communication and Collaboration Using Social Media.”

MOBILE MARKETING. Finally, mobile marketing is forecast to skyrocket between 2014 and 2019 (VanBoskirk, 2014). Increasing use of smartphones and tablets has provided marketers with yet another channel for highly targeted advertising (such as based on a user’s location). This is true especially for tablets (with their relatively large screens), which allow for various innovative interactive ad formats. Further placing ads into mobile phone apps allows app developers to offer apps for lower prices (or free, under the freemium model; see Chapter 2) and provides marketers with another opportunity to reach their target audience through their favorite channels. Finally, the growth in mobile commerce further contributes to the growth of mobile marketing, as companies are trying to reach their customers wherever, whenever.

PAYMENT MODELS IN INTERNET MARKETING. In offline advertising, an ad’s exposure can only be guessed and pricing is typically fixed. For example, the cost for renting an outdoor billboard is determined by the size of the billboard, the location, or the estimated number of cars passing by that billboard in a certain time period; likewise, the price for a newspaper ad is determined by the ad’s size, the paper’s circulation, and so on. On the web, in contrast, it is possible to determine exactly how many people have been exposed to or clicked on an ad. Thus, one common pricing model for online advertising is the **impression based model**; under this model, pricing is based on the number of times the page containing an ad is displayed, typically expressed in cost per thousand impressions (i.e., cost per mille, or CPM). Depending on advertising volume and the popularity of the site where the ad is placed, costs can range from US\$8 to US\$40 per thousand impressions. However, research firms estimate that between 30 and 60 percent of website visits may be generated by nonhuman traffic; further, many web surfers do not even look at the online ads and web browsers such as Firefox offer the option to block certain ads. Thus, the trend in web advertising is moving toward performance-based pricing models, where the return on investment is more direct, such as **pay-per-click models**. Under this type of pricing model, the firm running the advertisement pays only when a web surfer actually clicks on the advertisement; the cost per click is typically between US\$0.01 and US\$0.50 per click, depending on the site, its viewers, and so on. One drawback, however, of pay-per-click models is the possibility of abuse by repeatedly clicking on a link to inflate revenue to the host or increase the costs for the advertiser; this is known as **click fraud**. Click fraud has become increasingly problematic, and companies such as Google are constantly monitoring clicks to detect potentially fraudulent activity.

ASSESSING PERFORMANCE OF INTERNET MARKETING. One major benefit of Internet marketing is the ability to target specific recipients based on location, time of day, page content surrounding an ad, or the viewer’s demographics, “likes,” or interests (e.g., on a social network such as Facebook), making Internet marketing campaigns very effective; further, in contrast



WHEN THINGS GO WRONG

Buying Likes

We've all seen them in our social network feeds: "Like this page for a chance to win a cash prize" or "Share this link to help John Doe get a backstage pass to the concert!" Social media sites like Facebook are a great platform for businesses to generate buzz and, with a well-executed marketing campaign, get noticed by millions of users. Many businesses entice users to "like" their business page for some reward—a discount or chance to win a prize—and in turn, the users who "like" the business spread the word to each of their network connections automatically. Users of Twitter and Instagram can also promote topics or businesses using hashtags (keywords denoted with a "#" symbol; see Chapter 5). These campaigns can be very effective. For example, in 2015, Starbucks hosted a photo contest in which participants who posted a photograph with a red Starbucks cup could win US\$500. To be eligible to win, the contestants had to post the picture on Instagram along with the hashtag #RedCupContest. This simple campaign resulted in more than 40,000 entries competing for one of five prizes.

Sometimes, however, these campaigns and contests can be deeply biased by automated "likes" and submissions, giving unfair advantage to users who try to game the system. There are many services that offer "like buying" and other forms of electronic voting fraud. One such company, based in

Chennai, India, employs dozens of people whose job is to use a multitude of social media accounts to "like," follow, vote for, or otherwise promote whatever campaign their clients hire them to promote. Some of these companies use special software to spoof and rapidly change their IP address, preventing filtering from contest sponsors who try to prevent multiple votes from the same IP address or who limit valid entries to only those within a specified geographical region.

Social media platforms try to suppress this type of devious behavior, but, as with many such practices, it turns into a cat-and-mouse game with both the social networks and the fraudsters constantly finding new ways to outsmart the other. Do a search for "vote buying services" online and see who is currently ahead.

Based on:

Permenter, C. (2013, June 6). Buying likes and rigging votes: Facebook's seedy underworld. *The Daily Dot*. Retrieved June 27, 2016, from <http://www.dailycdot.com/business/facebook-buy-votes-rig-contests-likes>

Young, H. (2015, December 14). The 30 most brilliant social media campaigns of 2015. *Salesforce.com*. Retrieved June 27, 2016, from <https://www.salesforce.com/blog/2015/12/2015-most-brilliant-social-media-campaigns.html>

to traditional marketing campaigns, it is easy to assess viewer's reactions to an ad. Given that Google and Facebook know (or are able to infer) various characteristics of their users (and Google manages ads across a variety of partner websites ranging from AOL to the *Washington Post*), it comes as no surprise that these two companies reap 85 cents of each new online advertising dollar spent by companies, according to analysts. How is the success of Internet marketing campaigns measured? The performance of Internet marketing can be assessed by metrics such as **click-through rate**, reflecting the number of surfers who click on an ad (i.e., clicks) divided by the number of times it was displayed (i.e., impressions), or **conversion rate**, reflecting the percentage of visitors who actually perform the marketer's desired action (such as making a purchase, signing up for a newsletter, watching a video, and so on). Targeting a well-defined audience with an ad campaign can help to attract high-quality leads, ultimately resulting in higher conversion rates. In addition, tracking visitors' behavior on a website can provide a host of useful information. For example, a firm can track the path that visitors take through the many pages of its website and record the length of the visits, page views, common entry pages, a page's bounce rate and exit rate, and even the user's region, browser, or Internet service provider, among other statistics. **Exit rate** is defined as the percentage of visitors who leave the website (i.e., terminate the session) after viewing that page; in other words, it reflects the percentage of users for whom a particular page is the last page they view before moving on to a different site or closing their browser window. In contrast, **bounce rate** is defined as the percentage of single-page visits; in other words, it reflects the percentage of users for whom a particular page is the only page visited on the website during a session. As the different metrics can be affected by the page itself as well as by the quality of the traffic being attracted, the company can use this information to improve its website or attempt to attract higher-quality traffic. If the exit rate for a particular page is abnormally high, the company can try to find out why this occurs and redesign the page to entice the users to stay. Similarly, pages that go unused can be eliminated from the site, reducing maintenance and upkeep. This process of analyzing web surfers' behavior in order

to improve website performance (and, ultimately, maximize sales) is known as **web analytics** (for more on this topic, see Case 1 at the end of this chapter and Chapter 6).

Mobile Commerce, Consumer-To-Consumer EC, and Consumer-To-Business EC

Fueled by the megatrends, mobile commerce has seen tremendous growth in the past few years. As defined earlier in the chapter, m-commerce is any electronic transaction or information interaction conducted using a wireless, mobile device and mobile networks (wireless or switched public network) that leads to the transfer of real or perceived value in exchange for information, services, or goods (MobileInfo, 2016).

Powerful mobile devices such as Apple's iPhone and iPad or Samsung's Galaxy, supporting high-speed data transfer and “always-on” connectivity, provide a wide variety of services and capabilities in addition to voice communication, such as multimedia data transfer, video streaming, video telephony, a sheer unlimited number of useful apps, and full Internet access, allowing consumers to access information or make transactions on the go. Mobile payment systems such as Apple Pay further facilitate mobile commerce. Indeed, research firm Forrester expects 270 million U.S. shoppers to use mobile devices by 2020 (up from 244 million in 2015; Lindner, 2016). In other regions of the world, mobile commerce has an even larger impact, with almost 50 percent of all e-commerce transactions in China having taken place on a mobile device in 2015 (a number that is forecast to reach 71 percent by 2019; eMarketer, 2015a).

The increasing use of tablets is seen as another major driver of mobile commerce. Although providing for mobility, tablets are often used in people's living rooms as “couch computers”; thus, tablets allow people to shop from the comfort of their homes without being tied to a desk and a computer screen (Figure 4.14). In addition, tablets provide larger screen sizes, allowing for better product presentation. An analysis of 16.2 billion transactions from 150 online retailers showed that tablet users tend to spend significantly more per order than shoppers using smartphones or personal computers (Adobe, 2012); given that tablet users tend to have above-average incomes, tablets may be the perfect channel for selling products or services online.

LOCATION-BASED M-COMMERCE. Another key driver for m-commerce is **location-based services**, which are highly personalized mobile services based on a user's location. Location-based services are implemented via the cellular network, Bluetooth and Wi-Fi networks, and global positioning system (GPS) functionality, now built into most modern smartphones. Location-based services allow the service provider to offer information or services tailored to the users' needs, depending on their location. For example, search engines can provide specific information about attractions or restaurants located in the user's vicinity, retail stores

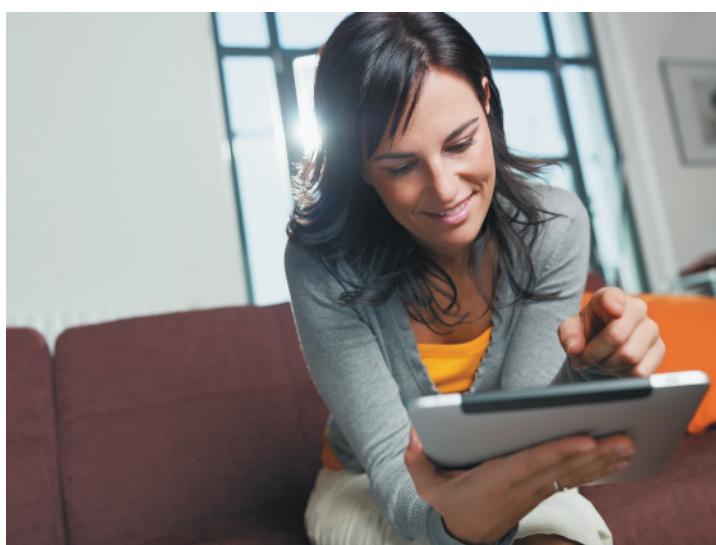


FIGURE 4.14

Tablets are often used as “couch computers.”

Source: Diego Cervo/Shutterstock.

TABLE 4.2 GPS-Enabled Location-Based Services

Service	Example
Location	Determining the basic geographic position of the cell phone
Mapping	Capturing specific locations to be viewed on the phone
Navigation	The ability to give route directions from one point to another
Tracking	The ability to see another person's location

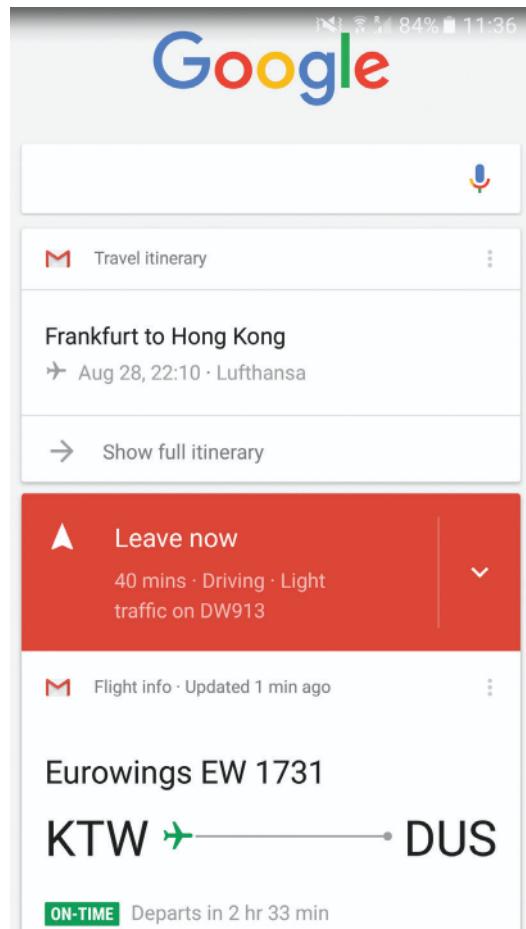
can enhance store locators with navigation instructions, or users can receive real-time traffic or public transport information (Table 4.2).

INFORMATION ON THE GO. In the digital world, people have become increasingly used to having tremendous amounts of information available. Mobile devices have taken this to the next level, in that people now have the information available whenever, wherever (Figure 4.15). For instance, when deciding on whether to visit a particular restaurant, people can get further information or customer reviews from sites such as Yelp using their mobile devices; similarly, when standing in a retail store, customers can easily retrieve a host of information and reviews about particular products. For customers, this capability can help tremendously when making purchase decisions; for companies operating in the offline world, this has turned into a mixed blessing. On the one hand, they can augment the offline shopping experience by being able to provide much more information than they would typically be able to, which can open up many opportunities for cross-channel and multichannel retailing and can allow bricks-and-clicks retailers to compete with their click-only counterparts. On the other hand, the rise in smartphone

FIGURE 4.15

Using mobile devices, information is always at your fingertips.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.



use has led to **showrooming**—that is, shoppers coming into a store to evaluate the look and feel of a product to then purchase it online or at a competitor's store. Obviously, click-only companies benefit from this practice; online retailer Amazon.com even offers an app that lets the user scan a product's bar code with the smartphone's camera and then displays the product information and price offered by Amazon.com.

In addition to providing information on the go, service providers offer mobile tickets or even mobile boarding passes; typically a QR code is sent to the smartphone of the user, who then just has to present the code to a QR code reader to verify the ticket or boarding pass. This adds convenience for the user, who does not have to keep track of paper tickets, physical boarding passes, and the like, and the service provider can offer additional information and services, such as automatic notifications of delays or gate changes for passengers.

PRODUCT AND CONTENT SALES. Mobile users increasingly use their mobile devices to purchase products or content on the go. In an attempt to harness this trend, many online retailers design mobile versions of their websites so as to facilitate the shopping process on mobile devices. With the increasing popularity of mobile commerce, companies have to strategically decide whether to go beyond mobile versions of their websites and create dedicated mobile apps, which can offer many features that cannot be provided on mobile websites. However, mobile apps are typically costly to develop as they have to be tailored to different platforms (e.g., Apple's iOS versus Android) and device form factors (such as different screen sizes of smartphones and tablets) (Figure 4.16). In any case, firms operating in the digital world should accommodate for unique aspects of mobile interactions (e.g., interactions are often short and fragmented or users face frequent distractions). According to research firm EPiServer, mobile users regard user reviews, direct customer support, adaptation to different screen sizes, location-based functions, and wish list functions as the most important features of mobile retail sites (eMarketer, 2016).

Especially among commuters, accessing content from mobile devices is extremely popular. Content providers ranging from newspapers to TV stations are now offering various ways to access their content from mobile devices. The increasing field of mobile content is obviously an important part of many companies' mobile marketing mix, as it allows reaching people in more places and provides for extremely targeted marketing efforts (such as based on a user's location).

C2C EC

C2C commerce has been with us since the start of commerce itself. Whether it was bartering, auctions, or tendering, commerce has always included C2C economics. Electronically facilitated interactions create unique opportunities (such as a large pool of potential buyers) and unique problems (such as the potential of being defrauded; see Table 4.3). This section discusses



FIGURE 4.16

Businesses have to decide whether to build apps for different platforms and form factors.

Source: Scanrail/Fotolia.

TABLE 4.3 Opportunities and Threats of C2C EC

Opportunities	Threats
Consumers can buy and sell to broader markets	No quality control
Eliminates the middleman that increases the final price of products and services	Higher risk of fraud
Always available for consumers, 24/7/365	Harder to use traditional payment methods (checks, cash, ATM cards)
Market demand is an efficient mechanism for setting prices in the electronic environment	
Increases the numbers of buyers and sellers who can find each other	

e-auctions and *online classifieds*, two of the most popular mechanisms consumers use to buy, sell, and trade with other consumers.

E-AUCTIONS. E-auctions provide a place where sellers can post goods and services for sale and buyers can bid on these items. Relatedly, bartering typically takes place on a one-on-one basis, but websites such as swap.com bring together many people listing items to swap.

The largest e-auction site, as you probably know, is eBay (www.ebay.com). eBay's revenue model is based on small fees that are associated with posting items, but these small fees quickly add up, so that in 2015 eBay's net revenues exceeded US\$8.5 billion. Whereas eBay is hugely popular, there continue to be cases of fraud. According to the Internet Crime Complaint Center (2016), e-auctions are marred with fraud, with e-auction fraud being among the top five most common crime types filed with the center. In particular, non-shipment of goods and counterfeit items tend to be the biggest problems; with the proliferation of fake goods ranging from handbags to brake pads, air bags, and chain saws, purchasing and using counterfeit goods can not only lead to legal complications but can potentially have dangerous or even deadly consequences. Needless to say, online auction sites warn users to exercise caution when purchasing goods; in addition, e-auction providers such as eBay offer swift conflict resolution mechanisms to preserve people's trust in the marketplace and use sophisticated business intelligence applications (see Chapter 6) to detect and minimize e-auction fraud, attempting to make C2C EC a safer shopping experience.

ONLINE CLASSIFIEDS. Another type of C2C e-commerce is online classifieds. Although online classifieds sites such as craigslist.com are enabled by web capabilities, no transactions take place online. Yet online classifieds have flourished in recent years, enabling people to sell anything from flowers to furniture. A related concept that has gained popularity is "freecycling," that is, giving away goods for free to anyone who is willing to pick them up.

PLATFORM-BASED C2C BUSINESS MODELS. As discussed in Chapter 2, digital platforms enable users to co-create value, and fueled by the megatrends social and mobile, many platforms focus on enabling C2C interactions. For example, ride-sharing platforms such as Uber, Linq, and Juno allow everyday people to use their own vehicles to provide an alternative to traditional cabs. Likewise, Airbnb allows people to rent their apartments to others, C2C marketplaces such as Etsy allow individuals to sell vintage or handmade products to other consumers, and the mobile photo-sharing service Instagram enables people to easily set up online storefronts.

C2B EC

Just as the web has enabled small businesses to participate in global EC, it has also enabled consumers to sell goods or services to businesses, reversing the more typical B2C model. Consumer-to-business (C2B) EC has seen a few implementations. One prime example is microstock photo sites such as Shutterstock, which sell pictures, videos, or artwork to publishers, newspapers, web designers, or advertising agencies. Up until a few years ago, clearinghouses such as Getty Images were the primary source for stock photography used by advertisers, book publishers such as Pearson Prentice Hall, or publishers of newspapers or magazines; however, the images purchased from these clearinghouses tended to be expensive, as the clearinghouses sourced the pictures from professional photographers. In contrast, Shutterstock sources much of

**FIGURE 4.17**

Amateur and professional photographers can sell their creations through microstock photo sites such as shutterstock.com.

its content not from professionals but from amateur photographers (Figure 4.17). Today, high-quality digital cameras can be had for far less than US\$1,000, and with the right editing software, amateur photographers can create images that almost match those of professional photographers. Amateur photographers can upload their pictures to microstock photo sites, where interested parties can license and download the images for US\$1 to US\$5 per image, which is a fraction of the price of a regular stock photo. Given that overhead costs are almost negligible, the microstock photo sites can make a profit while still sharing part of the revenue with the pictures' creators. Similarly, companies use crowdsourcing on micro-task marketplaces such as Amazon's Mechanical Turk (see Chapter 5) in order to have small, well-defined tasks (such as tagging pictures or describing products) completed by a scalable ad hoc workforce of everyday people. However, it can be argued that consumers who regularly engage in C2B transactions and make parts of their living with such transactions can be considered businesses; hence, the line between C2B and B2B transactions is somewhat blurry.

Securing Payments and Navigating Legal Issues in EC

Within a short period of time, radical developments in technology and systems have brought EC from a fringe economic activity to one of the most prevalent in today's global economy. This innovation has not slowed down and has opened some promising new areas within EC. This section outlines web-based financial transactions and legal issues related to engaging in EC.

Securing Payments in the Digital World

One of the most crucial aspects of B2C EC, C2C EC, and m-commerce is ensuring that online transactions are secure. Although the transfer of money is a critical factor in online shopping, online banking, and online investing, security researchers and software companies are lamenting that people are often reluctant to change their habits when surfing the web and carelessly reveal sensitive information to unknown or fraudulent sites. In fact, more than 17.6 million consumers in the United States (or 7 percent of U.S. adults) became victims of *identity theft* in 2014 (see Chapter 10). Security concerns and other factors (such as impatience, lengthy checkout procedures, or comparison shopping) lead shoppers to frequently abandon their shopping carts and to not follow through with a purchase—reports show that more than half of the online shopping carts are abandoned. Traditionally, paying for goods and services was limited to using credit and debit cards, but using these methods can open up many security issues. To address these issues, there are now different ways of exchanging funds when buying and selling goods or services online. Issues related to different forms of online payment are discussed next.

PAYMENT SERVICES. Concerns for security have led to the inception of independent payment services such as PayPal (owned by eBay), Apple Pay, Square, or Google Wallet. These services allow online customers to purchase goods online without having to reveal much private information to the actual sellers. Rather than paying a seller by providing credit card information, an online shopper can simply pay by using his or her account with the payment service. Thus, the customer has to provide the (sensitive) payment information only to the payment service, which keeps this information secure (along with other information such as e-mail address or purchase



GREEN IT

Green Online Shopping

Have you ever spent endless hours in different stores looking for a particular item? Unless the different stores are located in the same mall (or in the same general vicinity), driving between the stores requires using fossil fuels and contributes to increased pollution and road traffic. When shopping online, in contrast, you can easily search for products at different stores and compare prices, availability, shipping options, and so on, so you only need energy to power the device you use for your online “shopping trip.”

Unfortunately, calculating the environmental impact of online shopping versus shopping in a brick-and-mortar store is not always easy. Products purchased online are typically delivered by companies such as UPS or DHL; as the delivery vans travel optimized routes and deliver packages destined for hundreds of other people, they potentially save hundreds of trips taken to a store. Likewise, stores do not have to print out and handle paper receipts and other paperwork, lowering the need for chopping down trees. On the other hand, incredible amounts of cardboard boxes are needed to prevent damage to the items in transit.

A study conducted by Carnegie Mellon’s Green Design Institute estimated that purchasing a thumb drive from online retailer Buy.com (where the products are shipped directly from the distributor to the customer) can result in 35 percent savings in energy consumption and carbon dioxide emissions, compared with the same product purchased in a physical retail store. According to the researchers, the primary drivers for energy consumption for online purchases were packaging and delivery to the customers, whereas the largest driver of energy consumption for traditional retailing was the customer’s drive to and from the retail store, accounting for 65 percent of the total emissions produced.

Recent research conducted at the University of Delaware, however, suggests that online shopping might not be that green after all, due to an increase in fine particulate matter emissions (PM2.5) produced by the delivery vehicles. Further, the comparison is not always easy, as offline shoppers often bundle their purchases (such as by going to big box stores or shopping malls), online shopping may actually stimulate additional consumption (and thus need for transporting items), and delivery vehicles are often only a quarter full (as estimated by London’s transport authority).

The effects of increased particulate emissions and road traffic can especially be felt in large cities such as London, which expects delivery van traffic to increase by 20 percent until 2030—with this increase being entirely due to online shopping. As a result, cities are encouraging alternative energy to power these vans. For example, the city of London is providing subsidies to Gnewt Cargo, a company operating an all-electric delivery fleet, and the Norwegian Postal Service has purchased hundreds of electric delivery vans. While this is not going to reduce congestion, it can at least help make online shopping a little greener.

Based on:

DeWeert, S. (2016, February 17). How green is online shopping? *The Guardian*. Retrieved June 27, 2016, from <https://www.theguardian.com/environment/2016/feb/17/how-green-is-online-shopping>

Shankleman, J. (2016, May 9). As pollution from online shopping grows, London funds a solution. *Bloomberg*. Retrieved June 27, 2016, from <http://www.bloomberg.com/news/articles/2016-05-09/as-pollution-from-online-shopping-grows-london-funds-a-solution>

Swaney, C. & Ordiz, E. (2009, March 3). Carnegie Mellon study finds shopping online results in less environmental impact. *Carnegie Mellon University*. Retrieved June 27, 2016, from https://www.cmu.edu/news/archive/2009/March/march3_onlineshopping.shtml

history) and does not share it with the online merchant. Google linked its payment service to the search results so that Internet users looking for a specific product can immediately see whether a merchant offers this payment option; this is intended to ease the online shopping experience for consumers, thus reducing the number of people abandoning their shopping carts. Another payment service, PayPal, goes a step further by allowing anyone with an e-mail address to send and receive money. In other words, using this service, you can send money to your friends or family members, or you can receive money for anything you’re selling. This easy way to transfer money has been instrumental in the success of eBay, where anyone can sell or buy goods from other eBay users. With the increase in mobile interactions, mobile payment services such as Apple Pay or Square are seeing an increase in popularity. Such services greatly facilitate making in-store payments and offer an alternative to carrying cash or credit cards (e.g., by allowing the user to pay for a cup of coffee using a smartphone). A recent development of mobile payment services is to allow for peer-to-peer payments, such that a group of friends could easily split the bill for a meal at a restaurant. For example, the hugely successful Chinese messaging platform WeChat not only allows making online and offline payments but also allows for peer-to-peer transactions.

Cryptocurrencies. One radical innovation in the area of making and receiving payments is cryptocurrencies. Cryptocurrencies (the most widely used being Bitcoin) are virtual currencies that are not issued by any central bank and use encryption technologies to secure transactions and to generate new units of the currency. Often described as being primarily used for illicit purposes (such as dealing with drugs or weapons), these cryptocurrencies have various useful legitimate applications. Most of us are comfortable with providing credit card information to a reputable online retailer such as Amazon.com or NewEgg.com. Likewise, many of us have purchased things from other individuals or small companies using a payment service like PayPal. Credit card companies and payment services like PayPal act as trusted middlemen and provide consumers a safety net, giving them the confidence that their purchase will produce the desired good or service and ensuring that their personal financial information remains confidential. These services, however, come at a fairly significant cost. Credit card companies charge vendors between 1 and 3 percent of the purchase amount of every transaction, a cost that is typically passed on to the consumer in the form of higher prices. Payment services such as PayPal also charge fees, which can be as high as several percentage points of the total price.

In contrast, the technology underlying Bitcoin requires no trusted middleman, reducing the transaction costs to negligible amounts. Thus, Bitcoin is very useful for everything from micropayments to international transfers. In fact, many major online companies (including Dell, Expedia, and Overstock.com) as well as offline retailers now provide ways for customers to pay with Bitcoin. In addition to extremely low transaction fees, Bitcoin transactions are anonymous, akin to cash payments. How does Bitcoin work?

Bitcoin was launched around the year 2008 by an anonymous developer pseudo-named Satoshi Nakamoto. Bitcoin is transferred as payment within a completely decentralized



WHO'S GOING MOBILE

Mobile Payments

The advent of the credit card and electronic funds transfer (EFT) mechanisms have paved the way for cashless societies. Indeed, in the United States, only 7 percent of all transactions are made in cash, and in Sweden, the number is only 3 percent. Yet, even though the number of cash transactions seems to be on the decline, there are still various scenarios in which using EFT or credit cards is cumbersome or downright impossible. For example, many offline retailers resist accepting credit cards for small purchases, mainly due to the high costs involved, and many small amounts (such as paying at the parking meter) cannot be paid using credit cards. Similarly, the friend who covered the bill for dinner is unlikely to accept credit cards, and paying for online purchases on your mobile phone (e.g., for movie tickets) is very cumbersome.

With increasing mobility in the digital world, the smartphone appears to be a natural payment companion: Just like a wallet, most people carry their phone with them at all times. To harness this opportunity, companies have devised various innovative ways to use a smartphone as a payment device. For example, near-field communication (NFC) allows for simply waving an NFC-enabled phone in front of a reading device; the payment amount is typically billed to a linked credit card. Similarly, the American coffee giant Starbucks developed an app that lets users pay for their coffee by having the barista scan a bar code generated by the app, and PayPal developed an app

that allows for sending money to friends or for ordering products by simply scanning a QR code. Other novel payment systems use people's selfies or voice recognition to authorize payments. Payment provider Visa is even piloting a chip that enables the use of a car for making payments; built into the vehicle, the chip can communicate with gas pumps or parking meters and charge the payment amounts to a linked credit card account.

Mobile payment appears to be here to stay. However, it is not without problems. For example, critics cite the lack of accessibility for older generations as well as costs involved for the merchants and, last but not least, privacy concerns: Unlike cash transactions, mobile transactions are always stored somewhere, which may put people's privacy at risk when making purchases or even donations. On the other hand, mobile payments offer a host of opportunities for retailers, enabling them to build ever closer relationships with their customers.

Based on:

Cave, A. (2012, April 10). Is mobile the way we'll all be paying? *Telegraph.co.uk*. Retrieved June 27, 2016, from <http://www.telegraph.co.uk/finance/festival-of-business/9195540/Is-mobile-the-way-well-all-be-paying.html>

Collins, K. (2016, March 2). Paying with your face and car is the new paying with your phone. *CNet*. Retrieved June 27, 2016, from <http://www.cnet.com/news/paying-with-your-face-and-car-is-the-new-paying-with-your-phone>

peer-to-peer payment network—the payment processing is handled by thousands of computers around the world, each running the open source Bitcoin software. When someone pays for something using Bitcoin, the transaction is broadcast within the Bitcoin network, and is stored on a secure, public ledger that is accessible to any computer that wants to verify it. The authenticity of each transaction is ensured by digital signatures corresponding to the sending address of the payer and payee, and encryption ensures that the data about the parties involved in the transactions remain anonymous. The public ledger is constantly verified and maintained by the Bitcoin network and is thus “open for business” 24 hours a day, 7 days a week, and is not subject to any national holidays. In the Bitcoin network, this public ledger takes the form of a **blockchain**, an indelible, decentralized public ledger to which transactions are added in blocks, serving as proof of all transactions ever made (Figure 4.18). As the ledger is decentralized (i.e., distributed over a large number of computers), any changes made require consensus by the majority of nodes, making the blockchain highly resilient against tampering, and entries, once made, cannot be deleted. While blockchain technology is most widely known as the technology underlying Bitcoin, organizations from IBM to Wells Fargo are exploring possible ways of using blockchain technology for any other types of transactions that require trust, accountability, and transparency.

MANAGING RISK IN B2C TRANSACTIONS. When making an online purchase using a credit or debit card, an online customer has to transmit much personal information to a (sometimes unknown) merchant, and many Internet users (sometimes rightfully) fear being defrauded by an untrustworthy seller or falling victim to some other form of computer crime (see Table 4.4 for guidelines on how to conduct safe transactions on the Internet; see also Chapter 10). For online

FIGURE 4.18

In the Bitcoin network, transactions are stored on a public ledger in form of a blockchain.

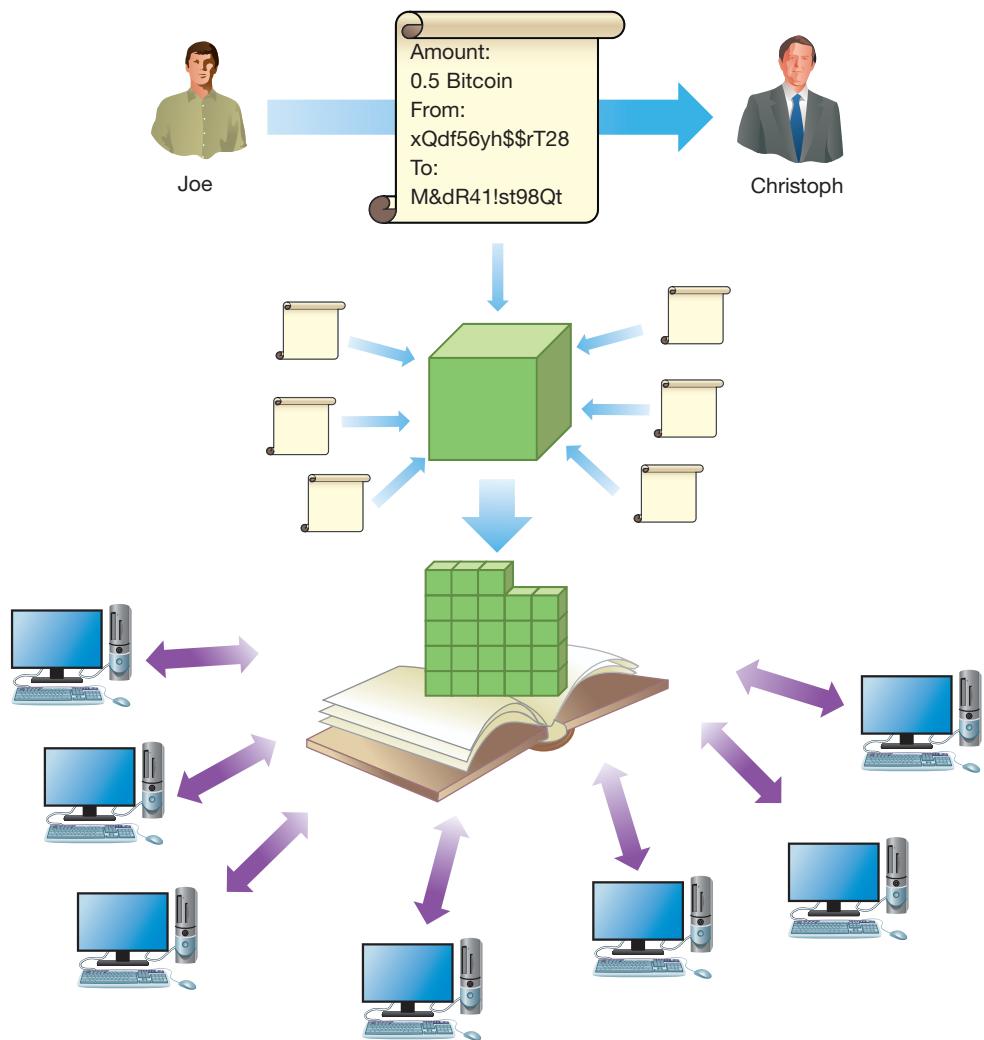


TABLE 4.4 Ways to Protect Yourself When Shopping Online

Tip	Example
Use a secure browser	Make sure that your browser has the latest encryption capabilities; also, always look for the padlock icon in your browser's status bar before transmitting sensitive information
Check the site's privacy policy	Make sure that the company you're about to do business with does not share any information you would prefer not to be shared
Read and understand the refund and shipping policies	Make sure that you can return unwanted/defective products for a refund
Keep your personal information private	Make sure that you don't give out sensitive information, such as your Social Security number, unless you know what the other entity is going to do with it
Give payment information only to businesses you know and trust	Make sure that you don't provide your payment information to fly-by-night operations
Keep records of your online transactions and check your e-mail	Make sure that you don't miss important notifications about your purchases
Review your monthly credit card and bank statements	Make sure to check for any erroneous or unauthorized transactions

Source: Based on Privacy Rights Clearinghouse (2016).

merchants, the risk of people using fraudulent credit card data may be equally high. As in offline transactions, online consumers at times dispute transactions for various reasons. In such cases, the merchant is financially responsible for the transactions, and credit card issuers typically charge back transactions that are disputed by cardholders. For the merchants, such chargebacks normally result in the loss of the transaction amount, loss of the merchandise, processing costs, and chargeback fees; in addition, the merchant's bank may charge higher fees or even close the merchant account if the chargeback rate is excessively high. Thus, minimizing chargebacks is of prime concern for online merchants. Some of the reasons for chargebacks, such as unclear store policies, product descriptions, shipping terms, or transaction currencies, can be minimized through good web store design; other reasons, such as stolen credit cards, require different safeguards (Visa, 2008).

Any credit card transactions must be authorized by the issuer of the credit card (typically the bank). However, this authorization merely ensures that the credit card was not reported as lost or stolen but does not ensure that the person making the transaction is the actual cardholder. In such card-not-present transactions, there is no imprint of the physical card and no cardholder signature, so online merchants have to be especially careful when deciding whether to make a transaction. While online customers demand a quick checkout process, leaving the merchant with little time to authenticate whether the customer is indeed the cardholder, the transaction date is the date the merchandise is shipped; thus, online merchants typically have one or several days to verify the identity of the cardholder (except for digital products or services). One mechanism used to authorize card-not-present transactions is the so-called **card security code**, a three-digit code located on the back of the card; this code is not stored in the card's magnetic stripe and is thus only known to a person who is in the possession of the physical card (note that credit card company rules prohibit merchants from storing the code). To further minimize risk, online merchants often use automated fraud-screening services that provide the merchants with a risk score based on a number of variables such as match between shipping address, billing address, and phone number; the time of the order and the customer's time zone; transaction volume; and the customer's IP address and its geographic location. Based on the risk score, merchants can then decide whether to let the transaction go through. For such screening services to be most

FIGURE 4.19

Various indicators can signal potential e-commerce fraud.



effective, the merchant should collect as much data as possible during the checkout process, which may lead some customers to abandon their shopping carts. In addition, online merchants can assess orders based on various fraud indicators (Figure 4.19); Visa recommends looking for fraud indicators such as:

- **E-mail addresses.** Legitimate e-mail addresses often contain some parts of the customer's name; in contrast, fraudsters often set up e-mail addresses consisting of meaningless character combinations with free e-mail providers.
- **Shipping and billing addresses.** Fraudsters often have the merchandise shipped to foreign, high-risk countries. Thus, merchants may require billing and shipping addresses to be the same. In addition, as many fraudsters come from foreign countries, misspellings of common words or street names may serve as a potential fraud indicator.
- **Transaction patterns.** Fraudulent transactions often show very distinct patterns. For example, the orders may be larger than normal, may consist of multiple items of the same type, or may consist largely of big-ticket items. Similarly, fraudulent transactions often consist of multiple orders using the same credit card in a short period or multiple orders using different cards shipped to the same address. Further, fraudsters often use overnight shipping so as to reduce the merchant's time for verification checks and to be able to quickly resell the merchandise.

Being alert for such fraud indicators can help an online merchant to reduce the risk of fraudulent transactions. Often, it is prudent to either call the customer for verification of the order (though this may be problematic for privacy reasons) or outright reject the transaction.

Legal Issues in EC

Although EC is now a viable and well-established business practice, there are issues that have changed the landscape for businesses and consumers and continue to do so. Two of the most important issues for EC businesses are taxation of online purchases and the protection of intellectual property, especially as it pertains to digital products, both of which are outlined next.

TAXATION. Although this issue is a relatively old one, it remains controversial within the American legal system. With EC global transactions increasing at an exponential rate, many governments are concerned that sales made via electronic sales channels have to be taxed in order to make up for the lost revenue in traditional sales methods. As people shop less in

TABLE 4.5 Arguments For and Against Taxation of EC Transactions

For	Against
Increases tax income of local, state, and federal governments	Slows EC growth and opportunity
Removes unfair advantage for e-tailers over brick-and-mortar stores	Creates additional compliance burden for e-tailers
Increases accountability for e-tailers	E-tailers located in one state would subsidize other states or jurisdictions Drives EC businesses to other countries

local retail stores, many cities, states, and even countries are now seeing a decrease in their sales tax income because of EC. Table 4.5 highlights issues associated with taxation of EC transactions.

According to tax laws such as the **Internet Tax Freedom Act**, sales on the Internet are treated the same way as mail-order sales, and a company is required to collect sales tax only from customers residing in a state where the business had substantial presence. In other words, only if an EC business had office facilities or a shipping warehouse in a certain state (say, California), it would have to collect sales tax on sales to customers from that state (in that case, California). Many EC businesses thus strategically selected their home bases to offer “tax-free shopping” to most customers. For example, Amazon.com tended to be very selective in where it located shipping facilities and warehouses to offer favorable tax conditions for most customers while still being able to offer fast delivery. Walmart.com, on the other hand, collects taxes on all of its U.S. EC transactions, as it is physically present in every U.S. state. Note that even if the EC business does not *collect* sales tax on goods or services you may have purchased, you are still liable for *paying* “use tax” (usually equal to your state’s sales tax) on those goods and services. Currently, Amazon has negotiated tax agreements with various states, and the U.S. legislature has proposed the Marketplace Fairness Act to simplify taxation issues surrounding e-commerce and to allow states to require e-tailers to collect sales tax even if the e-tailer has no physical presence. No matter whether (or when) this act is passed, taxation will remain a difficult issue.

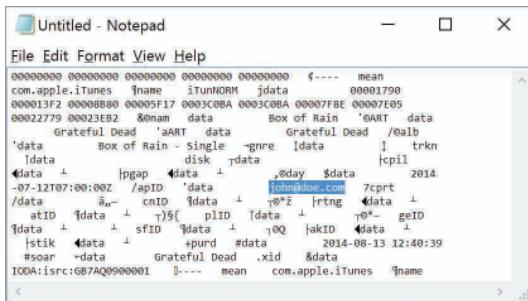
On an international level, taxation is even more difficult. A U.S. customer ordering an item from China may be liable for paying use tax in his or her home state; likewise, a customer outside the U.S. ordering from a U.S. seller would not have to pay U.S. sales tax but may be liable for paying tax (and/or import duty) in his or her home country on the shipment’s arrival. For digital products (such as software or music downloads), the movement of the product is difficult to track, and the tax revenue is easily lost. Obviously, e-businesses actively doing business in other countries have to comply with the various different tax laws in different countries.

OTHER LEGAL CONSIDERATIONS. In addition to taxation, companies selling goods or services on the web face a myriad of other issues. For example, companies should ensure they have explicit, enforceable terms of contract, terms of sale, and/or terms of website use; such terms may also cover questions surrounding the liability for content and its accuracy. Further, ownership of content and trademarks can be a virtual minefield. When posting content on one’s site, one has to ensure not to infringe on others’ copyrights or trademarks (e.g., by posting product photographs without permission or even by having trademarked names in one’s domain name). Likewise, care has to be taken if third parties develop content for one’s site: Who will own the copyright for that material? However, online businesses should not only ensure not to infringe on others’ intellectual property but also make sure to protect their own intellectual property, such as by displaying copyright notices and the like. Finally, it is important to clearly state the jurisdiction and ensure to comply with the laws and regulations of that jurisdiction.

DIGITAL RIGHTS MANAGEMENT. With consumers increasingly using EC as a viable alternative to traditional commerce, the entertainment industry has no choice but to embrace the Internet as a distribution medium. Yet digital media are easily copied and shared by many people, as

FIGURE 4.20

Digital watermarks are used to trace illegal copies of digital media to the original purchaser. Source: Notepad 2016, Windows 10, Microsoft Corporation.



the entertainment industry has painfully learned after the introduction of the compact disc. Hence, the entertainment industry has turned to **digital rights management (DRM)**, which is a technological solution that allows publishers to control their digital media (music, movies, and so on) to discourage, limit, or prevent illegal copying and distribution. DRM restrictions include which devices will play the media, how many devices the media will play on, and even how many times the media can be played.

To prevent illegal sharing of DRM-free content, it is often watermarked so that any illegal copy can be traced to the original purchaser (e.g., content purchased on iTunes contains the e-mail address used for the purchase) (Figure 4.20). A **digital watermark** is an electronic version of physical watermarks placed on paper currency to prevent counterfeiting.

The entertainment industry argues that DRM allows copyright holders to minimize sales losses by preventing unauthorized duplication, but critics refer to DRM as “digital restriction management,” stating that publishers are arbitrary on how they enforce DRM. Further, critics argue that DRM enables publishers to infringe on existing consumer rights and to stifle innovation; for example, restrictions and limitations such as limiting the number of times a game can be activated or limiting on which devices media can be accessed cause much inconvenience to users (such as when purchasing a new computer) and can thus breed piracy. Finally, critics argue that examples such as Amazon.com or Apple’s iTunes show that businesses can be very successful with DRM-free content (CNet Australia, 2012).

NET NEUTRALITY. The Internet was designed as an open network, which means that every website, every application, and every type of data (e.g., a game, Skype call, or YouTube video) is treated the same. Because of this openness, virtually anyone or any business, well known or unknown, can access and be found on the web. For example, unknown bloggers can compete with large news providers like CNN for readers. Many believe that this openness has been the primary catalyst for countless innovations and some of today’s most successful companies, like eBay and Google. Without this openness, many fear that startups and entrepreneurs will be muscled out of the marketplace by big corporations that have the money to control what people are able to see or do on the web.

In general, **net neutrality** is the principle that all Internet data should be treated the same. Proponents of net neutrality believe that the Internet should forward all data packets on a first-come, first-served basis, allowing anyone to freely communicate with any application or content without interference from a third party. Proponents are worried that without strong laws to protect the Internet, governments, providers, and large corporations will be able to block Internet applications and content and even block out competitors.

Many large corporations and telecommunications providers, however, would like to change the way information is accessed and prioritized on the web. Large telecommunication providers would like to charge different rates to access different websites, to have adequate speed to run certain applications, or even to have permission to plug in certain types of devices. Yet this would give larger and more established companies tremendous power over smaller and startup firms, and without legal protection, consumers could find that a network operator has blocked the website of a competitor or slowed the delivery of content from companies unwilling to pay additional fees.

Many believe that retaining net neutrality is critical to preserve current freedoms. It guarantees a level playing field for all websites and Internet technologies. Without net neutrality, many of the next generation of innovations may be shut out.

While electronic commerce has now existed for several decades, it continues to evolve and mature. Each year, innovative strategies continue to emerge in virtually all sectors of business and government. Technologies evolve as well as how and where people conduct electronic commerce, from desktops, to laptops, to tablets, and to smartphones at home and while on the road. New capabilities often create unforeseen issues that require new laws and regulations. The best prediction about the future is that change will continue in this rapidly evolving space.



INDUSTRY ANALYSIS

Retailing

You may make many purchases online in order to benefit from greater convenience or lower prices, but you will likely set foot in a brick-and-mortar retail store at least occasionally, and you may have noticed some changes brought by technology. A few decades ago, large retail chains started introducing computerized point-of-sale inventory systems consisting of check-out computers and an inventory control system. A simple bar code scan captures a sale, and the item is automatically deducted from the store's inventory, allowing real-time tracking of purchases so that the retailer knows when to reorder merchandise or restock shelves. In addition to a speedier checkout process, such systems help to reduce stockouts, increasing customer satisfaction. In many grocery stores, this system has been taken a step further, allowing the customers to conduct the checkout process themselves, saving time and labor costs. In Switzerland, grocery retailer Migros introduced a system that allows customers to scan items as they are placed into the shopping cart. At the checkout counter, all the customer has to do is swipe a credit card.

In the near future, many items may be equipped with radio frequency identification (RFID) tags (see Chapter 8), eliminating the need to scan each individual item, so that the total price for a cart full of merchandise can be calculated within a second, saving even more time and adding convenience for the customer. Imagine the time you'll save when all you have to do is pass with your cart through an RFID reader and swipe your credit card.

Payment systems are also changing. A new "Pay by Fingerprint" system allows customers to complete a purchase by placing a finger onto a fingerprint scanner without the need to sign a sales slip or enter a personal identification number (PIN); this makes the checkout process extremely convenient and secure. Another innovative way to pay for a purchase is via mobile phone. Using a technology called near-field communication (NFC; similar to Bluetooth), the customer's mobile phone communicates with the retailer's payment terminal, and the payment amount is automatically debited from the customer's bank account. NFC-based payment systems have already begun to be implemented; major smartphone manufacturers such as Samsung, Nokia, Motorola, and HTC actively support this new technology by integrating it into new handsets.

Further, many brick-and-mortar retailers have had to respond to the phenomenon of showrooming, in which, as

discussed earlier, customers examine products in person at a store and then leave to order the same product online for less. Retailers invest billions to build and maintain their storefronts, and online retailers can often undercut physical stores' prices; when a customer takes advantage of this, the brick-and-mortar retailer cannot recoup the cost of the storefront. Some retailers like Best Buy and Target are embracing this trend, however, by encouraging consumers to browse their shelves and compare prices online. By providing perks such as superior, personal customer service and instituting price-matching policies, these retailers prevent loss of customers due to price while benefiting by selling additional products. Other new and exciting in-store technologies include smart fitting rooms that use augmented reality technology to show how an item would look when worn or suggest complementary items. Finally, retail stores are increasingly using Bluetooth-enabled sales beacons to provide customers with real-time promotional offers.

As you can see, information systems have had a huge impact on retailing, and many more changes are yet to hit the shelves.

Questions

1. How can technology help brick-and-mortar retailers compete against e-tailers?
2. Privacy advocates criticize the use of RFID, as it allows better tracking of purchasing habits. How can brick-and-mortar retailers alleviate these concerns?
3. As you have read, part of the "human element" in retailing is being replaced by technology. How can brick-and-mortar stores avoid becoming too "sterile" when using information systems to compete against e-tailers?

Based on:

Davies, S. (2015, December 17). The smart fitting room is the future of retail. *TechCo*. Retrieved June 27, 2016, from <http://tech.co/smart-fitting-room-future-retail-2015-12>

Fitzgerald, D. (2013, November 3). Fear of "showrooming" fades. *The Wall Street Journal*. Retrieved June 26, 2016, from <http://online.wsj.com/news/articles/SB10001424052702303661404579175690690126298>

Nsubuga, J. (2016, February 27). Supermarkets of the future could have no staff. *Metro.co.uk*. Retrieved June 27, 2016, from <http://metro.co.uk/2016/02/27/supermarkets-of-the-future-could-have-no-staff-5721663>

Key Points Review

- 1. Describe different approaches to competing in cyberspace as well as different forms of electronic government and e-finance.** EC is the online exchange of goods, services, and money between firms and between firms and their customers. Companies and individuals are engaging in business-to-business, business-to-consumer, consumer-to-consumer, or consumer-to-business e-commerce. In addition, e-government is a government's use of IS to provide a variety of services to citizens (government-to-citizens), businesses (government-to-business), and other governmental agencies (either within a country or between countries; government-to-government). The Internet has also enabled conducting financial transactions via online banking or online brokerage and has provided the basis for various innovative fintech services.
- 2. Describe business-to-consumer electronic commerce strategies.** Companies must strategically position themselves to compete in the EC environment and choose between operating as brick-and-mortar companies, click-and-mortar (or bricks-and-clicks) companies, or click-only (or virtual) companies. Capabilities of the web have enabled new business models based on mass customization, disintermediation, or group buying as well as social commerce. E-tailers can benefit from being able to offer a wider variety of goods to more people at lower prices. On the other hand, a major drawback is customers' lack of trust.
- 3. Understand the keys to successful electronic commerce websites and explain the different forms of Internet marketing.** Successful B2C companies have a website that meets online customers' needs. A company should also advertise its web presence. Popular ways to advertise products or services on the web are search marketing, display ads, e-mail marketing, social media, and mobile marketing. Advertisers pay for search marketing or display ads on the basis of either the number of impressions or pay-per-click. Various metrics and web analytics can provide valuable information about the effectiveness of Internet marketing campaigns and performance of websites.
- 4. Describe mobile commerce, consumer-to-consumer electronic commerce, and consumer-to-business electronic commerce.** M-commerce is rapidly expanding with the continued evolution of faster cellular networks, more powerful handheld devices, and more sophisticated applications. Location-based services, based on GPS technology, are a key driver, enabling even more innovative m-commerce applications. As mobile consumers not only use their devices to obtain timely information on the go but also increasingly purchase products or content in mobile settings, businesses have to consider the specific settings and devices of their target customers. Further, the Internet has fueled the development of a variety of ways people can trade goods, socialize, or voice their thoughts and opinions. Specifically, e-auctions allow private people to sell goods to large markets. One emerging topic in EC is C2B EC, where individuals offer products or services to businesses.
- 5. Describe how to conduct financial transactions and navigate the legal issues of electronic commerce.** The ability to pay for products or services is key for any form of electronic commerce. Yet securing payments in the digital world is still of concern, both for customers and for merchants, who have to minimize their risk arising from potentially fraudulent credit card transactions; as a result, many (especially smaller) retailers use online payment services; for some applications, cryptocurrencies have become an alternative form of payment. Finally, taxation, legal issues surrounding website content, contracts, and transactions, as well as protecting intellectual property and net neutrality continue to be major issues and impediments to EC.

Key Terms

brick-and-mortar business strategy	143	consumer-to-consumer (C2C)	141	electronic commerce (EC)	140
bricks-and-clicks business strategy	144	conversion rate	158	e-tailing	144
blockchain	166	cross-channel retailing	145	exit rate	158
bounce rate	158	cryptocurrency	165	fintech	143
business-to-business (B2B)	141	digital rights management (DRM)	170	functional convenience	152
business-to-consumer (B2C)	141	digital watermark	170	government-to-business (G2B)	142
card security code	167	disintermediation	146	government-to-citizen (G2C)	142
click fraud	157	dynamic pricing model	148	government-to-government (G2G)	142
click-and-mortar business strategy	144	e-auction	162	group buying	148
click-only business strategy	144	e-finance	142	impression-based model	157
click-through rate	158	e-government	141	Internet Tax Freedom Act	169
consumer-to-business (C2B)	141	electronic bill pay	143	location-based services	159

long tail 146
mass customization 147
mobile commerce (m-commerce) 141
menu-driven pricing model 148
mobile banking 143
multichannel retailing 145
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omni-channel retailing 145

online banking 143
online brokerage 143
paid inclusion 156
pay-per-click model 157
QR code 154
reintermediation 146
representational delight 152
sales beacon 145

search advertising 156
search engine optimization (SEO) 155
showrooming 161
social commerce 148
sponsored search 156
structural firmness 152
virtual company 144
web analytics 159



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

Review Questions

- 4-1.** What is EC, and what different approaches to competing in cyberspace do companies use?
- 4-2.** What are the primary forms of e-government? Provide examples for each.
- 4-3.** Compare and contrast the click-only and the bricks-and clicks approaches to conducting business online.
- 4-4.** Describe the effects of disintermediation.
- MyMISLab 4-5.** Describe social commerce and explain how companies can leverage consumers' social networks.
- 4-6.** Describe the benefits and drawbacks of e-tailing.
- MyMISLab 4-7.** What is the online consumer's hierarchy of needs, and why is it important for e-tailers?
- MyMISLab 4-8.** Describe the differences between SEO, search marketing, and sponsored search.
- 4-9.** Describe m-commerce and explain how it is different from regular EC.
- 4-10.** What is showrooming, and how has it affected offline retailers?
- 4-11.** Compare and contrast online banking and online brokerage.
- 4-12.** How does taxation pose a threat to EC?
- 4-13.** How does net neutrality pose a threat to EC?

Self-Study Questions

- 4-14.** EC is the exchange of _____ among firms, between firms and their customers, and between customers, supported by communication technologies and, in particular, the Internet.
A. goods
B. services
C. money
D. all of the above
- 4-15.** _____ are those companies that operate in the traditional, physical markets and do not conduct business electronically in cyberspace.
A. Brick-and-mortars
B. Click-onlys
C. Both A and B
D. Dot-coms
- 4-16.** The ability to sell products directly to the end customers, without the need for distributors or retailers, is called _____.
A. disintermediation
B. disintegration
C. reintegration
D. reintermediation
- 4-17.** Business models based on catering to niche markets in addition to (or instead of) purely selling mainstream products are said to center on the _____.
A. far ends
B. long ends
C. niches
D. long tails
- 4-18.** _____ reflects the percentage of users for whom a particular page is the only page visited on the website.
A. Bounce rate
B. Exit rate
C. Click-through rate
D. Conversion rate
- 4-19.** Offering the customer different (independent) touchpoints, such as a retail store and a catalogue is referred to as _____.
A. mixed-channel retailing
B. cross-channel retailing
C. omni-channel retailing
D. multichannel retailing

- 4-20.** Trying to “outsmart” a search engine to improve a page’s ranking is known as _____.
 A. rank enhancement
 B. SEO
 C. search engine hacking
 D. Google fooling
- 4-21.** In order to minimize fraud, e-tailers look for anomalies in _____.
 A. e-mail addresses provided
 B. shipping and billing addresses
 C. transaction patterns
 D. all of the above
- 4-22.** According to the Internet Tax Freedom Act, e-tailers _____.
 A. have to collect sales tax from all customers regardless of their location
 B. have to collect sales tax based on the place of the customer’s residence
 C. have to collect sales tax based on the prevalent tax rate at the e-tailer’s headquarters
 D. have to collect sales tax only from customers residing in a state where the business has substantial presence

Answers are on page 176.

Problems and Exercises

- 4-23.** Match the following terms with the appropriate definitions:
 i. Click-through rate
 ii. Reintermediation
 iii. web analytics
 iv. Paid inclusion
 v. Conversion rate
 vi. Long tails
 vii. Click fraud
 viii. Search engine optimization
 ix. E-government
 x. Group buying
- a. Special volume discounts negotiated with local businesses and offered to people in the form of “daily deals”
 b. The design of business models that reintroduce middlemen in order to reduce the chaos brought on by disintermediation
 c. The large parts of consumer demand that are outside the relatively small number of mainstream tastes
 d. The percentage of visitors who actually perform the marketer’s desired action
 e. The number of surfers who click on an ad divided by the number of times it was displayed
 f. The use of information systems to provide citizens, organizations, and other governmental agencies with information about and access to public services
 g. Methods used to improve a site’s ranking
 h. The analysis of web surfers’ behavior in order to improve a site’s performance
- i. The practice of paying a fee to be included in a search engine’s listing
 j. The abuse of pay-per-click advertising models by repeatedly clicking on a link to inflate revenue to the host or increase the costs for the advertiser
- 4-24.** Visit www.firstgov.gov. What kind of services do you see that would help you? What services would you use? What areas are missing?
- 4-25.** Visit Alaska Airlines’s website (www.alaskaair.com) for real-time pricing and test the custom messenger bag builder at www.timbuk2.com. How have Internet technologies improved over the years?
- 4-26.** Search the web for a company that is purely web-based. Next, find the website of a company that is a hybrid (i.e., the company has a traditional brick-and-mortar business plus a presence on the web). What are the pros and cons of dealing with each type of company?
- 4-27.** Search the web for a click-and-mortar company that is using multichannel retailing and a company that is using cross-channel or omni-channel retailing. How do the customer interactions with those companies differ? Which company would you rather purchase from? Why?
- 4-28.** What is it about a company’s website that draws you to it, keeps you there on the site longer, and keeps you coming back for more? If you could summarize these answers into a set of criteria for websites, what would those criteria be?
- 4-29.** Visit the following services for comparison shopping: BestBookBuys (www.bestwebbuys.com/books), Bizrate (www.bizrate.com), and mySimon (www.mysimon.com). These companies focus on aggregating content for consumers. What are the advantages of these websites? What does the existence of such sites mean for the online merchants?
- 4-30.** Compare three different search engines. What tips do they provide to improve a page’s rankings? How much does it cost to advertise a page on their results pages? If you were a company, could you think of any situation where you would pay almost any amount to have the first listing on the first results page?
- 4-31.** Describe your experiences in online shopping. How did you pay for your purchases? What information did you have to reveal to the merchant? Did you feel comfortable giving out that information?

- 4-32. Have you ever used a mobile, wireless device such as a smartphone for online shopping? If so, what did you like or dislike about it? In what ways could your shopping experience be made better? If you have not used a mobile device for shopping, what prevented you from doing so? What would have to happen before you would begin using a mobile device for shopping?
- 4-33. When you shop online, is sales tax a criterion for you? Do you try to purchase goods where you do not have to pay sales tax? If you would have to pay sales tax for everything you buy online, would that change your online shopping behavior?

Application Exercises

Note: The existing data files referenced in these exercises are available on the book's website: www.pearsonhighered.com/valacich.



Spreadsheet Application: Analyzing Server Traffic

- 4-34. Campus Travel has recently found that its Internet connections between offices are becoming slow, especially during certain periods of the day. Since all the online traffic is maintained by another company, an increase in bandwidth requires a formal approval from the general manager. The IS manager has proposed to increase the bandwidth of the company's network; in a few days, he has to present the business case for this proposal at the weekly meeting of the department heads. You are asked to prepare graphs for the presentation to support the IS manager's business case. In the file ServerLogs.csv, you will find information about the network traffic for a 1-week period. Prepare the following graphs:

- Total bandwidth used for each day (line graph)
- Bandwidth used per day, by time period (line graph)
- Average bandwidth used in each two-hour period (line graph)

Format the graphs in a professional manner and place each graph on a separate page. (Hint: If you are using Microsoft Excel's Chart Wizard, select "Place chart: As New Sheet.")



Database Application: Tracking Network Hardware

- 4-35. As Campus Travel is new to EC, the management suggests following a stepwise approach for using the Internet to conduct business. Before using the Internet for conducting transactions, the managers recommend setting up a site that provides information to customers. Part of this informational site is an agency locator that shows the services each agency has. You have been asked to create a new database. This includes creating relationships between entities. To create this new database, do the following:
- Create a database called "agency."
 - Create a table called "agencies" and include fields for agency ID, street address, city, state, ZIP code, phone number, number of service agents, and working hours.
 - Create a table called "services" that includes service ID, name (i.e., type of service), and description.
 - Create a third table called "agency_services" that includes the agency ID field from the agencies table and the service ID field from the services table.
 - Once these tables are created, go to the relationship view and connect the agencies (one side) and agency_services (many side) tables and the services (one side) and agency_services (many side) tables using two one-to-many relationships (i.e., each agency can offer many services; each service can be offered by many agencies).

Team Work Exercise



Net Stats: Who Is Subsidizing Web Content?

When you subscribe to cable television, you typically have to decide between different packages, each offering various channels focusing on sports, movies, cartoons, and so on. In addition, you have the option of subscribing to other channels that interest you. Hence, the charges on your monthly cable bill are for your subscribed services. In contrast, the charges on your Internet bill are for connecting to the

Internet rather than for the content on the web. Hence, content providers on the Internet are typically dependent on other ways to generate revenue. Companies such as CNN, the *Washington Post*, Google, or Yahoo!, which provide content for free, subsidize their expenses by advertising revenue. One of the most common forms of advertising on the web is display ads, which have moved from simple static images to rich, interactive advertisements. Although the cost per thousand views may be only between US\$8 and US\$40, display ads are big business.

Which sites do people visit most often? Research firm comScore regularly provides rankings of the web's most popular "web properties," based on the number of unique monthly visitors. The top five properties in August 2016 were:

- Google Sites: 240.7 million unique visitors
- Yahoo Sites: 213.2 million unique visitors
- Facebook: 206.3 million unique visitors
- Microsoft Sites: 188.8 million unique visitors
- Amazon Sites: 186.3 million unique visitors

Questions and Exercises

- 4-36.** Search the web for the most up-to-date statistics.
4-37. As a team, interpret these numbers. What is striking/important about these statistics?

4-38. How have the numbers changed? Which industries seem to be most interested in online advertising?

Why?

4-39. Using your spreadsheet software of choice, create a graph/figure that effectively visualizes the statistics/changes you consider most important.

Based on:

ComScore (2016, August). Latest rankings. *comScore*. Retrieved September 22, 2016, from <https://www.comscore.com/Insights/Rankings?country=US>

Wojcicki, S. (2010, March 15). The future of display advertising. *Google Blog*. Retrieved June 27, 2016, from <http://googleblog.blogspot.com/2010/03/future-of-display-advertising.html>

Answers to the Self-Study Questions

4-14. D, p. 140
4-19. D, p. 145

4-15. A, p. 147
4-20. B, p. 155

4-16. A, p. 146
4-21. D, p. 168

4-17. D, p. 146
4-22. D, p. 169

4-18. A, p. 146

CASE 1 | Web Analytics

In the 1990s, Josh James enrolled in an information systems class as part of his business management and entrepreneurship degree program. Being not particularly excited about the topic, Josh sat near the back of the room. During the first class period, Josh noticed a student near the front of the class who was easily answering all of the questions, and he decided he wanted to get to know him. His name was John Pestana, and they quickly became friends. John—a technology whiz with a knack for spinning web code—suggested that he and Josh start building websites for companies, and a partnership was born. As their student-run business grew amid the dot-com craze of the late 1990s, their clients began to ask about whether their fancy new websites were drawing any more web traffic. The two young entrepreneurs immediately recognized a compelling business opportunity, and they soon founded Omniture, a web analytics company that quickly grew to dominate the web analytics market. With innovative analytics tools, Omniture attracted many large companies, including Walmart, Comcast, NBC Universal, and Hyatt. In 2006, Omniture went public and was the number-two performing technology initial public offering (IPO) that year. Three years later, Omniture was acquired by technology giant Adobe Systems for US\$1.8 billion. Adobe continues to develop the web analytics tools, which have since been integrated into the company's suite of online marketing solutions, the Adobe Marketing Cloud.

Web analytics is the measurement, collection, analysis, and reporting of web traffic

data with the goal of understanding and optimizing web usage. The key features of most web analytics tools are enabled by a small bit of programming code that is embedded in each of the pages of a website. As a user navigates from page to page, various pieces of information about the user are collected. These include metadata such as the type of browser (Safari versus Chrome versus Internet Explorer), the type of device (mobile versus desktop), or the viewable resolution of the user's screen; browsing data such as how long the user stays on each page or where the user clicks; and navigation path data, such as which page the user came from or how many total pages the user has viewed within the website. The data are collected anonymously and aggregated for later analysis. For popular sites like Walmart.com or Amazon.com, web analytics software can collect millions of points of data within a relatively short amount of time.

Many companies employ entire teams whose sole purpose is to analyze web analytics data. These analytics data can be a gold mine of valuable information that a company can use to inform strategic decisions regarding its website. Consider the value of such information to a major online retailer like Zappos.com. Using analytics data, Zappos's analysts could study the browsing behaviors of thousands of different users to identify potential improvements to their website. They might find that users get stuck on a certain type of page and identify changes to the menu structure to improve the navigation. They may find that many users add items to

their cart but exit the site without completing their order when they are prompted to create a user account. This discovery could lead them to move the account creation process to a different point in the checkout flow or perhaps even make account creation optional. These are only a few of the nearly infinite potential discoveries that web analytics data can help discover.

Given the large mass of web analytics data collected by a site like Walmart.com, there is a high potential for information overload. Thus, a key feature of successful web analytics solutions is the ability for business users to filter data in helpful ways, allowing them to drill down into items of interest. Another way in which analytics platforms reduce information overload is through the use of easy-to-interpret graphical representations of the data. These range from simple bar charts and line graphs to shaded geographical maps and complex charts depicting users' flow through a navigational structure. These and many other information summarization methods make the vast amount of web analytic data digestible so that business leaders can make informed, strategic decisions.

Web analytics is a prime example of business analytics in the digital age. For companies that conduct the majority of their business online, and in particular for retailers, entertainment hubs, and news providers, web analytics data provide invaluable insight into the behavior of their customers. Those companies that learn to effectively leverage those data can make significant changes that directly affect their bottom line.

Questions

- 4-40.** Why do you think Omniture services were so popular, given the time period in which the company was founded?
- 4-41.** Think of an online service (not retail) that you use frequently. How could this company use web analytics data to improve its website and positively affect its business?
- 4-42.** Do you think that capturing usage data for performing web analytics is an invasion of privacy? Why or why not?

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Based on:

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CASE 2 | Rocket Internet—Cloning Business Models

As many successful online businesses have painfully experienced, innovative business models in the digital world can be easily copied. Being early players in a new market and focusing on rapidly gaining market share, many companies enjoy a first-mover advantage but, due to their success, are cloned by numerous other “impersonators” around the globe: The daily deal website Groupon has a variety of clones all over the world; Uber has been cloned in China but has also attracted me-too companies in various other countries; Online clothing retailers such as Zappos or Asos have been cloned numerous times. Cloning successful business models can be less risky than coming up with and launching an innovative business idea, and often, developers of clones manage to sell the clones to the original companies later on; for example, in 2010, Groupon decided to buy up its “clones” to reclaim its identity and, most important, fast-track its expansion into foreign markets in Europe and Asia.

Rocket Internet, one of Europe’s biggest Internet companies, has gained notoriety for cloning business models. Founded by the brothers Marc, Alexander, and Oliver Samwer, Rocket Internet’s mission is “to become the world’s largest Internet platform outside the United States and China.” To achieve this mission, Rocket Internet’s focus is on building companies rather than innovating; in other words, Rocket Internet looks for innovative and successful Internet-based business models and replicates those in other (often emerging or pre-emerging) markets, striving to

grow the clone as quickly as possible with the aim of later selling the clone. To achieve rapid growth of a clone and gain a first-mover advantage in the clone’s region, Rocket Internet attempts to increase the clone’s reach, offers a wider variety of products or services, or tries to price competitors out of the market; typically, this approach requires investing significant funds not only into building the clone but also in marketing (using not only Internet marketing, such as Google AdWords campaigns, but often also traditional television ads). Using this strategy has proven to be very successful; for example, CityDeal (a Groupon clone) was sold to Groupon for US\$170 million less than half a year after the clone was launched. Rocket Internet has successfully cloned a number of innovative online business models, ranging from Airbnb (Wimdu) to Uber (EasyTaxi) to grubHub (foodpanda) to Zappos (Zalando, one of Europe’s largest fashion retailers). Although Rocket Internet is often accused of “stealing” business ideas, business models cannot be patented, and so there is little danger of facing legal consequences for infringing on other’s intellectual property.

While cloning successful Internet-based business models seems easy, this is not necessarily the case. Often, the originals are focused on growing their business in their respective home markets. Other markets, however, typically require different approaches to operations, marketing, and so on. Being extremely effective at adapting business models and tailoring them to local market conditions has been key to the success of

Rocket Internet. This is even more astonishing given that Rocket Internet now operates in more than 100 countries, and Rocket Internet has built tremendous knowledge about which factors (such as cultural, geographic, legal, and so on) are important for what types of business models. Interestingly, while many of the business models copied by Rocket Internet were developed in the United States, none of Rocket Internet’s clones operates in this market, which Rocket Internet considers oversaturated. Likewise, Rocket Internet has only limited reach in China, facing similar restrictions and protectionist policies as many other Western Internet businesses.

In spite of its impressive growth, Rocket Internet is also facing challenges. Using proprietary technologies and processes, Rocket Internet tries to launch a business within less than 100 days, after which it decides whether to continue pursuing the business model. In this process, Rocket Internet learned that cloning business ideas that heavily rely on communities and the network effect (such as Airbnb) is infeasible within a short time frame, given the need for building a community and customer trust. Further, although many of Rocket Internet’s businesses have achieved phenomenal growth, many have yet to make a profit, and Rocket Internet has been accused of being intransparent about the valuation of companies in its portfolio. However, as long as innovators continue to come up with new business ideas, there’s a good chance of these ideas being cloned, be it by Rocket Internet or by other companies.

Questions

- 4-43. Rocket Internet has been accused of killing innovation. Is the practice of copying business models and selling them back to the original ethical? Why or why not?
- 4-44. What types of business models are easiest to clone? What types are hardest to clone? Why? Give a specific example of each.
- 4-45. Think about an innovative business model you could “clone” and launch in a particular market. Which factors (such as cultural, geographic, legal, and so on) would be most important to adapt for this market? Which factors would be least important? Why?

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Go to mymislab.com for auto-graded writing questions as well as the following assisted-graded writing questions:

- 4-46. Describe mass customization and explain how companies can reap higher profits despite higher production costs for manufacturing customized products.
- 4-47. How can online retailers minimize the risk associated with credit card transactions?

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5

Enhancing Organizational Communication and Collaboration Using Social Media

Preview

This chapter focuses on social media and how social media can enhance organizational communication and collaboration. Most likely, you are actively using various social media applications such as Facebook, Instagram, or Wikipedia, and you may ask, “Why do we need to have a chapter on this?” Social media introduce unprecedented ways to connect to friends, share knowledge with your colleagues, or collaborate with a team of engineers 5,000 miles away, and many of today’s companies cannot afford to miss this trend. Most young people entering the workforce have grown accustomed to using Facebook or Twitter for their communication needs (and some even regard e-mail as an outmoded communication medium); if a company doesn’t allow the use of these tools, some employees may leave and work for another company. Additionally, you may have noticed your parents’ generation joining sites such as Facebook, as the masses are more and more taking those tools for granted.

With social media providing a vastly expanded set of capabilities for individuals and businesses, an understanding of how they can be applied can be very helpful. Being able to understand and apply these emerging capabilities and strategies that are associated with social media is a highly valued skill.

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MANAGING IN THE DIGITAL WORLD: Facebook

Managing our lives in the modern, digital world seems to be far more complex than it was in the past. The same is true for companies. Interactions with customers were limited to one-way communication using TV ads, billboards, posters, or radio broadcasts. In return, people showed affinity to a particular brand by displaying bumper stickers, wearing T-shirts, or refusing to even try alternative brands. All in all, no real interaction could be recorded between customers and brands.

Things have changed since then. In mid-2016, Facebook reported impressive usage statistics (Figure 5.1). Each month, more than 1.65 billion users access the site, and more than 1.5 billion of those users access the service via a mobile device. On average, Facebook users upload more than 300 million photos per day, and five new profiles are created every second.

Many companies have also joined Facebook, creating pages to extend their reach and promote new products. In addition, celebrities, musicians, public figures, movies, and almost any other product or service you can think of now appears to have a Facebook page. Facebook has become another get-together space for people who have acquaintances, friends, or beliefs in common. Businesses use it to build and track customer loyalty, and connections are made even tighter with the help of “like” buttons that seem to be on almost every site on

**After reading
this chapter,
you will be
able to do the
following:**

1. Explain organizations' needs for communication and collaboration.
2. Explain social media and evolving web capabilities.
3. Describe various social media applications, and explain their role in enhancing communication, collaboration, cooperation, and connection.
4. Describe how companies can manage enterprise-oriented social media applications and deal with potential pitfalls associated with social media.



FIGURE 5.1

Facebook is the most popular social network, with more than 1.65 billion monthly active users.

Source: Thomas Pajot/Fotolia.

the web. Facebook has changed the scope of social interactions, as consumer preferences, collective tastes, and future demands are now more easily analyzed and predicted through the number of "likes" or the comments left by consumers responding to photos regarding the latest smartphone or that new movie premiering next Thursday. Through this social media platform, companies can interact with customers like never before.

In early 2016, most objective measures of Facebook's tremendous success appear to continue. Over the past year, daily active users were more than 1 billion, up 16 percent, with quarterly revenue up 52 percent, exceeding US\$5.3 billion. Of the more than US\$5 billion in quarterly advertising revenue, about 82 percent was generated through ads delivered on mobile devices.

In early 2016, Facebook's market value was greater than US\$350 billion, making it the sixth most valuable company in America. Analysts predict that Facebook could grow more than 30 percent annually for the next few years. That growth rate is twice the rate that is forecasted for Google and nearly triple of what Apple is expected to grow. If this growth occurs, analysts believe that Facebook could be the first US\$1 trillion-dollar company.

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

1. How can Facebook be used to address organizations' needs for communication and collaboration?
2. What are the social media and evolving web capabilities used by Facebook?
3. Facebook started as a "pure" social networking site. What other social media applications are now integrated into Facebook, and how do they help enhance communication, collaboration, cooperation, and connection?

Based on:

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The Need for Communication and Collaboration

Just as you communicate with your friends when planning a vacation or organizing a party, or collaborate with your teammates on a class project, organizations rely on effective communication and **collaboration** (i.e., two or more people working together to achieve a common goal), both within and outside organizational boundaries. Most organizational business processes require communication and collaboration between employees of different departments as well as with outside business partners (such as suppliers), customers, and other external stakeholders. Many organizations operate on a national or global scale and rely on effective and efficient communication between various locations or subsidiaries, and even small, local companies need to communicate with suppliers or promote their products or services to customers. Further, globalization has enabled companies to source raw materials, parts, or components on a global scale or manufacture products wherever they can find the lowest cost, best quality, or most qualified workforce. In all of these scenarios, effective and efficient communication is essential to convey specifications, coordinate production or delivery schedules, and so on. Similarly, salespeople rely on efficient communication with the customers and with other departments within the organization. With the increased global reach of organizations, the needs for *internal* communication have also changed tremendously.

Virtual Teams

To be competitive, organizations constantly need to bring together the right combinations of people who have the appropriate set of knowledge, skills, information, and authority to solve problems quickly and easily. Traditionally, organizations have used task forces, which are temporary work groups with a finite task and life cycle, to solve problems that cannot be solved well by existing work groups. Unfortunately, traditional task forces, like traditional organizational structures, cannot always solve problems quickly, as structure and logistical problems often get in the way of people trying to get things done. Thus, organizations are increasingly trying to harness the expertise of highly specialized team members, regardless of their location. With various collaboration and communication tools enabled by the Internet, collaborators on projects or teams do not have to be colocated; rather, businesses increasingly form **virtual teams**, composed of members from different geographic areas and assembled as needed to collaborate on a certain project (Figure 5.2). Membership on these virtual teams is fluid, with teams forming and disbanding as needed, with team size fluctuating as necessary, and with team members coming and going as they are needed.

Employees may, at times, find themselves on multiple teams, and the life of a team may be very short. In addition, team members must have easy, flexible access to other team members, meeting contexts, and information. Resembling highly dynamic task forces, virtual teams are commonly used for tasks such as developing systems and software; for example, the programmers are located in India, the project managers are in the United States, and the testers are in Europe. However, systems development is not the only place you will find virtual teams. For instance, the healthcare industry has embraced the idea of using technology to create superior care for patients by creating virtual teams that may include dieticians, physicians, surgeons, pharmacists, and social workers from different cities, all of whom can coordinate care of a patient using various web technologies so as to provide the best healthcare professionals regardless of where the patient resides.

If you have ever worked on a team project for your class (and you probably have), you have noticed that there are many different communication needs, such as discussing issues, sharing documents, and making decisions. Just as there are many things to discuss within your team project, there are also many ways that you can communicate and collaborate, and different time horizons. One key distinction is between the need for **synchronous** (i.e., at the same time) and **asynchronous** (i.e., not coordinated in time) communication. For example, chatting online or making a telephone call are examples of synchronous communication, whereas texting or sending e-mails are examples of asynchronous communication. Likewise, meetings of virtual teams typically take the form of **virtual meetings** using online environments; such meetings can be held synchronously, like a teleconference, or asynchronously, using technologies such as online discussion boards. If time is of the essence, such as when attempting to meet deadlines or resolve urgent customer problems, synchronous media may be best suited, as delays can create process

**FIGURE 5.2**

Members of highly specialized virtual teams are often not colocated.

Source: Toria/Shutterstock.

inefficiencies or dissatisfied customers and can thus be costly for the organization. Thus, over the years, different tools have emerged to support various communication and collaboration needs (Table 5.1).

Groupware

Enabled by computer networking (and later the Internet), **groupware**—a class of software that enables people to work together more effectively—became a widely used way for collaboration within teams or organizations. Since the appearance of the first mainstream groupware product—Lotus Notes—in 1989, groupware has become ubiquitous in all types of organizations, with many (often free) tools allowing anyone with a connected device to utilize the benefits of groupware. Groupware and other collaboration technologies are often distinguished along two dimensions:

1. Whether the system supports synchronous or asynchronous collaboration and communication
2. Whether the system supports groups working together face-to-face or distributed

TABLE 5.1 Categories of Collaboration Tools

Category	Description	Instances	Examples
Electronic communication tools	Tools allowing users to convey verbal and written information and send files, documents, or other content	Fax, e-mail, voice mail, blogs, wikis, static websites	MS Outlook, Blogger, Wikipedia
Electronic conferencing tools	Tools allowing information sharing and rich interactions between users	Internet forums, instant messaging, application sharing, videoconferencing	Apple FaceTime, Skype, Google Hangouts, WebEx
Collaboration management tools	Tools used to facilitate virtual or collocated meetings and manage group activities	Electronic calendars, knowledge management systems, intranets, online document systems	Google Docs, MS Office Online, MS SharePoint

Using these two dimensions, groupware systems can be categorized as being able to support four modes of group interaction, as shown in Figure 5.3.

Depending on the purpose, organizations draw on different types of asynchronous groupware tools, such as e-mail, mailing lists, workflow automation systems, intranets (see upcoming discussion), group calendars, or collaborative writing tools. One widely used tool for group communication is **discussion forums** (also known as discussion boards or online forums), which emulate traditional bulletin boards and allow for threaded discussions between participants. Typically, discussion forums are dedicated to specific topics, and users can start new threads (Figure 5.4). Depending on the owner or host of the forum, the discussion forum may be moderated so that new postings appear only after they have been vetted by a moderator; further, some discussion forums may only allow posts from registered users, whereas others allow anyone to contribute. As the purpose of such forums is to enable discussion and/or solve problems, many discussion forums now incorporate collaboration features such as the ability to mark answers as helpful or correct.

Like asynchronous groupware, there are also many forms of synchronous groupware available to support a wide variety of activities, including shared whiteboards, online chat, electronic meeting systems, and, of course, video communication systems (discussed in the following section). An **electronic meeting system** is a sophisticated software tool used to help group members solve problems and make decisions through interactive structured processes such as electronic idea generation, idea evaluation, and voting (Figure 5.5). These structured processes help groups stay on track and avoid costly diversions that regularly occur in meetings. EMSs have traditionally been housed within a dedicated meeting facility; increasingly, web-based implementations support team members around the globe. Many groupware systems used by organizations combine a variety of tools supporting both synchronous and asynchronous communication and collaboration.

Videoconferencing

In the 1960s, at Disneyland and other theme parks and special events, the picturephone was first being demonstrated to large audiences. It took another 30 years to take off, but today, organizations are routinely conducting videoconferences to replace traditional meetings, using either desktop videoconferencing or dedicated videoconferencing systems.

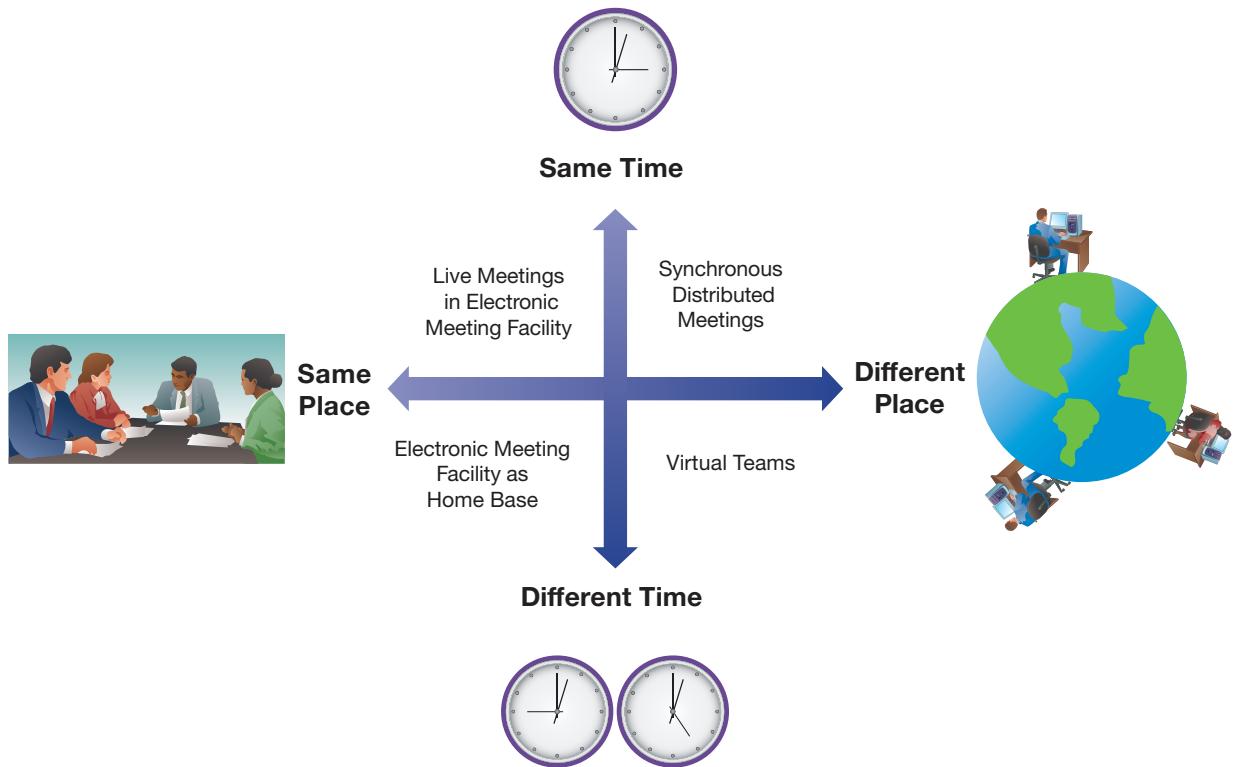


FIGURE 5.3

Groupware supports various modes of group interaction.

The screenshot shows the Microsoft TechNet forums homepage. At the top, there's a navigation bar with links for 'TechNet', 'Products', 'IT Resources', 'Downloads', 'Training', and 'Support'. Below that is the Microsoft logo and a search bar with 'Search TechNet with Bing'. The main content area has a header 'TechNet' and a sub-header 'Forums'. On the left, there's a sidebar with 'Ask a question' and 'Quick access' sections, including a 'Forums [view all]' link and a dropdown for 'Please select a forum ...'. Under 'Selected forums', three categories are listed: 'Exchange Server 2013 - High Availability and Disaster Recovery', 'Exchange Server 2013 - Mobility and ActiveSync', and 'Exchange Server 2016 - Setup and Deployment'. The main content area displays a list of forum posts. The first post is titled 'Importing EML files into Outlook 2010' and has 10 votes. The second post is titled 'Send to OneNote 2013 splits pages' and has 41 votes. Both posts include a brief description, the number of replies and views, and the user who posted it.

FIGURE 5.4

Microsoft offers discussion forums for questions and feedback related to its various products and services.

Source: TechNet 2016, Windows 10, Microsoft Corporation.

Desktop videoconferencing has been enabled by the growing power of processors powering personal computers and faster Internet connections. For desktop videoconferencing, all that is needed is a **webcam** (i.e., a small video camera that is connected directly to a PC or integrated in a laptop PC's monitor), a speaker telephone or a separate microphone and speakers/headphones, videoconferencing software (e.g., Skype, Google+, or Apple FaceTime), and a high-speed Internet connection. Similarly, people can now use various apps on their mobile devices, enabling them to make video calls on the go.

Dedicated videoconferencing systems are typically located within organizational conference rooms, facilitating meetings with customers or project team members across town or around the world. These systems can be highly realistic—as if you are almost colocated with your colleagues—but high-end systems can be extremely expensive, ranging from a few thousand dollars up to US\$500,000. No matter what type of videoconferencing system is utilized by an organization, this collaboration technology has come a long way from the demonstration at Disneyland in the 1960s and has become mainstream in most modern organizations.



FIGURE 5.5

An electronic meeting system utilizes networked computers and sophisticated software to support various group tasks.

Source: Konstantinos Kokkinis/Shutterstock.



GREEN IT

Green IT Fueling Renewable Energy

Everyone is excited about the potential for renewable energy to replace non-renewable sources such as coal, petroleum, and nuclear. Renewable energy is generated from natural processes that are continuously replenished, such as sunlight, rain, tides, and geothermal heat. For individuals and organizations, key considerations are reducing energy bills and reducing carbon footprint; reducing the carbon footprint is especially important for organizations attempting to portray a positive image by engaging in socially responsible behavior. Continuous improvements in various energy technologies are rapidly improving the efficiency and reducing the costs of renewable sources. Likewise, IoT sensors allow for analyzing energy needs and performance to optimize the balance between energy consumption and performance needs for a variety of devices. With such progress, many individuals and companies are going green by buying electric cars, installing solar panels and wind turbines, and so on.

Recently, the U.S. military has also started to embrace renewable energy sources. As the Department of Defense, which includes all branches of the military, is the largest consumer of energy in the United States, contributing to about 2 percent of the nation's total energy consumption, this can have significant impacts on reducing CO₂ emissions. While increasing its use of cleaner fuels is a good environmental

outcome, this is not a motivating factor for the U.S. military. According to one source, "We're concerned about climate change... but the first mission is bombs on target." Thus, its primary motivation centers around energy security, both on bases and when deployed throughout the world. For instance, by using solar technology when deployed in the Middle East, it reduced the diesel generator loads by 60 percent. However, using alternative energy sources and still being able to provide energy where needed, when needed, requires continuously monitoring and analyzing energy consumption. Senior leaders believe that solar and other renewable sources, coupled with analytic capabilities provided by information systems, will provide the military with greater energy options and improve the resilience of the operations both domestically and when deployed. And there will also be the added benefit of a greener and cleaner military.

Based on:

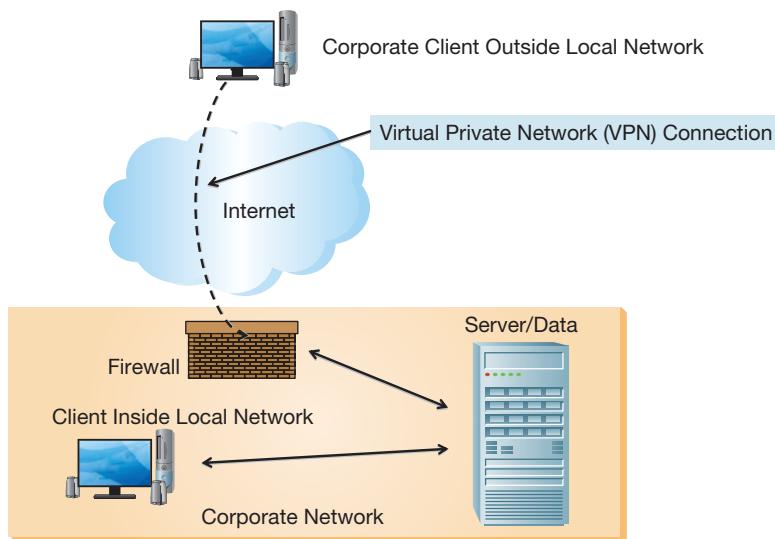
Hepler, L. (2016, June 22). Energy meets security: Can the military scale clean power? *GreenBiz*. Retrieved July 1, 2016 from <https://www.greenbiz.com/article/energy-meets-security-can-military-scale-clean-power>

Kaenel, C. (2016, March 16). Energy security drives U.S. military to renewables. *ScientificAmerican*. Retrieved July 1, 2016, from <http://www.scientificamerican.com/article/energy-security-drives-u-s-military-to-renewables>

Intranets and Employee Portals

Internet technologies have given rise to another widely used tool for communicating and collaborating within organizational boundaries. Specifically, many large organizations have intranet-based employee portals. As discussed in Chapter 3, "Managing the Information Systems Infrastructure and Services," an intranet is a private network using web technologies, used to facilitate the secured transmission of proprietary information within an organization. An intranet looks and acts just like a publicly accessible website, but the intranet pages are behind the company's firewall, so only authorized users can access the content using their web browser. Modern intranets allow for dynamically creating customized intranet pages for each employee depending on job functions or even geographical location. Whereas all pages have the same look and feel and draw on the same underlying data, each employee can access only the data needed to perform his or her job function (following the principles of least permissions and least privileges; see Chapter 10, "Securing Information Systems"). For example, if an employee from human resources logs on to the employee portal, he or she would see only content that pertains to his or her job, such as payroll information or hiring statistics.

All intranet pages are behind the company's firewall, and in the simplest form of an intranet, communications take place only within the confines of organizational boundaries and do not travel across the Internet. However, increases in employees' mobility necessitate that an intranet be accessible from anywhere. Thus, most companies allow their employees to use virtual private networks (VPNs) to connect to the company's intranet while on the road or working from home (i.e., telecommuting). Once connected via a VPN, users can access resources as if they were located within the organization and connected to the organization's network. Figure 5.6 depicts a typical intranet system architecture (see Chapter 10 for more on firewalls and VPNs).

**FIGURE 5.6**

Typical intranet system architecture.

REAL-TIME ACCESS TO INFORMATION. A major benefit of corporate intranets is the ability to increase the efficiency and effectiveness of collaboration by providing real-time access to information. Unlike paper-based documents, which need to be continually updated and distributed to employees when changes occur, intranets make it less complicated to manage, update, distribute, and access corporate information. For instance, Boeing disseminates corporate news by distributing multimedia content over the company's intranet, allowing employees to view digital copies of company news releases as they occur, from the convenience of their desktops.

With intranet-based solutions such as those deployed at Boeing, up-to-date, accurate information can be easily accessed on a company-wide basis from a single source that is both efficient and user friendly. Companies can become more flexible with resources required to create, maintain, and distribute corporate documents, while in the process employees become more knowledgeable and current about the information that is important to them.

ENTERPRISE SEARCH. Another component supporting employee productivity by providing real-time access to information is the integration of enterprise search functionality. As more and more content is accessible via a company's intranet, relevant information becomes increasingly difficult to locate, especially if the information is in different languages and located on different servers or databases, as is the case in many large global organizations such as Nestlé. Hence, the requirements for enterprise search engines are very different from those of Internet search engines such as Google or Bing. Enterprise search engines such as Microsoft's Enterprise Search or the Google Search Appliance are designed to retrieve content from various internal data sources, including documents, databases, or applications linked to the company's intranet. Such capabilities allow organizations to easily share millions of documents located throughout the organization. Thus, providing enterprise search functionality can enhance productivity and be an important factor contributing to users' satisfaction with the company's intranet.

COLLABORATION. One of the most common problems occurring in large corporations relates to the coordination of and collaboration on business activities in a timely fashion across divisions or functional areas. For instance, Boeing uses its intranet to facilitate collaborative efforts, such as in the process of designing new aircraft components. In this process, three-dimensional digital models of aircraft designs frequently need to be shared between aerospace engineers. Using Boeing's intranet, an engineer can share a drawing with another engineer at a remote location; the second engineer revises the drawing as necessary and uploads the updated drawing to a shared folder on the intranet. The Boeing intranet provides the company with the capability of reducing product development cycle times as well as the ability to stay abreast of current project, corporate, and market conditions. Likewise, intranets are being used to poll staff about current issues or by employees to communicate with each other and executives in secure nonpublic forums.

To further enable collaboration and communication, many intranet solutions now incorporate social components. In contrast to traditional intranets, where typically only select users with editorial privileges can create and update content, these intranets—sometimes referred to as **social intranets**—allow every user to create and update content and to easily connect with other content creators (see our discussion of social software below). Further, intranet solutions such as Jive are integrated with various other collaboration tools, ranging from Gmail to Dropbox, Skype, or customer relationship management software such as Salesforce.com (see Chapter 8, “Strengthening Business-to-Business Relationships via Supply Chain and Customer Relationship Management”).

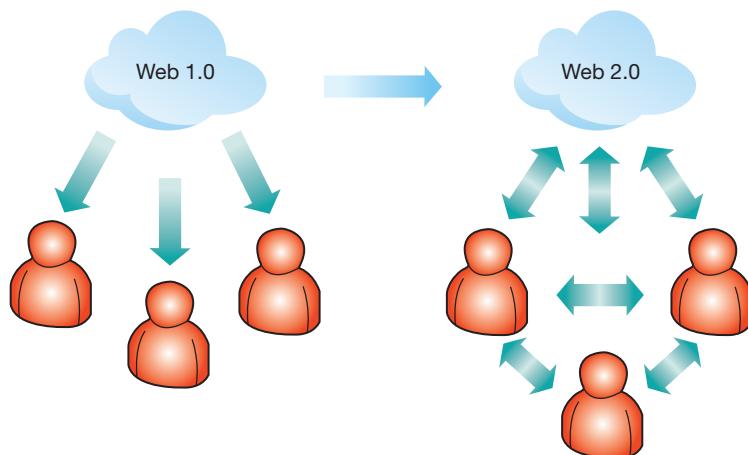
EMPLOYEE PORTALS. In addition to being used for communication and collaboration, organizational intranets are widely used to provide **employee portals** that enable **employee self-service** for administering benefits, managing retirement plans, or other human resources-based applications. For example, for large companies, processing human resources-related forms can be a large cost factor. Depending on the complexity of the form, processing a paper-based form can cost US\$20 to US\$30, according to benefits administration solutions provider Workscape, Inc. Whereas interactive voice response-based telephone applications can cut these costs to US\$2 to US\$4, using intranet-based employee self-service applications can reduce this further, to a few cents per form. Considering that an employee, on average, conducts 15 human resources-related transactions per year, the savings can be significant. Using the intranet, form templates can be centrally managed, and modifications can be made instantaneously as conditions change; thus, employees can submit the appropriate form electronically with the assurance that they have used the correct version. Further, using online forms can help to significantly reduce error rates, as the entries can be checked for accuracy at the time of data entry, thus preventing the user from inputting incorrect or illogical entries. Using employee portals, employees become self-reliant, reducing time spent dealing with employment-related issues and allowing them to focus on their work responsibilities.

The Evolving Web

The traditional collaboration tools previously introduced are based on Internet technologies. However, up until a few years ago, the web was regarded as a one-way medium (sometimes referred to as “web 1.0”), with a relatively strict distinction between content creators and content consumers. Some entities would create content (say, a website), and others would consume this content. However, changes in technology have enabled new uses of the web; dynamic web applications, often referred to as **web 2.0** applications, allow people to collaborate and share content online, shifting the users’ role from passive consumers of content to content creators (Figure 5.7). In contrast to the TV network ABC’s site, where content is provided by ABC, the web 2.0 application YouTube depends on **user-generated content**, content that is created and uploaded by other users; similarly, whereas *Encyclopaedia Britannica* invests large sums in professionally researched articles, the articles in the online encyclopedia

FIGURE 5.7

Web 2.0 applications shift a web user’s role from a passive consumer of content to its creator.





COMING ATTRACTIONS

Dissolvable Electronics

The pharmaceutical industry is fighting a constant battle against various bacteria that can quickly evolve to become resistant to antibiotic treatments. Drug researchers can spend months or years developing a new treatment, only to have that treatment lose effectiveness when the bacteria it was designed to kill become resistant. New antibiotics must then be developed, and these cunning bacteria keep pharmaceutical companies on their toes. It is not known whether researchers will be able to stay ahead of the bacteria indefinitely and keep the population healthy. But some researchers are developing alternative ways of killing bacteria using methods that are not susceptible to the mutations of bacteria.

Researchers at the University of Illinois are developing specialized electronic devices capable of performing short-term therapeutic tasks without active treatment from a medical professional. The key characteristic of these devices is their ability to disappear—to dissolve after a time and be absorbed by the person they were helping to heal. For example, after a surgery in which a large incision is made, a key risk for recovering patients is that of bacterial infection. A dissolvable electronic device could be embedded in the incision and emit just enough heat to kill bacteria. After the risk of infection has passed, the device, which is made of “biocompatible” materials, would then dissolve and be absorbed or excreted through the normal biological processes of the body.

Researchers have been working with an array of natural materials to test how well they perform in electronic devices

and whether they might cause side effects or other damage when implanted. A variety of biodegradable materials, including DNA, proteins, and metals, have been tested. One test utilized egg proteins and found that the device’s performance matched that of a non-degradable device, worked for more than 3 months in dry conditions, and lasted from 2 to 10 hours when operating in wet conditions. In this experiment, the rest of the chip took about 3 days to dissolve.

So, while this technology is not yet ready for deployment, the researchers have successfully demonstrated that it is possible to create dissolvable electronic circuits. Perhaps the technology will soon develop into something that will help the human race further reduce disease and sickness that still afflicts many around the world.

Based on:

ACS. (2016, April 27). Toward dissolvable electronics for implants and sensors. *American Chemical Society*. Retrieved June 28, 2016, from <https://www.acs.org/content/acs/en/pressroom/presspacs/2016/acs-presspac-april-27-2016/toward-dissolvable-electronics-for-implants-and-sensors.html>

Drake, N. (2013, May 24). New wireless electronics could heal wounds and then dissolve. *Wired*. Retrieved June 28, 2016, from <http://www.wired.com/2013/05/remote-controlled-dissolvable-electronics>

Zyga, L. (2015, January 15). Water-soluble silicon leads to dissolvable electronics. *Phys.org*. Retrieved June 28, 2016, from <http://phys.org/news/2015-01-water-soluble-silicon-dissolvable-electronics.html>

Wikipedia are jointly written and edited by the online community (owing to societal changes and competition from Wikipedia, *Encyclopaedia Britannica* decided to stop producing printed encyclopedias in 2012, instead focusing on its online offerings). In addition to these applications, many organizations have successfully incorporated web 2.0 concepts into their business models. For example, Amazon.com adds value to its site by incorporating product reviews from its customers. This way, it gives customers a channel to voice their thoughts; at the same time, a larger number of reviews can help other customers make better decisions, thus attracting more visitors to Amazon.com’s site. Likewise, platform-based business models (such as pursued by Airbnb, Uber, or YouTube; see Chapter 2, “Gaining Competitive Advantage Through Information Systems”) are based on web 2.0 concepts. In the following sections, we will discuss technological and societal changes that both enable and necessitate changes in the way many organizations do business.

Evolving Web Capabilities

Many successful web 2.0 applications rely on the network effect. The network effect (as defined in Chapter 1, “Managing in the Digital World”) refers to the notion that the value of a network (or tool or application based on a network) increases with the number of other users. In other words, if a network has few users, it has little or no value. Many successful websites or service providers (such as Google) try to provide value to users by making parts of their functionality or data (such as map data) available for other websites to use and thus enable creating unique and dynamic applications, or *mashups*, quickly and easily.

The idea of mashups came from popular music where many songs are produced by mixing two or more existing songs together; in web 2.0 terminology, a **mashup** is a new application (or website) that uses data from one or more service providers. For example, a mashup could combine map data, photos, reference information, hotel prices, and weather information to provide a comprehensive overview of travel destinations. Rather than having to collect or generate all of this information single-handedly, the creator of the mashup could simply draw on services provided by Google Maps, Flickr, Wikipedia, Expedia, and AccuWeather (Figure 5.8). The online itinerary planner Sygic integrates data from OpenStreetMap, hotel booking services, and other services to let users plan their next holiday. Likewise, users and companies can create mobile apps by combining various services and data sources. The local search app AroundMe uses data from services such as Booking.com, Opentable.com, or Foursquare to display information, reviews, or driving directions about businesses, restaurants, or medical facilities near a given location. Other websites and mobile apps use data from airlines, radio stations, recommendation services, or any other sources of useful information.

Many organizations have recognized the power and benefits of allowing other sites and apps to incorporate their services and data into mashups. Why are companies doing this? By providing access to useful services and data, organizations extend their reach and build and strengthen customer relationships, providing a base for revenue-generating services (e.g., Google offers mapping services for free for low-volume usage but offers the services as a paid version for high-volume commercial usage, such as integration in a hotel booking site).

Evolving Social Interaction

Many successful web 2.0 applications embody core web 2.0 values such as collaboration and social sharing; these can be classified as **social media** (or **social software**), allowing people to communicate, interact, and collaborate in various ways. With web 2.0 coming of age, people's behaviors as well as societies have undergone rapid changes. For example, many people have changed the ways they search for information. Whereas in the past people turned to paper encyclopedias as sources of unbiased information, people now turn to websites such as Wikipedia or ask their friends and acquaintances on social networks such as Facebook for personalized information. Similarly, there has been a marked shift in the way people view privacy and share information; although criticized by privacy advocates, people are sharing more personal information online than ever before. Repeatedly, you can read about people posting the most private information without thinking about the consequences; as Facebook and other social websites have become pervasive in many people's lives, you have information about your friend's recent drinking escapades leading to a driving under the influence (DUI) arrest, your coworker's breaking up with his girlfriend, and other things you may or may not want to know, all at your fingertips. Clearly, social software has strongly influenced the lives of many people, and social media have now reached a point where almost everything is interconnected. Further, ongoing conversations on social media generate vast amounts of Big Data, which can be used not only by the social media companies themselves but also by organizations using social media to connect with their stakeholders. Table 5.2 highlights the shift in perspectives from the web 1.0 to the web 2.0 era.

FIGURE 5.8

A mashup is a new application (or website) that uses data from one or more service providers.

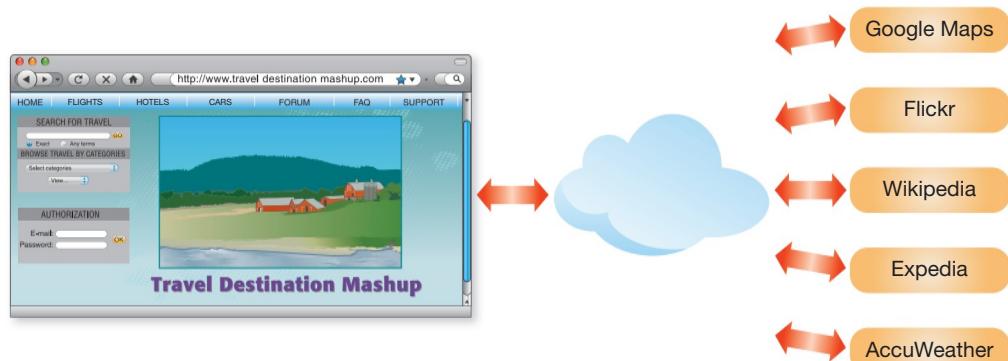


TABLE 5.2 Shifting Perspectives from Web 1.0 to Web 2.0

Web 1.0	Web 2.0
Me	Me and you
Consume content	Consume and create content
Connect ideas	Connect ideas and people
Search	Receive and give recommendations to friends and others
Find	Share
Techies rule	Users rule
Organizations	Individuals

Source: Based on Sessums (2009).

The Evolving Workspace

The “millennials,” or “Generation Y,” who grew up being tied to social software such as Myspace (once the world’s largest social network site, which now primarily focuses on music), YouTube, or Facebook, are joining the workforce and have much different expectations for their workplace than prior generations, and some fundamental shifts are taking place in employer–employee relationships (see Accenture, 2016). For example, employees are now looking for a portfolio career rather than a cradle-to-grave job, tend to view themselves as citizens rather than employees, and “loan their talent” to the employer rather than being a “human resource.” Accenture feels that this new generation of “born digital” workers have new expectations about how work should be organized and performed. For instance, companies no longer just serve customers, compete with rivals, or are limited to industry boundaries. Today, successful companies collaborate with customers, partner with rivals, and evolve their business as needed. Thus, to be successful, companies must create a corporate culture that is embracing the trends of the digital world. For instance, millennials bring with them many new and valuable skills but also attitudes that may be difficult to integrate with more traditional business environments. A great example of this relates to the use of social networking in the office. If a business bans the use of social networking sites at work, many millennials will easily find creative workarounds to circumvent such policies or simply find a job that is embracing the trends of the digital world. Many believe that embracing social media and other changes is not only necessary to attract and retain top talent, it is also good for business (CIPHR, 2016). Viewing social media as a way to enhance company culture, improve customer relationships, and recruit future customers and employees provides many benefits. It also provides companies with deeper insight into what their competition is doing and what matters to their customers, all of which can aid in planning for the future.

Future Web Capabilities

Web technologies and collaboration are ever-evolving topics, and many developments have yet to be fully realized. This section briefly forecasts future capabilities of the web, in particular, focusing on efforts to create the semantic web and characteristics of web 3.0.

THE SEMANTIC WEB. Since the web opened up for public use, the number of web pages and sites has grown exponentially. Although this increase in web pages should mean that we have ever more information at our fingertips, it also means that the information is increasingly harder to find. What if the information on the web was organized in a way that users could more easily find information or relevant content? Traditionally, web pages were designed to be understood by people but not by computers, and search engines were examining pages for the existence of key terms; for example, when searching for “what eats penguins,” a search engine would return web pages that might have this information, but more likely various pages just having the words or key terms “what” and “eats” and “penguins,” as search engines were not sophisticated enough to be able to find, understand, and integrate content presented on web pages. The **semantic web**,

originally envisioned by Tim Berners-Lee, one of the inventors of the World Wide Web, is a set of design principles that will allow computers to better index web pages, topics, and subjects. When web pages are designed using semantic principles, computers will be able to understand the meaning of the content, and search engines will be able to give richer and more accurate answers. The major search engines encourage webmasters to integrate so-called microdata into their pages' HTML markup to help search engines understand the *meaning* of content on the pages; for example, the markup of a business' address can be enhanced by using microdata to specify the meaning of the different parts of an address. In 2012, Google has started making strides toward implementing concepts related to the semantic web in its "knowledge graph." When searching for terms in Google, the search engine now attempts to understand what the user may mean; for example, when searching for "kings," the search engine not only provides a list of pages containing the keyword "kings" but also displays a box containing links to search results specific to the *Los Angeles Kings*, the *Sacramento Kings*, and the NBC TV series *Kings*. Similarly, when searching for "Los Angeles Kings," Google returns not only a list of web pages but also a summary of relevant information about the hockey team, culled from various web sources. Although the semantic web is largely unrealized (and may never be fully realized due to issues surrounding complexity, feasibility, or privacy concerns), Google's efforts show that computers are getting ever closer to understanding the meaning of content on the web.

WEB 3.0. In many ways, web 2.0 has already replaced web 1.0, and the question is "What will replace web 2.0?" For some, web 2.0 is just a short transitional period before the next wave of Internet technologies, which is predicted to last until 2020. There are several ideas on what this next wave, sometimes termed web 3.0, will entail. Some, such as *Forbes* contributor Eric Jackson, envision the next wave of the web to be centered around mobility, almost announcing the demise of the web as we know it. Others see web 3.0 as the "contextual web," where the immense amounts of content available to users will be filtered by contextual factors such as time, location, social activities, and so on. You may have already seen some of these emerging technologies in practice, especially regarding the context of a user's location, and we may only know what web 3.0 really is when we see it; it may even forever remain a buzzword. Nevertheless, we can see exciting new developments on the horizon, and the coming trends will likely involve true integration of devices and connectivity to create powerful, socially aware Internet applications. Stay tuned to see what the future holds.

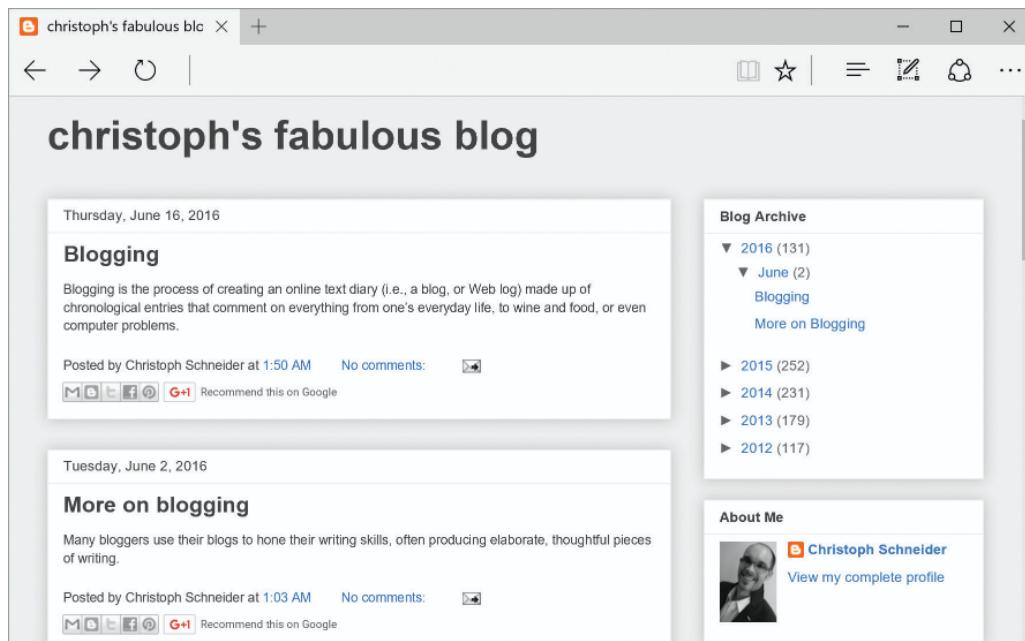
Social Media and the Enterprise

Having realized the opportunities brought about by web 2.0 applications, many business organizations are continuously looking for ways to use social media to support their existing business processes; many organizations have built successful business models entirely based on core web 2.0 values such as social sharing or collaboration (see Chapter 4, "Enabling Business-to-Consumer Electronic Commerce," for a discussion on social commerce). In addition, the use of social media within a company's boundaries or between a company and its customers or stakeholders can help in sharing organizational knowledge, making businesses more innovative and productive, and helping them to effectively connect with their customers and the wider public.

You were likely familiar with many of the social media applications mentioned throughout the previous chapters, but there may have been some that you were not aware of. You are probably more comfortable with or find more value using some tools over others. Similarly, organizations are increasingly trying to find the right tools for their different needs. In the following sections, we will discuss how different social media applications enable or support communication, cooperation, collaboration, or connection; needless to say, many of these applications cannot be neatly categorized, fitting into more than one category.

Enhancing Communication Using Social Media

A prime application of social media in the enterprise is facilitating and enhancing the communication within an organization as well as between an organization and its stakeholders. For organizations, social media have opened up a vast array of opportunities for presenting themselves to their (potential) customers; at the same time, these applications have opened up literally thousands of channels for people to voice their opinions about an organization. In this section, we introduce various social media tools used for communication.

**FIGURE 5.9**

Blogging is the process of creating an online text diary (i.e., a blog, or web log) made up of chronological entries.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.

BLOGS. Blogging originally started out as a way for novices to express themselves using very simple web pages. Blogging is the process of keeping an online text diary (i.e., a **blog**, or web log) made up of chronological entries that comment on everything from one’s everyday life to wine and food or even computer problems (Figure 5.9). Rather than trying to produce physical books to sell or use as gifts, bloggers (i.e., the people maintaining blogs) blog about their lives or voice their opinions (although feedback is often encouraged through associated threaded discussions). Many bloggers use their blogs to hone their writing skills, often producing elaborate, thoughtful pieces of writing. Others write blogs with the aim of attracting large audiences so as to monetize their efforts using online advertising or affiliate marketing programs.

However, blogs are not without controversy. Nicholas Carr, noted technology journalist (and active blogger himself), classifies blogging as the “**amateurization**” of journalism. Often the value of blogging is the ability to bring breaking news to the public in the fastest possible way. By doing so, some bloggers cut journalistic corners, rendering some of the posts on the blogs less than accurate, and blogs have been criticized for frequently providing the biased opinions of the writers, particularly because many of the authors’ sources cannot be or have not been verified.

Nevertheless, bloggers have massively influenced the way in which people gather and consume information and have become important voices that can sway public opinion. In fact, turning to free information from blogs and other online sources, many readers have canceled newspaper subscriptions. In turn, diminishing readership in traditional newspapers has enticed advertisers to begin to withdraw from this traditional medium, leading to budget cuts and layoffs at reputable newspapers such as the *San Francisco Chronicle*, the *New York Times*, the *Washington Times*, and many others. Unfortunately—and ironically—this may erode the very sources that many bloggers base their information on.

In addition to blogs created by and/or for individual readers, blogs are being used by small, medium-sized, and large organizations for connecting with their employees or customers. For example, IBM’s business-oriented social software suite IBM Connections includes blogs, helping people to voice ideas and obtain feedback from others. Similarly, companies such as Google maintain official company blogs (e.g., <http://googleblog.blogspot.com>) to inform their stakeholders about news, rumors, or current thoughts. In contrast to press releases or other official public relations statements, blogs provide an avenue for companies to present themselves in a more approachable way.

MICROBLOGGING. Microblogging, similar to blogging, enables people to voice their thoughts; however, in contrast to blogs, which often contain lengthy posts, microblogging services are designed for broadcasting relatively short “status updates,” which are distributed in (near) real time. In contrast to social networks, where users can choose who can or cannot receive their status updates, typically, anyone can follow another person’s microblog. A popular microblogging service is Twitter, which

allows users to post short (up to 140 characters of text) “tweets” that are delivered to the author’s followers or subscribers (Figure 5.10). The recipient can “retweet” (i.e., re-broadcast) interesting tweets to his or her followers. With many people broadcasting everything they find interesting and the high speed of message transmission, Twitter has become a source for breaking news. In China, where Twitter is blocked, the most popular microblogging service is Sina Weibo, which is widely used not only by individuals and companies but also by various levels of government to portray a positive image or monitor public sentiments. Many social networking sites (discussed later) also have microblogging functionality built in; for example, users can update their status on Facebook, letting their friends know about their current thoughts and allowing them to post replies.

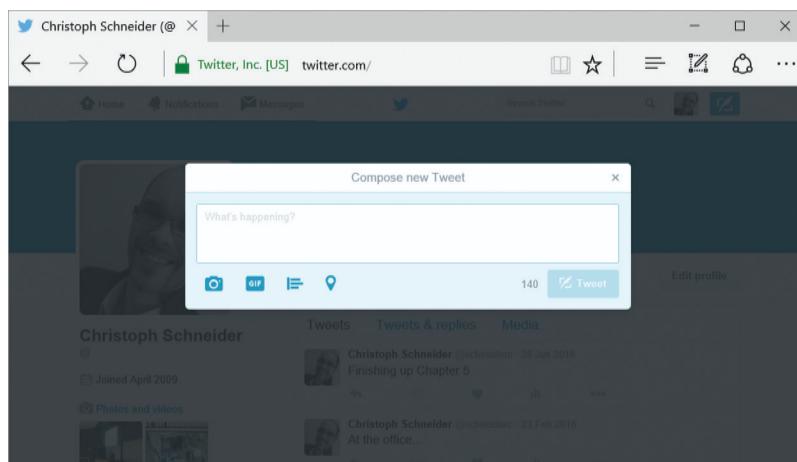
Many organizations have used this trend and created accounts on Twitter. For example, Coca-Cola has an official Twitter account it uses to post news or interact with its (as of mid-2016) more than 3.2 million followers; Coca-Cola follows more than 66,000 Twitter accounts and actively replies to and retweets Twitter messages. This way, Coca-Cola signals that it cares about its followers, trying to increase its customers’ brand loyalty. When posting a tweet, users can tag words or phrases with a “#”—called a **hashtag** (e.g., #NBAFinals, #ThursdayThoughts, or #WearOrange)—to indicate the topic and relate the tweet to other tweets about the same topic. A word phrase or topic that is tagged at a greater rate than others is said to be **trending**. A topic becomes trending because of a concerted effort by users or because of an event (e.g., a new winner of the Super Bowl or a missing aircraft) that prompts people to tweet about the topic. Microblogging, however, is not limited to text content. Apps such as Vine allow users to easily share short video clips, taken with the smartphone’s camera. Likewise, Tumblr allows users to go beyond the 140-character limit and share any kind of digital content, including text, music, and videos; by combining features of blogs, microblogs, and social networking sites, Tumblr allows companies to communicate and connect with their customers. For example, in May 2014, AMC premiered a full-episode sneak preview of its new TV series *Halt and Catch Fire* on Tumblr.

INSTANT MESSAGING. In contrast to asynchronous discussion forums, blogs, and status updates, **instant messaging** (or online chat) enables real-time written conversations. Using instant messaging, multiple participants can have conversations and enjoy immediate feedback from their conversation partners. Some social networking sites such as Facebook have integrated instant messaging functionality. In addition, the increase in smartphone usage has merged instant messaging with cell phone–based text messaging; cloud-based messaging services such as WhatsApp allow for group chats, free text messages or voice calls (even internationally), and even the exchange of multimedia content, using the smartphone users’ data plan or Wi-Fi connection. Other popular instant message services include Viber, Line, or WeChat (hugely popular in China). Some instant messaging apps such as Snapchat or Telegram allow users to set a time limit specifying for how long the recipient can view the message before it is automatically deleted. Many organizations have adopted web-based instant messaging for internal communications and also use live chat for sales and customer support functions. In addition to offering live chat with human customer service agents, companies increasingly use automated *chatbots* (discussed in Chapter 6) to initiate conversations and gather preliminary information from the customer in order to route him or her to the relevant human customer service representative.

FIGURE 5.10

Twitter allows posting short “tweets” that are delivered to the author’s followers or subscribers via mobile phone or Twitter applications.

Source: Screenshot of Twitter.
Copyright ©, by Twitter.



Enhancing Cooperation with Social Media

In addition to communication, companies and individuals can benefit from social media applications that enable cooperation. Cooperation between individuals or organizations creates win-win situations such that one participant's success improves the chances of success of other participants. As with other social media applications, social media applications facilitating such cooperation rely on the network effect to provide the greatest benefits for users.

MEDIA SHARING. One example of cooperative social media applications making use of the network effect is the sharing of user-generated content such as pictures, videos, audio, or even presentations. Sharing media has become immensely popular on the web, using applications such as Flickr or Instagram (images), Vimeo or YouTube (videos), or SlideShare (presentations); using sites such as Pandora, users can even create their favorite music stream and share it with others who may have similar interests. Typically, the shared content is hosted on media-sharing sites; however, the content can also be embedded into other sites, creating a win-win situation for the content creator and the site embedding the content. For example, embedding an interesting and relevant YouTube video into a blog post helps to increase the attractiveness of the blog while at the same time increasing the viewership of the video, thus creating positive returns for both parties.

Similarly, webcasting is increasingly used for media sharing. Webcasting (or podcasting) is the distribution of digital media content, such as audio or video files for on-demand playback on digital media players. The increase in mobile devices such as smartphones and tablets has contributed to the tremendous growth of **webcasts** (or **podcasts**), as the consumption can be time shifted and place shifted; in other words, webcasts allow media content to be consumed at one's convenience, whenever or wherever. The term *podcasting*, derived from combining the terms *broadcasting* and *iPod*, is a misnomer, as podcasts can be played on a variety of devices in addition to Apple's iPods. As with blogging, webcasting has grown substantially, with traditional media organizations now webcasting everything from shows on National Public Radio to Fox's *Family Guy* to the *Oprah Winfrey Show*. In addition to media organizations and independent webcasters, the educational sector uses webcasts for providing students access to lectures, lab demonstrations, or sports events; this allows students to review lectures or prepare for class during their morning and evening commutes. In 2007, Apple launched iTunes U, which combines various course management tools; iTunes U is used by major U.S. universities, such as Stanford, Berkeley, and the Massachusetts Institute of Technology, with many universities offering free content ranging from lectures to faculty presentations (Figure 5.11). As webcasts can be enriched by allowing for interactive Q&A sessions or by embedding PowerPoint presentations, organizations increasingly use webcasts to provide access to shareholder meetings, online training, road shows, or other events.

To receive the most current content, users can subscribe to blogs, webcasts, videos, and news stories through Apple's iTunes, or via **RSS** (*Really Simple Syndication* or *Rich Site Summary*) feeds. Content publishers provide RSS feeds to notify users of updates to the content. Rather than users actively having to check multiple sources for updated content, RSS readers automatically check the feeds for updates and provide a synopsis of a document or the full text.

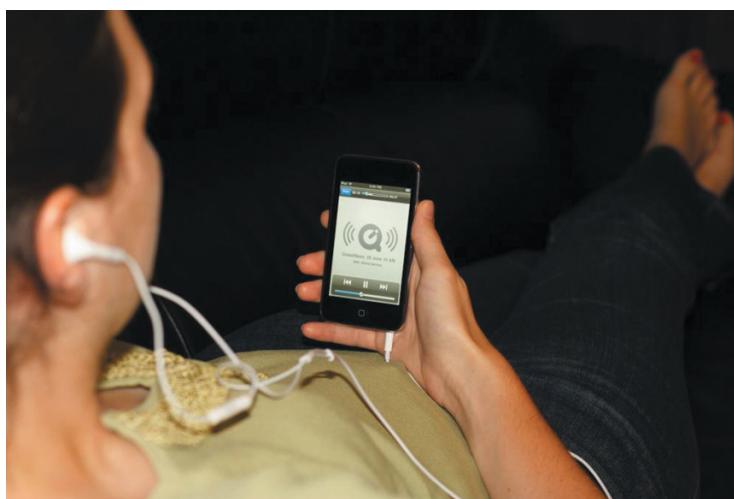


FIGURE 5.11

A student listens to a podcast on iTunes U.

Source: Courtesy of Christoph Schneider.

Recently, various apps, such as Periscope and Facebook, have enabled the possibility of sharing live video. Using Facebook Live, the White House broadcasts live videos from press conferences or president's speeches, and companies use live video to broadcast everything from hot topics to interviews or public performances. Broadcasting live videos via social media can enable various forms of direct interactions with the audience, such as by enabling the content creator to directly engage with the audience by responding to questions or comments during the broadcast. Yet, for the social media apps, monitoring content broadcast via live video is highly problematic: How can the spread of objectionable or illegal content be avoided? A case in point is the live broadcast of a double murder in Paris, France, in June 2016; the killer, a self-proclaimed follower of ISIS, used Facebook Live to broadcast himself murdering a police commander and the commander's wife. Given the rapid pace at which such content is generated, continuously monitoring and stopping (or deleting) such broadcasts is virtually impossible for service providers.

TAGGING. One problem with user-generated content is its variety; status updates, photos, videos, and other content are typically not easy to categorize or find. **Metadata**—which can be simply thought of as data about data—describe data in terms of who, where, when, why, and so on, and can be useful for categorizing content and making it easier to find. For example, metadata about a Word document include the author, the time the document was created, and when it was last saved; metadata about a digital photo include date and time, focal length, shutter speed, aperture value, and so on; metadata about a phone call include call time, duration, location of participants, phone numbers, or the phones' unique identifiers (Figure 5.12).

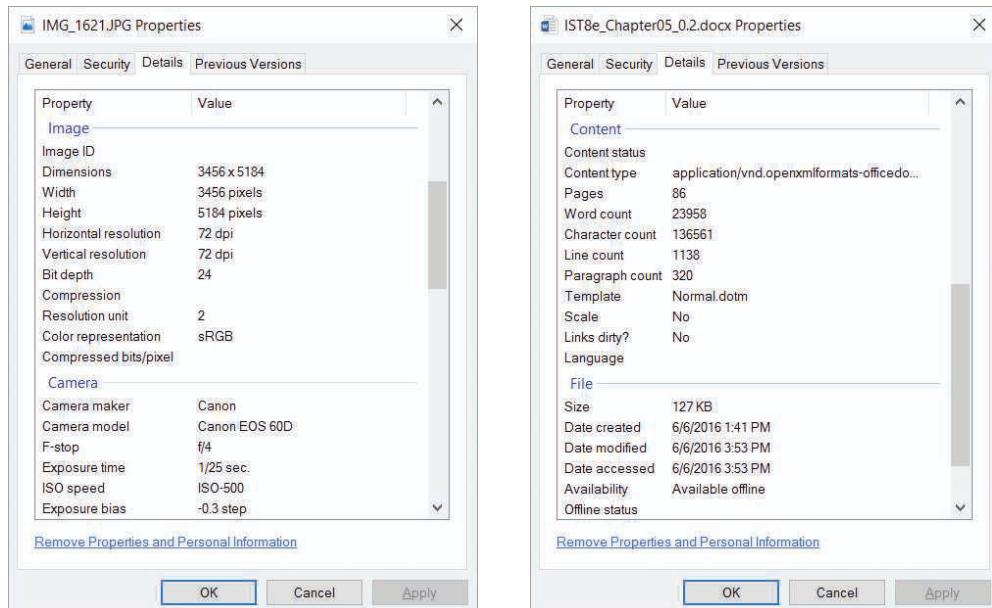
Whereas certain metadata about documents or media files are captured automatically (e.g., when saving a document in a word processor or when taking a picture with a digital camera), there are various other useful pieces of information that are not automatically captured, such as keywords about a document or the names of people in a picture. Thus, *manually adding tags*, or metadata, to digital media or other content is an important aspect of many social media applications. Tags are commonly added to pictures and videos on websites such as Flickr, a picture- and video-hosting website that allows users to upload their content. Likewise, hashtags, popularized by social media applications such as Twitter, Tumblr, and Instagram, are used to add metadata to messages posted on these services, allowing users to search for content related to a certain topic. A way to visualize user-generated tags or content on a site is through **tag clouds** (Figure 5.13). The size of a word in a tag cloud represents its importance or frequency, making it easy to spot the most important or frequent words or tags.

GEOTAGGING. Another type of metadata about media such as photos, videos, or even blogs or tweets is of geospatial nature; knowing where exactly a photo was taken and in what direction the camera was pointing, or knowing the location of a person sending out a breaking news update on Twitter can be extremely valuable. Such geospatial metadata (such as latitude, longitude, or altitude) added to digital media is referred to as **geotags**. Once the geographical coordinates of

FIGURE 5.12

Metadata about a photo and a Word document.

Source: Windows 10, Microsoft Corporation.



**FIGURE 5.13**

A tag cloud representing words and concepts that are key to social media.

Source: Vlue/Shutterstock.

an item are known, it can easily be visualized on a map. For example, Google Maps can display various types of geotagged content, such as photos, webcams, Twitter posts, or Wikipedia articles about places or landmarks. Thus, Google can offer a map experience containing pictures of attractions, reviews, and things to do without having to take a single picture or write a single review itself. Geotags are often automatically generated, for example, when taking images with a smartphone; yet this may lead to privacy or security concerns, for example, when sharing images online. A case in point is the arrest of John McAfee, the creator of the antivirus software, who was sought by authorities in Belize in connection with a murder. McAfee went into hiding and, in 2012, met with a team of journalists in Guatemala; one of the journalists posted a picture with him online but forgot to remove the location metadata, revealing McAfee's hideout to the Guatemalan authorities, who arrested him for illegally entering the country. After a week in a Guatemalan prison, McAfee was deported to the United States.

SOCIAL BOOKMARKING. As other social media applications, social bookmarking relies on the network effect. For many web surfers, key challenges are finding information and then finding it *again* at a later time; hence, people often keep long lists of bookmarks to sites they find interesting or visit frequently. Although this is useful for individuals, users may miss a plethora of other, related, and potentially interesting websites. **Social bookmarking** helps to address this by allowing users to share interesting content and to create categorization systems (referred to as **folksonomies**). As more people participate in social bookmarking, the value for each user grows as the bookmarks become more complete and more relevant to each user. Widely used public social bookmarking tools include reddit and StumbleUpon. Likewise, Pinterest allows users to “pin” content they find interesting, and media websites such as CNN.com provide sharing links so as to increase the reach of their content. For organizations, social bookmarking can be extremely valuable for knowledge management and harnessing the collective intelligence of employees. Using enterprise-oriented social bookmarking tools, it is easy to map “islands” of knowledge within an organization, thus helping to easily find experts on a given topic.

SOCIAL CATALOGING. Similar to social bookmarking, **social cataloging** is the creation of a categorization system by users. Contributors build up catalogs regarding specific topics such as academic citations, wireless networks, books and music, and so on. For example, users can create virtual bookshelves with the social cataloging application goodreads, organize their collections, write reviews, and then share this bookshelf with others on the web. Similarly, students and researchers can use free tools such as Mendeley or Zotero (Figure 5.14) to manage their citations, thus facilitating the creation of reference lists for research papers. Organizations are typically dealing with tremendous amounts of information, ranging from supplier information to frequent customer complaints, and can use social cataloging for structuring this information and making it more accessible and useful.



SECURITY MATTERS

Terrorism Is Winning the Social Media Battle

Terrorism is the use of violence or threat of violence in order to purport a political, religious, or ideological change. Terrorists aim to provoke irrational fear among large numbers of people in order to influence policymakers and thus advance their goals. To be successful, terrorists need to gain publicity about their cause. Historically, terrorists have learned to use media to their advantage and rely on media to spread their message and further their goals. For example, in the 1960s and 1970s, there was a rash of commercial airliners hijacked. Often, these hijackings would be broadcast live on TV, and many believed that this exposure actually increased the number of hijackings. At that time, there was very little security or passenger screening at airports. To stop the hijackings, the government mandated screening of passengers and luggage.

Over the past many decades, terrorists have continued to refine their ability to leverage the available media to reach as many people as possible. In order to garner publicity toward their cause, terrorist organizations resort to acts of violence and aggression that deliberately target civilians. While terrorism has not been effective at taking down governments and capturing political power, it has been very successful at gaining increasing attention and spreading fear. Today, due to the convenience, affordability, and broad reach of social media platforms such as YouTube, Facebook, and Twitter, terrorist groups are increasingly using social media to further their goals and spread their message. New technologies have not only made it astonishingly easy to produce high-quality propaganda images and videos, they have also made it far easier to disseminate this propaganda. Cheap portable cameras and easy-to-use editing software allow for the rapid production of content. Digital distribution on social media sites allows

content to be distributed globally or broadcast in real time at little cost or effort. With smartphones connected to the Internet, content can be viewed by millions around the world.

Terrorist organizations like the Islamic State, often referred to as ISIS, have created a variety of relatively well-edited videos to serve a dual purpose, inspiring one group of people to join their cause while disgusting and frightening the others. Numerous videos of executions have been released, including those of Western aid workers, journalists, alleged spies, suspected homosexuals, and anyone else the terrorists believe to be their enemy. Various types of dramatic murders have been displayed, including decapitations, shootings, and even burning victims alive.

While attempts have been made by various governments and agencies to thwart the use of social media by terrorist organizations, these attempts have (mostly) not been successful. As the future continues to unfold, we can be sure that violent extremists will continue to evolve their use of the latest media and platforms in an attempt to further their cause.

Based on:

Burke, J. (2016, February 25). How the changing media is changing terrorism. *The Guardian*. Retrieved June 28, 2016, from <https://www.theguardian.com/world/2016/feb/25/how-changing-media-changing-terrorism>

Gates, S. (2015). Social media, recruitment, allegiance and the Islamic State. *Perspectives on Terrorism*. Retrieved June 28, 2016, from <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/446/html>

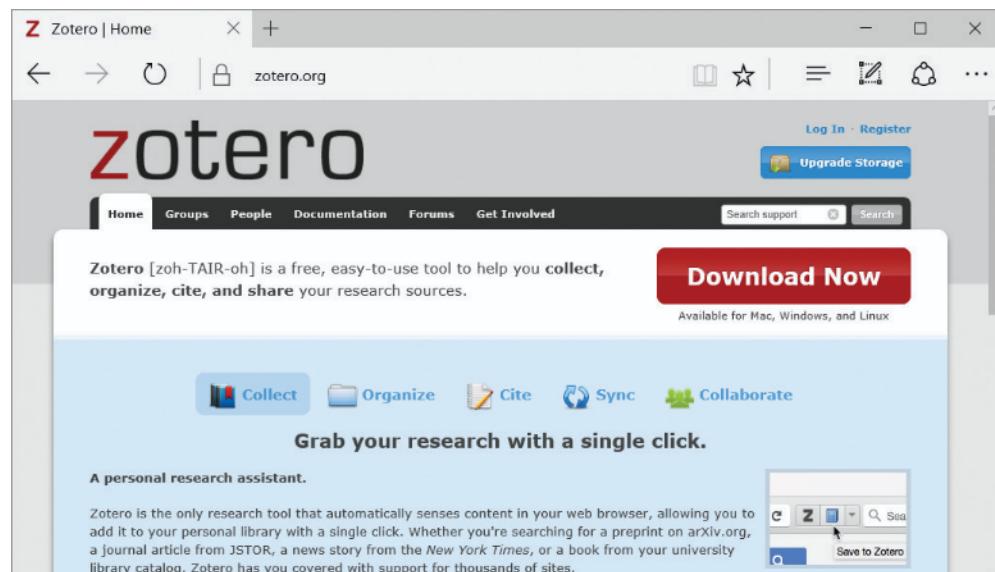
Koerner, B. I. (2016, April). Why ICIS is winning the social media war. *Wired*. Retrieved June 28, 2016, from <https://www.wired.com/2016/03/isis-winning-social-media-war-heres-beat>.

Terrorism and social media. (2016, June 17). In *Wikipedia, The Free Encyclopedia*. Retrieved June 28, 2016, from https://en.wikipedia.org/w/index.php?title=Terrorism_and_social_media&oldid=725707095

FIGURE 5.14

Zotero helps in organizing citations and research resources.

Source: Courtesy of Center for History and New Media, George Mason University. Copyright ©, by Zotero.



Enhancing Collaboration with Social Media

Traditional office technologies, such as telephones or e-mail, are very useful to organizations; yet such technologies are not well suited to support rich, rapid, multi-person team collaboration. For example, the telephone is best suited for person-to-person communication; e-mail is a useful technology for teams, but it does not provide the structure needed for effective multi-person, interactive problem solving. Modern organizations need technologies that enable team members to interact through a set of media either at the same place and time or at different times and in different locations, with structure to aid in interactive problem solving and access to real-time information. The Internet, cloud computing, and the increase in the use of mobile devices have enabled various social media applications that provide many capabilities that have forever transformed the way individuals and teams can work together. These are described next.

CLOUD-BASED COLLABORATION TOOLS. One key trend that has greatly facilitated collaboration is the rise of cloud computing. Traditionally, sharing and collaborating on documents were cumbersome; users typically had to e-mail documents back and forth or had to worry about having the latest version of the software installed. **Cloud-based collaboration tools** have greatly facilitated collaboration; for example, cloud-based collaboration tools allow for easy access and easy transfer of documents or other files from one person to another; using services such as Dropbox, documents are not only stored on a user's computer but also synced to other computers or devices via a copy of the document stored in the cloud. This way, a user can access a file from multiple devices, always having the latest version at his or her fingertips, or collaborators can work on documents without needing to e-mail documents. Similarly, tools such as Evernote, Wunderlist, or Microsoft OneNote allow for synchronizing and sharing of notes, task lists, and the like. Cloud-based productivity suites take this concept a step further by not only storing the files in the cloud but also enabling the access of office productivity tools from any computer (or even mobile device) with a web browser and Internet connectivity. While this frees the user from having to locally install productivity software, using cloud-based collaboration tools requires a live Internet connection to work on shared documents, and thus users may not be able to work when traveling or when having Internet connectivity problems. Table 5.3 outlines various benefits and risks of cloud-based collaboration tools.

Organizations and individuals can choose from different options for using cloud-based collaboration tools. On one end of the spectrum, companies offer single-purpose tools for everything from creating presentations to managing projects. On the other end of the spectrum, cloud-based collaboration tools such as Google Apps or Microsoft Office 365 integrate everything from document sharing to videoconferencing, thereby mirroring (or even surpassing) the capabilities of traditional offline office suites (Table 5.4).

TABLE 5.3 Benefits and Risks of Cloud-Based Collaboration Tools

Domain	Benefit	Risk
Information technology	Reduced costs and risks when using preexisting, easily deployed, and low-cost web-based tools (versus in-house developed tools).	Loss of control regarding data and service quality (data and tools will likely reside on the provider's server).
Organization	Tools are easy to use, facilitating widespread adoption throughout an organization.	Little or no documentation, training, or support for system complexities or problems.
Competition	More efficient and effective than e-mail, FTP, or legacy collaboration tools, potentially speeding up product development cycles and enabling quick responses to competitors' actions.	Security and compliance policies are often difficult to enforce, which may increase the possibility of exposing sensitive corporate data; increased threat of industrial espionage.
Upgrade cycles	No need to purchase software upgrades.	Tools and features in the collaboration environment can change without notice, potentially causing problems with users and corporate IT strategy.

TABLE 5.4 Web-Based Collaboration Tools

Type	Names
Spreadsheets	Google Drive, Zoho Sheet, Microsoft Excel Online
Word processors	ThinkFree, Zoho Writer, Google Drive, Microsoft Word Online
Presentation	Google Drive, Zoho Show, Microsoft PowerPoint Online, Prezi
Office suites	Zoho, Google Apps, Microsoft Office Online
Project management	Trac, Redmine, eGroupWare, Collabtive
Notes/task management	Evernote, Wunderlist, Microsoft OneNote Online
Cloud storage/sharing	Dropbox, Google Drive, Microsoft OneDrive, SugarSync, iCloud

CONTENT MANAGEMENT SYSTEMS. A content management system (CMS) allows users to publish, edit, version track, and retrieve digital content, such as documents, images, audio files, videos, or anything else that can be digitized. For example, organizations use open source content management systems such as WordPress, Joomla, or Drupal to create blogs or websites (see also upcoming discussion of open source software); Carnival Cruise Lines uses WordPress for publishing company news; the French automaker Peugeot uses Joomla for its company website; and the University of Minnesota uses Drupal. Whereas traditionally, webmasters would have the task of adding, modifying, or deleting content on a company’s website, content management systems provide easy-to-use interfaces that allow the *creators* of content to make necessary changes; thus, a member of the marketing team may edit a product’s description without having to ask the IS department to make the changes. Typically, such content management systems facilitate the creation and management of web content by allowing the assignment of different roles to different users; these roles are associated with different permissions, such that some users can create and edit content, others can edit but not create, and yet others can only view content contained in the system. Many open source content management systems can even be used for building e-commerce sites by incorporating functionality such as inventory management or shopping cart functionality. Yet content management systems, also known by several other names, including digital asset management systems, document management systems, and enterprise content systems, can be used for collaboration beyond the creation and management of websites. For example, Microsoft SharePoint is a document management platform that can be used to host intranet sites, extranet sites, or public websites that enable shared workspaces and integrate other collaborative applications such as document sharing, *wikis* (see upcoming discussion), and blogs. SharePoint also includes workflow functionality such as to-do lists, discussion boards, and messaging alerts (Figure 5.15). Because SharePoint has been designed to be easily customizable, it has been installed in a variety of businesses, which can personalize the collaborative SharePoint websites to meet their needs.

Learning Management Systems Similar to content management systems used for communication and collaboration, learning management systems such as Blackboard, Sakai, and Moodle have facilitated business processes in educational settings. Typically, learning management systems enable uploading and viewing content, administering exams, and self-service functions such as registering for courses or viewing grades. Increasingly, learning management systems offer additional tools for enabling team collaboration, class discussions, and the like.

COLLECTIVE INTELLIGENCE. One major benefit of social software is the ability to harness the “wisdom of crowds,” or collective intelligence (Surowiecki, 2004). The concept of **collective intelligence** is based on the notion that distributed groups of people with a divergent range of information and expertise can outperform the capabilities of individual experts. For organizations, making effective use of the collective intelligence of their employees, customers, and other stakeholders can prove extremely valuable. Based on the concept of collective intelligence, **peer production** is the creation of goods or services by self-organizing communities. In peer production, the creation of the goods or services is dependent on the incremental contributions of the participants such that anyone can help in producing or improving the final outcome. Prime examples of peer production are open source projects and wikis.

WHO'S GOING MOBILE

Going SoLoMo: Yelp

If you're looking for a good restaurant, tailor, or pest control service in town, it is difficult to know which of the many options will provide the best service. Luckily, there's Yelp. You've probably heard of Yelp, the review and rating platform where you can find valuable information on local businesses provided by previous customers. The company began in 2004 as a way for friends to exchange local service recommendations via e-mail. The service quickly evolved to include social networking services and has expanded its operations to many countries around the world. Yelp has also been a pioneer in developing mobile, location-based services. Boasting 135 million monthly visitors and 95 million reviews (as of 2016), Yelp tends to come up as an example whenever people talk about the intersection of social, local, and mobile services (sometimes called **SoLoMo** for short).

Yelp has embraced the rising trends in mobile device usage. Shortly after the iOS app store launched the mobile app craze in 2008, Yelp released its first app for the iPhone. Apps for other platforms followed. With Apple's release of iOS 6 in September 2012, Yelp's rating and review content was integrated into the mapping and directions app of the iOS operating system. By November 2013, Yelp reported that 45 percent of its traffic came from mobile devices. Part of the reason for Yelp's mobile success is the fact that a smartphone with a Yelp app installed is "location-aware," meaning that users can use the phone's global positioning system (GPS) capabilities to find Yelp reviews of locations in the area. This is very useful if you are in an unfamiliar area and would like to go eat somewhere with positive reviews. You can simply search for restaurants and choose from among the highest-rated restaurants within walking distance.

Yelp has leveraged its dominating mobile presence to its advantage. The company began allowing local businesses to advertise to local users, and the advertising technique has proven quite powerful. If you open the Yelp app and are searching for restaurants, Yelp can be pretty confident that you're hungry and about to make a purchase. A cleverly placed ad offering a discount from a local pizza place may be just the thing that convinces you to buy a pizza instead of the Big Mac offered next door. Yelp is still seeing strong growth, with revenues of US\$550 million in 2015, representing a year-on-year growth of 46 percent between 2014 and 2015. With about 35 percent of Yelp's overall revenue coming from local advertising, Yelp has some critics, who feel that Yelp is manipulating reviews and blocking overly negative reviews in order to increase ad spending by businesses. Still, while smartphone users increasingly use their devices to find information about local business, Yelp is well positioned to continue its SoLoMo leadership.

Based on:

Anonymous. (2016, February 8). Yelp announces fourth quarter and full year 2015 financial results. *PR Newswire*. Retrieved June 28, 2016, from <http://www.prnewswire.com/news-releases/yelp-announces-fourth-quarter-and-full-year-2015-financial-results-300216659.html>

Holloway, D. (2015, November 19). Americans to spend \$40 billion at local businesses this holiday season. *YelpBlog*. Retrieved June 28, 2016, from <https://www.yelpblog.com/2015/11/americans-to-spend-40-billion-at-local-businesses-this-holiday-season>

Yelp. (2016, June 25). In *Wikipedia, The Free Encyclopedia*. Retrieved June 28, 2016, from <https://en.wikipedia.org/w/index.php?title=Yelp&oldid=726935600>

Name	Modified	Modified By
IST8e_Ch8	7 minutes ago	Dr. Christoph SCHNEIDER
IST8e_Ch8_V0.1	6/3/2016	Dr. Joseph VALACICH
IST8e_Ch8_V0.2	6/5/2016	Dr. Christoph SCHNEIDER

FIGURE 5.15

The Microsoft SharePoint content management system can assist in project collaboration.

Source: SharePoint 2016, Windows 10, Microsoft Corporation.

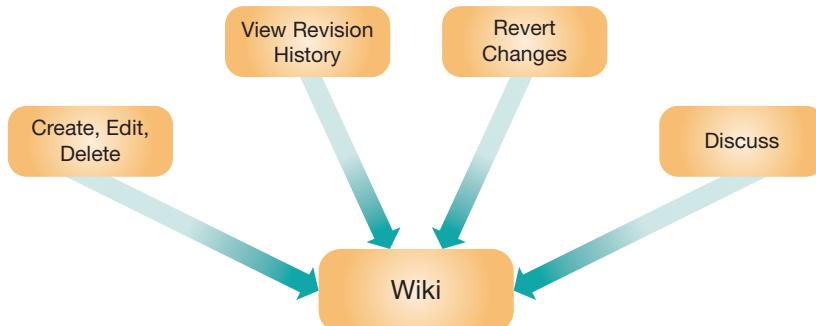
Open Source Software Traditionally, software—ranging from Adobe Acrobat to large ERP systems—has been developed by software companies. In contrast, open source software, such as the Firefox web browser, the Linux operating system, or the Apache OpenOffice productivity suite, is created, maintained, and updated by thousands of volunteers located all over the world (see Chapter 9, “Developing and Acquiring Information Systems”). Often, someone with an idea for a useful program develops an initial version; other developers looking for interesting projects to work on may then join the original creator and contribute to the continuing development of the software. Organizations now have access to various high-quality open source software, ranging from operating systems to databases, web servers, and e-commerce solutions; using open source software offers benefits such as security, flexibility, and auditability (of the program’s source code). For individuals, participating in open source software projects can help to improve their skill set or boost their CVs. For organizations, participating in open source projects can be a way to influence the direction the software’s development may take and to build goodwill by giving back to the community.

Wikis Also based on the concept of collective intelligence, wikis are used for a variety of collaboration tasks. A **wiki** is a website allowing people to create, edit, or delete content as well as discuss about content or suggested changes with other members of the community. In contrast to a regular website, a wiki is linked to a database keeping a history of all prior versions and changes; thus, a wiki allows viewing prior versions of the pages as well as reverting any changes made to the content. The idea behind wikis is that by allowing anyone to contribute content or edit others’ contributions, the collaborative work performed by the community helps to minimize vandalism and ensure high-quality content (Figure 5.16). For example, Wikipedia articles are created by Wikipedia users, and almost any of these articles can be edited by either anonymous or registered users. By allowing easy access, Wikipedia has grown exponentially within just a few years. However, Wikipedia is not without critics. Some argue that by allowing anyone to create and edit articles, systematic biases in the content can occur. This includes the ability for users to add misinformation that is hard to verify. For example, recent news show that politicians, companies, and other entities of interest frequently edit their Wikipedia pages to portray a more positive image. Sometimes, so-called “wiki wars” arise, where contributors continuously edit or delete each others’ posts. Also, Wikipedia has been found to have a significant cultural bias on some topics, as most contributors are males from either North America or Europe, and the information is not always backed by verifiable sources. Given these issues, many universities discourage students from citing Wikipedia, and in some instances professors have been failing students for using Wikipedia as their primary (or only) source. Still, the contributors’ collective intelligence ensures that the quality of many articles matches (or surpasses) that of traditional encyclopedias, and a Wikipedia article may be a good starting point for researching about a topic; as always, it is good practice to evaluate the sources used within an article, and to consult other sources as well. Wikipedia openly acknowledges this situation and encourages users to check the facts against multiple sources.

Wikis have been used for many more things than just an online encyclopedia. The ability for users to contribute and edit content has a wide variety of applications, such as designing software, helping people find media, and even helping people play video games. In fact, many organizations are using wiki technology to create internal knowledge repositories.

FIGURE 5.16

The ability to create, edit, or delete content, view prior versions, revert any changes, and discuss about content and suggested changes are key to the creation of high-quality content by a community.



HUMAN-BASED COMPUTING (CROWDSOURCING). Another way companies are using the collective intelligence of individuals is through crowdsourcing. When companies look for cheap labor, many immediately think about outsourcing work to *companies* in different countries, such as India, China, or Russia (see Chapter 1). However, companies have now found a way to use *everyday people* as a cheap labor force, a phenomenon called **crowdsourcing**.

Amazon.com took crowdsourcing mainstream with its micro-task marketplace called Mechanical Turk. Using this marketplace, requesters can crowdsource so-called human intelligence tasks (HITs), which are small, self-contained tasks that humans can solve easily but would be difficult for a computer to solve. Examples of HITs include tagging images, generating potential search key words for a product, fixing product titles on e-commerce sites, and so on (Figure 5.17; see also Chapter 4 for more on consumer-to-business business models). Users can find HITs that are of interest to them, solve the tasks, and earn money that is credited to their Amazon.com account. As you can see, for companies, crowdsourcing is an innovative way to reduce costs by using the expertise of the crowds. Similar to grid computing (see Chapter 3), a person's "idle time" is used for a certain business task, and many people are willing to provide their resources in exchange for a relatively small amount of money. In order to harness the power of the crowds, some companies have even created their own, internal, micro-task marketplaces; for example, Microsoft's "Universal Human Relevance System" is used by Microsoft to crowd-source tasks related to improving Bing search results, conduct research, and so on. A related concept is that of open innovation. As discussed in Chapter 2, companies are increasingly attempting to create ad hoc research-and-development networks by integrating external stakeholders into their innovation processes so as to harness the power of the crowds.

Enhancing Connection with Social Media

Social media applications also aid in connecting people with each other, companies with their customers or stakeholders, or people with content. Without a doubt, social networking has become the most popular type of application in this category; we explore social networking and other, lesser-known applications in the following sections.

SOCIAL NETWORKING. In addition to direct collaboration, **social networking** has become one of the most popular uses of the Internet over the past few years. Social networking sites create **social online communities** where individuals with a broad and diverse set of interests meet, communicate, and collaborate. Facebook exemplifies this trend, being the third most popular site on the web (and being surpassed only by YouTube and Google), according to Alexa.com. Facebook took the spot as the most frequented social network from Myspace.com, which originally was designed to be a social network based on musical interests but then changed to a general interest social network used primarily by teens and young adults; over time, the importance of Myspace has declined tremendously, and in May 2014, Myspace was barely ranked in the top 1,000 sites on the web. Because of the network effect, as Facebook grew, it became ever more attractive for other people to join. In March 2016, Facebook announced that it had 1.65 billion monthly active users, and it is still growing. Other social networks are built on the tremendous increase in mobile devices. For example, the location-based social network Swarm is built around the idea of people using their mobile devices to "check in" at places.



FIGURE 5.17

Anyone can earn money on micro-task marketplaces by solving small, well-defined tasks.

Social networks were initially primarily popular among preteens, teens, and young adults, but social networking demographics have slowly shifted, with 79 percent of American Internet users between 30 and 49 years and 64 percent of Internet users between 50 and 64 years using Facebook. In addition to general interest social networks, several social online communities are targeted at professional audiences, allowing users to meet business contacts, post career profiles, present themselves in a professional context, ask for expert advice, or be contacted regarding job opportunities. For example, LinkedIn has more than 414 million members, and Xing (popular in the German-speaking market) has almost 11 million members. Further, enterprise-oriented social software such as IBM Connections features social networking tools that allow people within organizations to connect to one another; similarly, Yammer, part of Microsoft, is designed as a private social network for communication and collaboration within organizations (Figure 5.18). Designed to mirror consumer-oriented social media apps people are used to, applications such as Yammer are but one example of increasing consumerization of IT, where technologies and applications are first designed for the consumer marketplace and then make inroads into organizational settings. Other players in the enterprise social networking market include Slack and Facebook's business-oriented social network named Facebook at Work.

Organizations also increasingly use social networks to connect with their customers. Numerous companies have their own Facebook pages to interact with their customers, get feedback on new products or services, or in general portray a positive brand image.

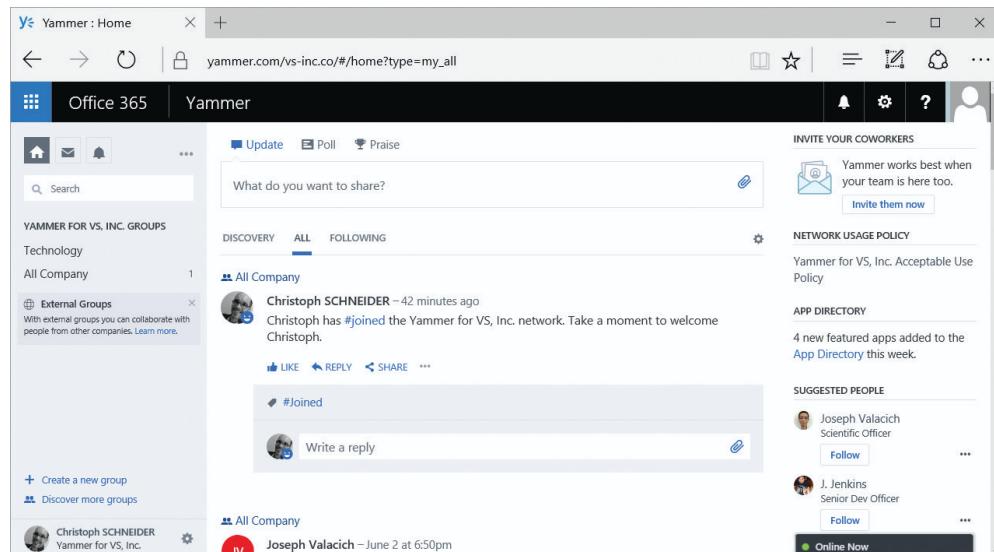
However, social networks are not without critics. In particular, one area of criticism is the way users' newsfeeds are assembled on social networks such as Facebook, where sophisticated algorithms analyze your (and others') behavior and try to predict which of your friends' posts may be of interest to you; for example, the algorithms analyze which posts you like, which friends you interact with most (e.g., as indicated by your activity in response to your friends' posts), how many comments or likes a post receives, and so on. Facebook's use of advanced analytics thus determines what type of items each user gets to see (or not). While this means that you might be more likely to see items you are actually interested in, this also results in people only being exposed to opinions of like-minded people, and some have accused Facebook of creating a "filter bubble" (see Case 1 at the end of the chapter). Further, many companies are trying to use social media to attract web traffic; often, these companies post incomplete or tantalizing headlines for stories in order to encourage users to click on them. Such types of headlines are often referred to as **clickbait**; as a user clicks on the link, the company earns revenue through ads posted on the page containing the article (which often turns out to be less than informative or useful; see also Case 2 at the end of the chapter).

Social Search As the web has grown explosively since its early days (in the first 6 years, the growth rate was 850 percent, and after only 15 years, the number of websites was larger than 100 million; Nielsen, 2006), finding relevant information has become increasingly difficult. Early search engines such as Altavista were based on key words embedded within pages and often

FIGURE 5.18

Organizations use enterprise social networks for communication and collaboration within the organization.

Source: Yammer 2016, Windows 10, Microsoft Corporation.





ETHICAL DILEMMA

Anonymity, Trolling, and Cyberharassment

Using pseudonyms, fictitious accounts, or proxy servers to hide one's online tracks, it is easy to operate anonymously on the Internet; unfortunately, all too frequently, the anonymity offered by the Internet brings out the worst in people. When people are anonymous, they are more likely to enter into a state of deindividuation, a loss of self-awareness often causing antisocial behavior. Deindividuation has been used to explain a lot of humanity's darkest behaviors, including violent crowds, lynch mobs, and even genocide.

While many people just want to lead civilized discussions in online forums, you are likely to have witnessed various vicious posts, nasty discussions, or outright fights in such forums. Many are waged by anonymous combatants who exhibit intolerance and anger toward others they view as being evil or wrong. These angry individuals are often referred to as trolls. More formally, an **Internet troll** is a person who creates discord on the Internet by starting arguments or upsetting people by posting inflammatory content on social media sites with the deliberate intent of provoking readers into an emotional response, often for the troll's own amusement. Most of these trolls operate anonymously.

Much of the behavior of trolls can be classified as cyberharassment, which refers to the use of the Internet to stalk or harass an individual, group, or organization. Cyberharassment can take many forms, from false accusations, defamation, slander, and libel to threats, vandalism, identity theft, and doxing (researching and broadcasting personally identifiable information about an individual). Many feel that the Internet has provided a platform for trolls to join together to become cyber lynch mobs.

An example of such cyberharassment occurred during Gamergate, which began as an online backlash against perceived breaches of journalistic integrity on video game news sites. Beginning in August 2014, Gamergate targeted several women in the video game industry. After a former boyfriend of one of the women wrote a lengthy disparaging blog post about her, others falsely accused her of entering a relationship with a journalist in exchange for positive game reviews and ultimately

threatened her with assault, rape, and murder. Most Gamergate supporters were anonymous, making it difficult to identify or prosecute the harassers. Gamergate has led to calls for better methods of tackling and prosecuting online harassment. However, the design of the Internet makes it difficult to dramatically change a person's ability to be anonymous if they want to be.

Questions

1. Reflecting on your past online behavior, do you think that the anonymity of the Internet played a role in you engaging in antisocial behavior?
2. Given the difficulty in prosecuting online trolls and those who engage in cyberharassment, what can society do to reduce these antisocial behaviors?

Based on:

Cyberstalking. (2016, May 28). In *Wikipedia, The Free Encyclopedia*. Retrieved July 1, 2016, from <https://en.wikipedia.org/w/index.php?title=Cyberstalking&oldid=722514151>

Deindividuation. (2015, November 4). In *Wikipedia, The Free Encyclopedia*. Retrieved July 1, 2016, from <https://en.wikipedia.org/w/index.php?title=Deindividuation&oldid=688980515>

Dewey, C. (2014, October 14). The only guide to Gamergate you will ever need to read. *The Washington Post*. Retrieved June 30, 2016, from <https://www.washingtonpost.com/news/the-intersect/wp/2014/10/14/the-only-guide-to-gamergate-you-will-ever-need-to-read>

Doxing. (2016, June 21). In *Wikipedia, The Free Encyclopedia*. Retrieved July 1, 2016, from <https://en.wikipedia.org/w/index.php?title=Doxing&oldid=726385601>

Gamergate controversy. (2016, June 15). In *Wikipedia, The Free Encyclopedia*. Retrieved July 1, 2016, from https://en.wikipedia.org/w/index.php?title=Gamergate_controversy&oldid=725428951

Internet troll. (2016, June 24). In *Wikipedia, The Free Encyclopedia*. Retrieved July 1, 2016, from https://en.wikipedia.org/w/index.php?title=Internet_troll&oldid=726762067

Martin, A. (2013, May 30). Online disinhibition and the psychology of trolling. *Wired*. Retrieved July 1, 2016, from <http://www.wired.co.uk/article/online-aggression>

tried to assemble “directories” of the web. In 1996, Sergey Brin and Larry Page, the founders of Google, came up with a new algorithm for Internet search. Called BackRub, the algorithm used the number of *other* pages linking to a web page as a measure of interest, so as to return more relevant results to users. Yet returning the most relevant results to each individual user's query remains the holy grail for search engines. Given that people tend to trust recommendations from their networks of friends, search engines and social networks are trying to capitalize on the fact that content posted by friends is typically more relevant than content posted by complete strangers. Social search attempts to increase the relevance of search results by including content from social networks, blogs, or microblogging services. For example, some approaches let users annotate or tag search results, making it easier for others to find relevant information; this is especially valuable for enterprise search applications, where other users within an organization can tag internal documents, making it easier to find information as well as to find people within the organization who have certain skills or knowledge.

VIRAL MARKETING. In the offline world, marketing one's products or services is one of the most important aspects of successfully running a business. In an online context, marketing websites, products, and services is equally important, and business organizations use techniques such as search marketing, paid inclusion, and banner advertisements to promote their websites (see Chapter 4). Building on the foundations of social networking, advertisers are now using **viral marketing** to promote their websites, products, or services. Viral marketing is using the network effect to increase brand awareness. The term *viral marketing* was coined by Harvard business professor Jeffrey Rayport to describe how good marketing techniques can be driven by word-of-mouth or person-to-person communication, similar to how real viruses are transmitted through offline social networks. Rather than creating traditional banner ads or sending out millions of emails, businesses create advertisements in a way that entices the viewers to share the messages with their friends through e-mail or social networks so that the messages will spread like a virus. Viral marketing can take many forms, such as video clips, e-books, flash games, and even text messages.

The power of viral marketing can be a great tool, and there are several techniques that are critical to creating a successful viral marketing campaign. Writer and interaction designer Thomas Baekdal (2006) has outlined some critical factors in viral marketing, including the following:

- Do something unexpected
- Make people feel something
- Make sequels
- Allow sharing and easy distribution
- Never restrict access to the viral content

Following these principles entices users to view content, share it with their friends, and revisit the site to look for new content. For example, Turkish Airlines's "Kobe vs. Messi Selfie Shootout" video quickly went viral. Likewise, Volvo Trucks's "Epic Split" video featuring Jean-Claude van Damme became one of the most successful viral videos (and triggered a large number of user-generated parodies).

One of the earliest viral marketing campaigns was used during the launch of the free Hotmail e-mail service. One of the techniques used was adding a footer to every outbound message. This footer gave a short message about Hotmail.com's free e-mail service, and the message about the service was spread with every e-mail sent through the service. This campaign proved very effective (Hotmail spent only US\$500,000 to get 12 million subscribers), and Microsoft later bought Hotmail.

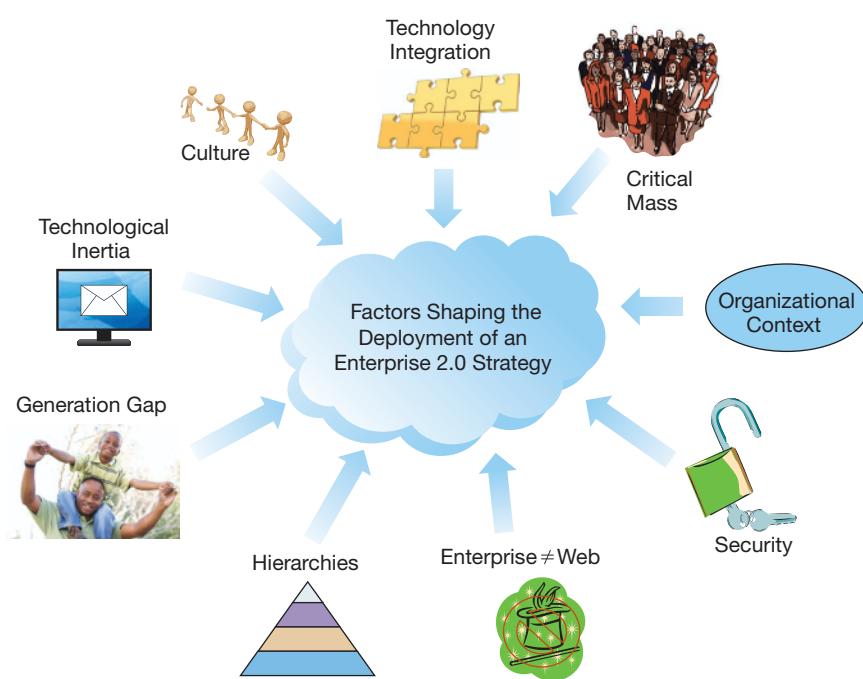
With people increasingly posting pictures or videos of things they like or enjoy, such posts can go viral as well. Thus, another viral marketing strategy is to do good or innovative things that people take pictures of and share and to rely on people's social networks to spread the message.

Managing Social Media Applications in the Enterprise

As you have seen, mobile social, the cloud, and Big Data have enabled various tools that organizations can use for communicating with external stakeholders as well as for enhancing collaboration and connection of employees within the enterprise. In the following sections, we discuss factors organizations should take into account when considering the use of social media applications within the organization. Then we highlight potential pitfalls brought about by these tools when used by people within and outside an organization.

Organizational Issues

In previous discussions, you have learned that in many cases, technology can be an important enabler of strategic advantage if implemented and managed carefully. Similarly, with internal enterprise-oriented social media applications, the technology is a critical success factor, but it is not the only component, and change management can be critical for success or failure of such initiatives. Just providing the tools in the hope that employees will use them for the intended purpose is not enough; rather, management has to ensure that employees are aware of the tools, their purpose, and rules or policies surrounding the use of these tools. Given that social media applications are based on close social interaction, information sharing, and network effects, corporate culture is key to successful implementations of social media applications in the organization. Specifically, a corporate culture of knowledge sharing, trust, and honest feedback is conducive to such implementations. In addition to culture, various other caveats have to be taken into consideration (Khan, 2008) (Figure 5.19).

**FIGURE 5.19**

Various factors have to be taken into account when using social media applications within an organization.

Source: Andy Dean Photography/Shutterstock.

ENTERPRISE≠WEB. While reading this chapter, you have learned about many web-based technologies you are familiar with from your daily life. Although many of those technologies are hugely successful in a consumer environment, this success does not always translate to success in a corporate environment. On the web, sites such as YouTube, Wikipedia, and Facebook have evolved over the years to become as successful as they are today, and examples such as Myspace show that success at one point in time is not guaranteed to continue. Further, what appears as seamless “magic” collaboration is sometimes based on intricate processes. For example, good articles in Wikipedia are based not only on the contributions of many editors but also on many behind-the-scenes discussions over controversial issues or over how to improve an article. In contrast, many open source software projects closely guard changes to the software’s programming code such that only a limited number of “committers” can actually implement suggested changes.

CULTURE. As highlighted earlier, organizational culture is a critical success factor for implementing social media applications in organizations, and many proposed projects face strong cultural resistance. Social media applications, based on the premise of open communication, do not always do well within traditional top-down organizational structures based on rigid hierarchies and control. Further, social media applications base their success on user-driven self-expression (if no one were willing to update his or her status on Facebook, people would eventually stop visiting the site); on the web, people participate by choice, but people in organizations cannot be forced to participate. Hence, organizations have to understand the multiple stakeholders, personalities, and perspectives of future users and ensure that any enterprise-oriented social media initiative will appeal to the organization’s members.

ORGANIZATIONAL CONTEXT. Any implementation of social media applications should be driven by a specific usage context. Just as users choose popular social media applications such as YouTube or Wikipedia to fulfill a particular need, the work-related context should drive the choice of tools. In other words, organizations should always ask what objective is to be accomplished with the tool and only then decide which type of tool to implement. Merely setting up a wiki site and hoping that the employees will use it for the “right” purpose most likely will not lead to the intended results.

ORGANIZATIONAL HIERARCHIES. Often, enterprise-oriented social media initiatives are driven by user departments, and small-scale pilot implementations appear to work quite well. However, organization-wide implementations typically need changes in terms of organizational culture and processes and often the flattening of organizational hierarchies. Therefore, to be successful, enterprise-oriented social media implementations need the support and active involvement of senior management so as to cope with the large magnitude of changes.



WHEN THINGS GO WRONG

Crowdfunding Failures

Crowdfunding refers to the practice of funding a project or venture by raising small amounts of money from a large number of investors, typically via the Internet. Crowdfunding is a new and innovative way to get financing to support projects that might not otherwise be fundable using traditional methods. Another advantage of crowdfunding is that it connects investors with similar interests that might otherwise not have been able to have come together. Unfortunately, as with many other technological advances, crowdfunding can also be abused by unscrupulous individuals looking to take advantage of unsophisticated investors. There are several ways that crowd funded projects can fall short of expectations.

Some projects simply overpromise and under-deliver. The campaigners may simply not have the experience needed to execute the project or may have underestimated the resources and effort required. The Zano drone project, for example, collected more than US\$3.4 million on the popular crowdfunding site Kickstarter and pledged to build a miniature quadcopter drone. After months of delays, the drones were finally delivered. Unfortunately, however, their capabilities and performance fell far short of expectations. Torquing Group, the company behind the project, filed for bankruptcy, and Kickstarter launched an independent investigation.

Another case of setting high expectations and failing to deliver is the Laser Razor from a company called Skarp. The

campaign promised to deliver a laser-powered shaving instrument that seemed to push the limits of what is technologically possible. The company raised more than US\$4 million in pledges on Kickstarter before Kickstarter pulled the plug. Skarp was unable to demonstrate that it had even a prototype of the product. Skarp relaunched the project on Indiegogo (another crowdfunding site) and collected an additional US\$442,000. As of mid-2016, the campaign was delayed and unresponsive to investor inquiries.

Other projects like the Crystal Wash 2.0 are outright scams. This pseudo-scientific approach to clothes washing using “shrinking water molecule clusters” had been previously debunked yet still managed to collect more than US\$268,000 in pledges. Lastly, some projects are simply pranks or jokes. A user set up a Kickstarter campaign to fund his board game-playing habit, and another asked for a million dollars to build a custom car.

The moral of the story is that crowdfunding sites are not stores. It's important to understand that you are contributing to a promise and promises can be broken.

Based on:

Knibbs, K. (2015, December 23). The 9 most disgraceful crowdfunding failures of 2015. *Gizmodo*. Retrieved June 30, 2016, from <http://gizmodo.com/the-9-most-disgraceful-crowdfunding-failures-of-2015-1747957776>

NETWORK EFFECTS AND CRITICAL MASS. Successful social media applications such as Wikipedia base their success on network effects and the long tail (see Chapter 4) and have needed some time to achieve a critical mass. For example, although Wikipedia enjoys millions of page views per day, there is only a small number of people who choose to actively participate in the creation of content. Within organizations, achieving the critical mass needed for successful social media implementations is often difficult and takes considerable time and patience. Although for many smaller organizations collaborative social media applications can be beneficial, they will most likely not be able to harness the network effects that can be achieved with a larger user base.

GENERATION GAP. The success of an enterprise-oriented social media initiative is also heavily dependent on the composition of the organization's workforce. In organizations with large numbers of millennials, who have grown accustomed to highly interactive and communicative online social environments, such initiatives have a higher likelihood of success; in contrast, many baby boomers are used to rigid hierarchies and organizational structures and are less likely to fully embrace the capabilities of organizational social media applications. Further, senior organizational members may not fully grasp the potential and implications of social media applications in organizational settings.

TECHNOLOGICAL INERTIA. One factor hindering the adoption of many new technologies is technological inertia. In many cases, people are not willing to switch to new applications unless they see real, tangible benefits. This can be especially a hindrance with social media applications, many of which incorporate a variety of other tools (such as chat or instant messaging interfaces within social networking sites).

TECHNOLOGICAL INTEGRATION. Organizations will have to ensure that any enterprise-oriented social media applications are integrated well with the organization's existing information systems infrastructure so as to reap the greatest benefits from connecting people with one another and

connecting people with information. Typically, organizations choose systems provided by outside vendors such as Yammer, which allows the organization to create its own private social network. However, organizational users will use the tools they are used to as a benchmark, and many consumer-oriented tools such as Facebook create high expectations of usability for any internal tool.

SECURITY. A final issue is related to security and intellectual property. For organizations, securing their information systems infrastructure is of paramount concern (see Chapter 10). Any application that allows closer collaboration by increasing data sharing will necessarily incur greater risks of security breaches. Companies thus have to balance their desire for enhancing collaboration with the need to protect intellectual property and compliance with rules and regulations such as the Sarbanes–Oxley Act.

Downsides and Dangers of using Social Media Applications

Many organizations (and individuals) have learned painful lessons from public relations blunders and from not considering the fundamental rule: The Internet never forgets. Another fundamental rule brought about by social media applications is to constantly monitor social media and quickly and appropriately react to emerging issues. In this section, we highlight potential pitfalls of social media and the enterprise.

ONLINE PRODUCT REVIEWS. Online as well as offline consumers increasingly consult the web before making a purchase decision. Before making a purchase on Amazon.com, many potential buyers first consult the user reviews; relatedly, people read other travelers' reviews of hotels or restaurants on Tripadvisor.com or consult websites dedicated to providing expert reviews. Unfortunately, such reviews are not always as unbiased as they seem, and sometimes companies hire people to deliberately spread positive (or negative) word of mouth across a variety of sites. The act of posting fake product reviews is unethical, to say the least. Fakespot.com, a website analyzing user reviews on Amazon.com using text mining (see Chapter 6, "Enhancing Business Intelligence Using Big Data and Analytics"), lists various products having more than 80 percent fake reviews. In 2015, Amazon started suing companies that offer good (read: fake) reviews for a fee. Having sued more than 1,000 people who posted fake reviews, in mid-2016 Amazon.com started suing sellers who offered items for sale on Amazon.com's sites and who purchased fake reviews. While Amazon.com is expending much effort to combat the problem, fake reviews are likely to continue to spread, undermining trust in review systems and leading customers to make suboptimal purchasing decisions.

MICROBLOGGING. Whereas microblogging can be very valuable for corporate communications, it has to be used carefully and is not without controversy. For example, in early 2014, New York City's police department (NYPD), attempting to boost the department's image, encouraged people to tweet images with police officers using the hashtag #myNYPD. Unfortunately, the response was not what the NYPD had hoped for. Rather than tweeting positive photos, the department's critics soon used the hashtag for pictures depicting police brutality and racial discrimination.

For individuals, posting the wrong "tweets" can also have serious consequences, as they are more likely than not to reach the wrong readers—sooner or later. A Chicago woman was recently sued by her landlord for posting a tweet complaining about the management company's reaction to mold in her apartment. The management company sued her for defamation, arguing that the tweet was published on a global scale. Whereas the lady had a mere 22 followers on Twitter, the landlord's lawsuit was covered in major news outlets, online and offline, including the *Chicago Tribune*, the Associated Press, and the *New York Times*.

SOCIAL NETWORKS. While free to host, having and maintaining a page on a social network is not free for organizations—the company should take great care to monitor what is happening on the page and take appropriate action. For example, Starbucks lets its customers upload their favorite Starbucks-related pictures to its Facebook page. However, people frequently post unrelated pictures, play pranks with the company logo, or post otherwise inappropriate content. A company then has to walk the fine line of removing inappropriate content to preserve the company's image while not alienating its fans. Starbucks chooses to liberally allow unrelated content.

As with most social software, posting the "wrong" content can quickly get you in trouble. Companies routinely check social networking sites before making hiring decisions, and many applicants have lost a job offer they almost had secured. Similarly, your posts may make it farther than you think; stories abound of people getting laid off after ranting about their jobs and their bosses in Facebook status updates—unfortunately, the boss was in the employee's contacts

list and could immediately see the post. Further, many people never bother to adjust their accounts' privacy settings and inadvertently shout things out for the whole world to read.

BAD VIBES GOING VIRAL. As with other social media, viral marketing can be a blessing or a nightmare. One of the most infamous examples happened back in 2008, when a musician on a tour witnessed from his airplane window how baggage handlers mishandled—and broke—his US\$3,500 guitar. After not getting a satisfying response from the airline, the musician decided to write a song and post it on YouTube in 2009. The video quickly went viral, and the airline rushed to “make things right” for the musician. For the airline, however, the damage was done, and the video has since attracted more than 15 million views. Likewise, a Ryanair passenger’s complaint letter posted on Facebook was shared more than 68,000 times in less than 10 days. Whereas traditional phone complaints were a one-to-one conversation between the customer and a call center agent, the balance of power has shifted toward the customer, necessitating swift, effective responses by the companies. A case in point is the response of Domino’s Pizza, where two employees posted videos on YouTube displaying them playing not-so-harmless pranks and preparing sandwiches with disgusting ingredients; the videos quickly went viral and attracted more than a million viewers in just a few days. Domino’s was initially slow in responding and decided not to respond to the crisis, fearing that a reaction might draw even more interest. After 48 hours, however, Domino’s changed its strategy, opened a Twitter account to interact with concerned customers, and posted a video response by the president of Domino’s on YouTube assuring that the culprits had been found, that the entire store had been closed and sanitized, and that everything would be done to avoid hiring the “wrong” people in the future. A nationwide survey by a media research company has found the response to be fairly successful, with more than 90 percent of the respondents indicating that the response video was effective in restoring trust in the brand.

LESSONS LEARNED. As you probably know from your own experience and have seen from these stories, news travels fast in social media. For the companies in question, this is an enormous threat, as negative publicity can quickly reach millions of people. At the same time, the company’s reaction is equally critical, as it can reach people just as fast and thus has to be carefully crafted. Richard Levick, president of Levick Strategic Communications, has provided some tips on how to prepare for and deal with such crises:

1. Identify a crisis team including members from within your organization (e.g., public relations or executive team) and from the outside (e.g., lawyers).
2. Identify your worst social media nightmare (and make sure to know the signs to look for, such as search engine key terms your opposition could use).
3. Monitor your social media environment (such as YouTube, Facebook, and Twitter) and be connected and responsive.
4. Act fast. The first 24 hours count.

As in the offline world, companies should try to avoid such crises in the first place, but being prepared for a public relations disaster is crucial in today’s fast-paced world. Many organizations have realized the need for social media monitoring; for example, Dell recently opened its “Social Media Listening Command Center” as a key part of its overall marketing efforts. Monitoring social media posts mentioning Dell in about a dozen languages not only enables Dell to respond to customers’ problems before they go viral but also serves as an effective means to gather business intelligence. We will discuss more about the role of social media monitoring and business intelligence in Chapter 8.

SOCIAL IMPACTS OF SOCIAL MEDIA. Clearly, social media have greatly changed the way we interact and will continue to do so. Over the past decade and a half (MySpace, the once widely popular social network, was launched in 2003), people’s attitudes toward sharing content as well as toward privacy have seen a tremendous shift. Likewise, social media have provided people with far wider access to information and have democratized content creation, which has tremendous effects on the way societies function. For example, whereas U.S. presidential campaigns used to be largely funded by big donors, Barack Obama’s 2008 campaign made wide use of social media and generated significant funding from small contributors. Similarly, Bernie Sanders’s 2016 presidential nomination campaign relied on a large crowd of small donors for support. In addition, the Internet and social media has lowered barriers to entry by giving candidates

free platforms to make their voices heard by removing the costs for printing and distributing campaign material. Together, this has lowered the influence of the wealthy on politics.

Yet people also point to downsides brought about by everyone's ability to create content and by the way this content is being spread. In particular, traditional media outlets used editorial judgment to decide what would be covered. In social media, this judgment is increasingly replaced by automated algorithms that determine what content is being shown to social media users. For example, as algorithms on social networks analyze user behavior in order to provide the most relevant content, there is the risk of algorithms filtering out content that is in conflict with the users' viewpoints. Whether these developments are potentially hurting democracy remains to be seen, but it is clear that social media and the accompanying societal changes will continue to have large impacts on individuals, organizations, and society as a whole.



INDUSTRY ANALYSIS

Online Travel

Spring break is coming, and you've decided to go to Puerto Vallarta this year. Chances are that your first step will be to check the websites of Expedia, Priceline, Travelocity, and Orbitz for flights to and hotels in your chosen destination. We all know the big four online travel agencies; in today's digital world, they dominate the travel industry. They took the old brick-and-mortar travel industry and turned it into an online service where you can click to book flights and hotel reservations, change or cancel flights, reserve rental cars—even plan a vacation. In Internet terms, you can think of the big four as still being in Online Travel 1.0. But technology marches relentlessly on, and Online Travel 2.0 is in the works. Evidence of this transition to Online Travel 2.0 is reflected in Expedia recently purchasing both Travelocity and Orbitz. When competition heats up, mergers and acquisitions often follow.

A new crop of travel sites has popped up, offering several benefits over the big online travel agencies. These travel sites are very different from typical online travel services, however. The first, and arguably the most prominent, example is Airbnb. Airbnb allows people to offer houses, condos, apartments, and rooms (private or shared) to anyone who happens to be traveling through the area. If you're planning a vacation, you could book a hotel through the hotel's website or an online travel agency. Alternatively, you could use Airbnb to rent a house or apartment from someone, often for a fraction of the cost. Property owners benefit by generating income from unused living space, and Airbnb handles the processing of all rent payments. The site also offers an extensive rating and review platform that motivates property owners to provide excellent service to attract future renters. Airbnb has been fairly successful so far and as of April 2016 was valued at approximately US\$30 billion. If renting a house from a stranger worries you, there will always be hotels for you to use. But if you trust the ratings and experiences from "the crowd," you can save a bundle in many popular locations to which you might travel.

Once you get to your location, however, you'll need a way to get around. Again, you could book a rental car through a car rental company or an online travel agency. Or you could save some more cash and use a social taxi service like Uber. This service provides a platform through which individuals can

request and pay for a "taxi" service from qualified drivers in 449 cities in 66 countries (as of mid-2016). Using the Uber mobile app, riders can request a ride at the tap of a button and then monitor the location of the reserved car in real time. Upon completion of the trip, the Uber app allows the driver to collect payment. Uber requires that drivers submit to an insurance and background check and has typically targeted a higher-end market of users. The first Uber drivers had such cars as Cadillac Escalades, BMW 7 Series, and Mercedes-Benz S550 sedans. The company has since expanded to a wider selection of cars to appeal to more riders and has recently implemented a ride-sharing system that allows riders to quickly request to "ride along" with someone to a specific destination. Similar to Airbnb, Uber encourages the use of a rating and review system to incentivize drivers to provide excellent service.

So next time you go on a trip, consider the benefits available through these social travel platforms. You might save a few bucks and maybe even make a friend in the process.

Questions

1. Do you use online travel agencies for assisting you with travel plans? If so, which service provider do you use, and why did you make this choice? If not, why not?
2. What features would you identify as crucial to the success of social travel services such as Airbnb and Uber?

Based on:

Airbnb. (2016, June 26). In *Wikipedia, The Free Encyclopedia*. Retrieved June 29, 2016, from <https://en.wikipedia.org/w/index.php?title=Airbnb&oldid=727088256>

Picker, L. & Isaac, M. (2016, June 28). Airbnb is said to be seeking funding valuing it at \$30 billion. *The New York Times*. Retrieved June 29, 2016, from <http://www.nytimes.com/2016/06/29/business/dealbook/airbnb-is-said-to-be-seeking-funding-valuing-it-at-30-billion.html>

Singh, M. & Sweeney, P.T. (2016, March 18). Online travel M&A in focus in OTA market. *Bloomberg*. Retrieved June 29, 2016, from <http://www.bloomberg.com/professional/blog/consolidation-in-online-travel/>

Uber (company). (2016, June 29). In *Wikipedia, The Free Encyclopedia*. Retrieved June 29, 2016, from [https://en.wikipedia.org/w/index.php?title=Uber_\(company\)&oldid=727469300](https://en.wikipedia.org/w/index.php?title=Uber_(company)&oldid=727469300)

Key Points Review

- 1. Explain organizations' needs for communication and collaboration.** In today's increasingly competitive world, organizations need to communicate and collaborate effectively and efficiently within and outside organizational boundaries. For example, virtual teams, composed of team members located around the globe that are forming and disbanding as needed, have communication needs that often cannot be met by traditional communication media. Traditionally, organizations used tools such as groupware, videoconferencing, or intranets for their communication and collaboration needs.
- 2. Explain social media and evolving web capabilities.** In contrast to traditional web 1.0 sites, web 2.0 applications allow people to collaborate and share information online, with a shift in the users' role from passive consumer of content to creator of user-generated content. Owing to societal changes, using social media can be an important factor in being able to attract or retain employees as younger generations are joining the workforce. Future web capabilities extending web 2.0 are the semantic web and the "contextual web," which is characterized by devices providing the information and content needed depending on the user's specific context. To harness the opportunities brought about by these changes, organizations are increasingly using social software to connect with customers and internal or external stakeholders in order to become more innovative or productive.
- 3. Describe various social media applications, and explain their role in enhancing communication, collaboration, cooperation, and connection.** Social software can enhance communication within organizations as well as between an organization and its stakeholders. Blogs, microblogging, and instant messaging are widely used by individuals and organizations to communicate with internal and external

stakeholders. Social media applications such as media sharing, social bookmarking, or social cataloging applications facilitate cooperation by using the network effect to provide the greatest benefit to users. Further, social media applications have enabled new forms of collaboration for organizations and individuals. These and other technologies have enabled cloud-based collaboration tools, content management systems, and wikis as well as the use of collective intelligence and crowdsourcing. Finally, social media applications aid in connecting people with each other. For individuals, social networking has become an important way to meet new friends, connect with family members, or meet new colleagues and business partners. The reach of social networks is also used by business organizations to market their products or services through viral marketing, which resembles offline word-of-mouth communication, in which advertising messages are spread like viruses through social networks.

- 4. Describe how companies can manage enterprise-oriented social media applications and deal with potential pitfalls associated with social media.**

Organizations have to take into account that success in a consumer environment does not necessarily translate into success in a corporate environment. Further, organizations have to take into account issues associated with culture, organizational context, and organizational hierarchies; in addition, lack of critical mass, the generation gap, and technological inertia can hinder the success of enterprise-oriented social media initiatives. Finally, in organizational contexts, integration with existing technologies and security are of primary concern. Further, an organization's opponents can use social media to spread damaging content or information to people all over the world within a very short time. Organizations should therefore carefully prepare for such incidents.

Key Terms

"amateurization" of journalism	195	groupware	185	social online communities	205
asynchronous	184	hashtag	196	social search	207
blog	195	instant messaging	196	social software	192
clickbait	206	Internet troll	207	SoLoMo	203
cloud-based collaboration tools	201	mashup	192	synchronous	184
collaboration	184	metadata	198	tag cloud	198
collective intelligence	202	microblog	195	tag	198
content management system (CMS)	202	peer production	202	trending	196
crowdsourcing	205	podcast	197	user-generated content	190
desktop videoconferencing	187	RSS	197	viral marketing	208
discussion forum	186	semantic web	193	virtual meeting	184
electronic meeting system	186	social bookmarking	199	virtual team	184
employee portal	190	social cataloging	199	web 2.0	190
employee self-service	190	social intranet	190	webcam	187
folksonomy	199	social media	192	webcast	197
geotag	198	social networking	205	wiki	204



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

Review Questions

- 5-1.** What are virtual teams, and how do they help to improve an organization's capabilities?
- 5-2.** What are mashups? How do they enable social media applications?
- 5-3.** What capabilities will define the web of the future?
- 5-4.** How can social software help harness the wisdom of the crowd?
- 5-5.** Why is using social media an important factor for attracting and retaining employees?
- 5-6.** How can social software enhance communication?
- 5-7.** How can social bookmarking and social cataloging help in an organization's knowledge management efforts?
- 5-8.** What is a wiki? Why would an organization want to implement a wiki?
- 5-9.** Explain what is meant by crowdsourcing and how the web is enabling this form of collaboration.
- 5-10.** How can organizations use social networking to connect with their customers?
- 5-11.** Why is organizational culture an important factor in enterprise-oriented social media initiatives?
- 5-12.** Why can social media be both a blessing and a threat for organizations?
- 5-13.** How can organizations plan for social media disasters?

Self-Study Questions

- 5-14.** Collective intelligence is based on the notion that distributed groups of people with a divergent range of information and expertise will be able to outperform the capabilities of _____.
A. crowds
B. customers
C. individual experts
D. virtual teams
- 5-15.** Microblogging is used primarily for _____.
A. creating an online text diary
B. providing location information
C. short status updates
D. customer support functions
- 5-16.** Tagging is adding _____ to content such as maps, pictures, or web pages.
A. metadata
B. comments
C. blogs
D. knowledge
- 5-17.** The process of adding metadata such as latitude and longitude to pictures, videos, or other content is called _____.
A. adding geodata
B. location tagging
C. geotagging
D. tagging
- 5-18.** Successful enterprise-oriented social media initiatives consider _____.
A. organizational culture
B. organizational hierarchies
C. technological inertia
D. all of the above
- 5-19.** _____ is the process of creating an online diary made up of chronological entries.
A. Wikiing
B. Tagging
C. Blogging
D. None of the above
- 5-20.** Webcasts are also known as _____.
A. podcasts
B. blogcasts
C. radiocasts
D. weblogs
- 5-21.** A wiki _____.
A. allows users to add content
B. allows users to revert edits
C. allows anyone to read content
D. allows all of the above
- 5-22.** _____ is using the network effect to increase brand awareness.
A. Brand marketing
B. Shared marketing
C. Social marketing
D. Viral marketing
- 5-23.** _____ communication is when people are all meeting at the same time or in real time.
A. Synchronous
B. Asynchronous
C. Instantaneous
D. None of the above

Answers are on page 218.

Problems and Exercises

- 5-24.** Match the following terms with the appropriate definitions:
- Microblog
 - Asynchronous
 - Metadata
 - Social networking
 - Peer production
 - Social software
 - webcasts
 - Folksonomy
 - Network effect
 - Blog
 - Web-based applications embodying core web 2.0 values such as collaboration and social sharing, allowing people to communicate, interact, and collaborate in various ways
 - Digital media streams that can be distributed to and played by digital media players
 - The creation of goods or services by self-organizing communities
 - The notion that the value of a network (or tool or application based on a network) is dependent on the number of other users
 - User-created categorization system
 - Chronological online text diary that can focus on anything the user desires
 - Data about data
 - Social networking service that allows to post relatively short status updates
 - Using web-based services to link friends or colleagues
 - Not coordinated in time
- 5-25.** Visit a popular social network (such as Facebook). What features entice you to visit such site repeatedly? Do you have an account in an online social network? If yes, why? If no, what is keeping you from having such account? Is there any content you definitely would or would not post on such a site?
- 5-26.** Go to www.programmableweb.com. List some interesting mashups you find. What factors do you think make a good mashup website?
- 5-27.** Go to Amazon's Mechanical Turk website (www.mturk.com). Which of the HITs do you think could be completed using a computer, and which could not? Why?
- 5-28.** Search the web for a social networking site that you have not heard about before. Describe the target users of this online social network. Are the features of this site different from those you are familiar with? If so, describe those features. If not, describe common features.
- 5-29.** Visit Google Drive (drive.google.com) and Microsoft Office Online (products.office.com/office-online). Compare and contrast the features of each productivity suite. Which suite would you choose to use, and why?
- 5-30.** Have you ever blogged? If so, what did you like or dislike about the experience? What do you see for the future in blogs?
- 5-31.** Find an article you can contribute to on a wiki page. What do you like or dislike about this process? What would encourage you to contribute more to the wiki? Why?
- 5-32.** Envision and describe general features of web 3.0 applications. Describe a feature you would like to see in the next version of the web.
- 5-33.** Describe an application or service you would like to be able to use on the web that is not yet available. Describe the potential market for this application or service. Forecast how long you believe it will take before this will occur.
- 5-34.** Search the web for public relations blunders involving social media. How did the companies in question react? In your opinion, were the reactions effective? Why or why not?
- 5-35.** Have you listened to or watched a webcast (or podcast)? If so, describe your experience. If not, why?
- 5-36.** Describe the pros and cons of collaborating with colleagues over the web. What is useful about this form of collaboration? What is difficult?
- 5-37.** Describe an example of viral marketing that you have experienced.

Application Exercises

Note: The existing data files referenced in these exercises are available on the book's website: www.pearsonhighered.com/valacich.



Spreadsheet Application: Online Versus Traditional Spreadsheets

- 5-38.** Campus Travel is currently evaluating the possibility of using online spreadsheet software as opposed to the traditional locally installed spreadsheet application. There are a variety of issues involved in this decision. The company wants you to investigate the possibilities that are currently available while also paying special

attention to the company requirements. Campus Travel has the following requirements: (1) the ability to share spreadsheets easily, (2) the ability to secure this information, (3) the ability to save the spreadsheets into other formats (i.e., CSV files), and (4) the ability to work from anywhere in the world. Prepare the following information:

- On the Internet, find different options for online and traditional spreadsheets and list the available options.
- Using the company requirements, list the pros and cons for each spreadsheet option.

- Using an online spreadsheet, summarize the findings and provide a recommendation to the company. Present your findings with tables and/or graphs, if available.



Database Application: Tracking Website Visits

- 5-39.** As Campus Travel expands its web presence, the importance of tracking what the competitors are doing has become very important. This includes making sure Campus Travel tracks the prices of packages and services that its closest competitor offers. To do so, a database must be created to track this information. Follow these steps to create the database:
- Create a database called “tracking.”
 - Create a table called “company_info.” In this table, create fields for company_name and company_URL.
 - Create a table called “products.” In this table, create fields for the company_name,

- product_name, product_description, product_price, and date_retrieved.
- Create a table called “services.” In this table, create fields for company_name, service_name, service_description, service_price, and date_retrieved.
- Once these tables are created, go to the relationship view (select “Relationships” under the “Database Tools” tab) and connect the company_info (one side) and products (many side) tables and the company_info (one side) and service (many side) tables.
- Make sure that when you create the relationships, the referential integrity option is selected. (This will make sure that when you delete a company, the products associated with the company are also deleted.)
- Test the referential integrity by adding data to the tables and make sure that when a company is deleted in the company table, the products table is updated, too.

Team Work Exercise



Net Stats: Most Popular Facebook Fan Pages

More and more organizations have discovered Facebook as a way to connect with their customers and drive word-of-mouth advertising. Any company can create a Facebook page containing basic information about the business, a “wall” to share content, a space for uploading photos or pictures (many organizations use this to show “behind-the-scenes” content), and so on. Further, businesses can add apps (such as an app that allows customers to make a reservation at a restaurant) to further engage with their customers.

Facebook users who “like” a page automatically receive the business’s status updates in their newsfeeds. As the liking of a page is announced to others in the user’s newsfeed and his or her profile, the liking of the page can spread throughout the user’s network of friends. Further, each business’s page has a listing of all Facebook users who like the page. What businesses are liked by most Facebook users? As of April 2016, the top 10 most-liked product pages were the following:

Rank	Page	Likes (millions)
1	Facebook for Every Phone	506.96
2	Facebook	170.72
3	Cristiano Ronaldo	110.82
4	Shakira	104.54
5	Vin Diesel	98.48
6	Coca-Cola	97.21
7	Eminem	91.97
8	FC Barcelona	91.96
9	Real Madrid CF	88.14
10	Lionel Messi (Leo Messi)	84.34

Questions and Exercises

- 5-40.** Search the web for the most up-to-date statistics. Try to find the number of “likes” for pages that interest you most.
- 5-41.** As a team, interpret these numbers. What is striking/important about these statistics?
- 5-42.** How have the numbers changed since April 2016? Which categories seem to draw most attention in social networks? Why?
- 5-43.** Using your spreadsheet software of choice, create a graph/figure that effectively visualizes the statistics/changes you consider most important.

Based on:

Statista. (2016) Most popular Facebook fan pages as of April 2016, based on number of fans. *Statista.com*. Retrieved May 3, 2016, from <http://www.statista.com/statistics/269304/international-brands-on-facebook-by-number-of-fans>

Answers to the Self-Study Questions

5-14. C, p. 203

5-15. C, p. 195

5-16. A, p. 198

5-17. C, p. 198

5-18. D, p. 209

5-19. C, p. 195

5-20. A, p. 197

5-21. D, p. 204

5-22. D, p. 208

5-23. A, p. 185

CASE 1 | Living in a Bubble: Facebook, Newsfeeds, and Journalism

Social media platforms like Facebook have become an integral part of how we interact with the world around us. From posting about what we had for lunch to our political views to our favorite movies, TV shows, and products, we express ourselves digitally in these online forums. With so many people posting so much information, it can be challenging to keep up with everything that is going on in our circle of friends and acquaintances. To make things easier and help us better manage the volume of posts, platforms like Facebook have introduced algorithmic prioritization of posts. These algorithms study what you are most interested in, whom you have close relationships with, even where you are located to determine which of the posts in your feed are most likely to interest you. In most cases, this is a good thing—the posts in your feed are the most relevant to your interests. A problem arises, however, when we consider the impact of social media on the shifting landscape of political thought and expression.

For many years, professional journalists have been challenged by the ease at which virtually “anyone” can publish information on social media. Historically, traditional newspaper companies controlled the physical distribution of sheets of paper. Content was generated by newspaper employees, edited, and then distributed. Print newspapers during this period were the primary mechanism by which not just news but editorial and political opinions were shared across society. The system certainly wasn’t perfect—political expression on a mass scale was concentrated in the hands of a few major publishers. Regulations were required, and social norms had to evolve to address the threats this concentration of control posed.

Yellow journalism scares in the early 1900s led to improvements in editorial standards and laws restricting consolidation in the industry.

Fast-forward to today and digital media has drastically changed the publishing landscape. It is no longer necessary to invest heavily in a printing and distribution system to reach a mass audience, and many traditional print newspapers have disappeared. This shift has taken a great deal of power out of the hands of traditional publishers and left the market for news and content wide open. As a result, we are left with a new set of challenges on how political thought and opinions are disseminated throughout society. The old regulations and social norms may no longer be adequate to mitigate the threats posed by dysfunctional distribution systems. Stepping into this wide open market for news and content distribution are platform providers like Google, Apple, Facebook, and others. These platform providers have traditionally thought of themselves as technological enablers, agnostic to the political whims of the public they serve. The reality is that the content posted and consumed by the public on these new media platforms has become the de facto political discourse of our day.

Enter the algorithmic newsfeed. The algorithms are designed to show us things we will like and the things we want to read. It is possible that most of this content is benign, such as the latest gossip on celebrities or a new fashion trend; however, a good deal has to do with news and political issues of the day. Indeed, many people now get their news primarily from social media. In an election year, our feeds are choked with news and opinions about this candidate or that. When the algorithms start to sift

through this tidal wave of information, they do what they are designed to do—pick out things that we will like. Opposing views or dissenting opinions are suppressed—not through active censorship but simply by being less preferred by the viewer. We are then essentially living in an information bubble—only seeing content we like, news presented from a perspective aligned with our own, and opinions that agree with our own. This filtering and silent censorship of our worldviews can have a profound effect. We may come to believe that everyone shares our views and opinions because that is what we see in our newsfeeds—a self-reinforcing collection of stories and content. We are surprised to encounter others with views different from our own and in some cases react angrily by removing (“unfriending”) the offending individual from our network. This can amplify divisions between groups and can ratchet up tensions in political discourse by making it far less likely that we are aware of and even understand opposing views, let alone empathize with those who hold them.

Technology is always evolving, and our society both reacts to and drives technological change. When new content distribution platforms take over the mechanisms of social discourse, many of our assumptions about the nature of politics and the nature of political debate can be undermined. How these new mechanisms and social interactions will shape up in the long run is an open question. The only certainty is that change is inevitable and only diligence will allow us to maintain the free and open society we have enjoyed for so long. Conscious effort will be required to amplify the benefits and mitigate the risks of a changing technological and social landscape.

Questions

- 5-44.** Have you personally experienced the information bubble effect? How would you know if you did? What was the topic?
- 5-45.** How might the information bubble effect be overcome? What technological and social changes might be needed to mitigate algorithmic self-reinforcement?
- 5-46.** What role should platform providers play in social discourse? Do these technology companies have an obligation to understand the impacts they are having on society? Do they have a responsibility to participate?

Based on:

Bell, E. (2016, March 7). Facebook is eating the world. *Columbia Journalism Review*. Retrieved June 29, 2016, from http://www.cjr.org/analysis/facebook_and_media.php

Bradley, T. (2016, March 16). Leave me out of your Instagram algorithm bubble. *Forbes*. Retrieved June 29, 2016, from <http://www.forbes.com/sites/tonybradley/2016/03/16/leave-me-out-of-your-instagram-algorithm-bubble>

Saiidi, U. (2016, March 16). The social media bubble. *CNBC*. Retrieved June 29, 2016, from <http://www.cnbc.com/2016/03/16/social-media-creates-group-think.html>

Shah, R. (2015, July 2). Do privacy concerns really change with the Internet of Things? *Forbes*. Retrieved July 1, 2016, from <http://www.forbes.com/sites/raunshah/2015/07/02/do-privacy-concerns-really-change-with-the-internet-of-things>

CASE 2 | Like Farming and Clickbait

Facebook uses algorithms to select what content goes in your newsfeed. These algorithms take a variety of things into account, such as your relationship to the poster, your interests, and even your location. However, one of the most important factors is the number of likes or shares that a post has received. If a post has been liked or shared by a large number of people, it will be more likely to show up in other people's feeds. The assumption here is that because lots of people are liking or sharing the post, it must contain popular or desirable content. Usually, this is a good thing—it can help you quickly get to content that your friends and family have already vetted and that you are likely to enjoy and want to see. Unfortunately, scammers have developed a variety of mechanisms to take advantage of this functionality.

Scammers take advantage of their victims by getting them to view content related to their scams or to download viruses or other malware. Just like spam e-mail, it only requires a very small percentage of recipients to click on a malicious link or to run a malicious attachment in order for the scammer to make money. As a result, scammers have an incentive to get as many people as possible to view their content or click their links. To accomplish this on a social media platform, scammers look for ways to get lots of people to view their content by having it show up in their newsfeed. Because a post's popularity can drive how frequently it shows up in people's feeds, scammers look for ways to artificially inflate the popularity of their posts. One mechanism is so-called "like farming."

Like farming begins when a scammer posts an article or story that is seemingly innocuous and designed to get people to like or share it. Often, these posts appeal to the emotions or political views of the readers.

"This poor little girl with cancer lost her hair to chemotherapy—'like' this post to let her know she's still beautiful!" or "This new government policy is outrageous—'like' this post if you're outraged, too!" Another approach is to try to convince readers that they can win a valuable prize—such as the latest smartphone or even plain old cash—by liking the story. Any story offering to enter you in a contest or give you something for simply liking or sharing is highly suspicious and unlikely to be legitimate. Stories promising that "If I get X number of likes, then something amazing will happen for me" or "I was challenged to get X number of likes" are also highly likely to be like-farming schemes.

Once the scammer has convinced enough people to like or share the story, the scammer changes out the content. The post is edited such that it no longer contains the emotional story, puzzle, or contest but instead shows marketing material for the scam or other undesirable content. In some cases, the scammer will sell the rights to edit the post to other scammers on a black market. A post with a high popularity rating that can be edited at will is a valuable commodity to those looking to do you harm. Either way, you and your friends are now seeing questionable and even dangerous content thanks to the farmed likes.

Other, less malicious forms of abuse take advantage of the algorithmic post selection as well. Many organizations will create headlines for their stories that are incomplete or tantalizing in order to encourage users to click on them, like "You won't believe what happens next." These "clickbait" headlines force users to actually click on the story in order to learn a key detail or to find out the answer to a question. When the story gets clicked on, the social media platform counts that as a vote toward the popularity of the

story. The user has unwittingly bumped up the popularity of the post and made it more likely that it will be seen by members of the network. This increases the popularity rating of the post or the poster and makes it more likely that the content will be seen by more people. This type of abuse isn't necessarily perpetrated by actual scammers, just organizations looking to improve their online popularity ratings and the effectiveness of their advertising and marketing material. However, scammers often use these techniques as well. Falling for clickbait can lead you to malware and other scam sites.

How can one avoid falling victim to like farming and clickbait? It starts with being better informed. Look at the source of a post. Is it a reputable news organization or an unknown site? User behavior is also an important factor. Avoid liking or sharing suspicious posts and stories. If something sounds too good to be true, it probably is. Most social network platforms, including Facebook, provide tools that allow users to review their activity log and see what they have liked or shared. Users can take advantage of these tools to look back at their history and identify content that has changed or that they now recognize as like-farming or clickbait material. By reporting or un-liking suspicious content, this type of abuse can be mitigated. In mid-2016, Facebook announced a new algorithm to reduce the amount of clickbait in users' newsfeeds. To assess the likelihood of a headline being clickbait, humans scored thousands of headlines on their likelihood of being clickbait; these scores were then used to train the new algorithm. Using this algorithm, Facebook is now able to automatically classify headlines based on their likelihood of being clickbait, and filter (or punish) those with high clickbait likelihood scores.

Questions

- 5-47.** Have you personally encountered like farming? Have you reviewed your activity log? Have you ever liked a post that has turned bad?
- 5-48.** You have now seen some techniques for identifying and avoiding scams. How can the social media—using general public be better educated to avoid online scams such as like farming and clickbait?

- 5-49.** Who is responsible for this type of malicious activity? Is it simply the fault of the scammers abusing the system? Do users and platform providers have a responsibility to reduce the risk of abuse? If so, how might this be accomplished?

Based on:

Abel, J. (2015, April 22). Like-farming Facebook scams: Look before you "like." *Consumer Affairs*. Retrieved July 1, 2016, from <http://www.consumeraffairs.com/news/like-farming-facebook-scams-look-before-you-like-042215.html>

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Go to **mymislab.com** for auto-graded writing questions as well as the following assisted-graded writing questions:

- 5-50.** What is blogging, and why are blogs sometimes controversial?
- 5-51.** What is viral marketing? What capabilities of the web help to spread the virus?

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6

Enhancing Business Intelligence Using Big Data and Analytics

Preview

Today, organizations operate in a global, highly competitive, and rapidly changing environment. A key to effective management is high-quality and timely information to support decision making. Yet, to enhance decision-making, this high-quality and timely information needs to be extracted from ever-increasing amounts of structured and unstructured data gathered from a variety of sources. Here, we first describe the need for enhanced decision making, followed by a description of databases and data warehouses, two fundamental components for gaining business intelligence. Then we describe the primary IS components utilized by organizations to extract meaningful insights from data. In Chapter 2, "Gaining Competitive Advantage Through Information Systems," you learned about general types of information systems supporting organizations' different decision-making levels and business functions that execute various business processes in order to realize the strategic goals of the organization. Here, we introduce business intelligence and advanced analytics tools utilized at various decision-making levels of modern organizations. Finally, we discuss how knowledge management systems help organizations effectively capture, store, and retrieve organizational knowledge, and how geographic information systems help analyze spatially referenced data to make better business decisions.

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MANAGING IN THE DIGITAL WORLD: Intelligence Through Drones

Over the past years, commercially available drones have made great progress; they can recognize obstacles, maintain stable flying positions even under windy conditions, or safely return to their starting position in case of low battery levels. In the robotics lab at the University of Pennsylvania, researchers are hard at work creating flying robots that can sense each other and features of the environment, giving the impression that they have a mind of their own. In one demonstration, a group of eight flying devices—called quadcopters—rise from the ground in unison and fly around the room in a carefully orchestrated formation. They then fly through a small window, one by one, and form up on the other side. What is particularly impressive about the devices is that they are autonomous, meaning that other than receiving instructions about going from point A to point B in the room, the devices are fully autonomous, get to decide where to move and how fast to get there, and are responsible for avoiding collisions. These devices are the precursor to drones that could be used in the real world for various purposes, ranging from package delivery to surveillance to search and rescue operations.

DARPA, the U.S. government research agency, is also actively working on improving the capabilities of such "micro-drones" and is developing a new class of small UAVs that will be able to navigate inside buildings without relying on GPS for navigation or having a remote pilot.

**After reading
this chapter,
you will be
able to do the
following:**

1. Describe the need for business intelligence and advanced analytics and how databases serve as a foundation for making better business decisions.
2. Explain core concepts of business intelligence and advanced analytics.
3. Describe how organizations can enhance decision making by using knowledge management and geographic information systems.

These small autonomous UAVs will be able to fly through an open window and then navigate rooms, stairways, corridors, and other obstacle-filled environments—all at 45 mph! Such UAVs will provide previously unattainable intelligence in battle and other high-security situations.

In a more mundane context, Amazon.com is aggressively working on a drone delivery system, called Amazon Prime Air, that would allow a package ordered online to be delivered within 30 minutes by a small flying drone. In Amazon.com's ideal future, each city would have a local warehouse and a small task force of delivery drones, ready at a moment's notice to deliver thousands of small packages to Amazon.com's happy customers.

Another implementation of drone technology is in gathering geographic data to help farmers find plots of soil that are most suitable for crop growth (Figure 6.1). For example, researchers at the University of Aberdeen are developing drones with advanced imaging capabilities. These drones can be sent out to survey vineyards to find soil that is most optimal for grape growth. This could be especially valuable for growers given that soil content and area humidity tends to vary from year to year. Likewise, drones can be used by scientists to map tree cover.

The technology described here is still under development, but things are progressing rapidly. You are likely to have already seen drones at sports events, and drones have made inroads into the hobby sector, where individuals use drones to take travel pictures, hone their flying skills, or spy on their neighbors. With the capabilities of relatively inexpensive drones developing rapidly, varied applications of these technologies can benefit society in a number of different ways.



FIGURE 6.1

Drones are providing valuable data for countless purposes.
Source: Stockninja/Fotolia.

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

1. How can databases support the operation of autonomous and semiautonomous drones?
2. How can the creators of drones use advanced analytics to enable drone technology?
3. How can drones support spatial decision making?

Based on:

Amazon Prime Air. (2016, June 14). In *Wikipedia, The Free Encyclopedia*. Retrieved June 29, 2016, from https://en.wikipedia.org/w/index.php?title=Amazon_Prime_Air&oldid=725315546

Amos, I. (2015, November 22). How drones are helping Scots scientists to grow better potatoes. *The Scotsman*. Retrieved June 28, 2016, from <http://www.scotsman.com/news/environment/how-drones-are-helping-scots-scientists-to-grow-better-potatoes-1-3955007>

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Unmanned aerial vehicle. (2016, June 28). In *Wikipedia, The Free Encyclopedia*. Retrieved June 29, 2016, from https://en.wikipedia.org/w/index.php?title=Unmanned_aerial_vehicle&oldid=727319653

Enhancing Organizational Decision Making

In Chapter 2, you learned about the importance of strategic planning for gaining and sustaining competitive advantage. To stay ahead of the competition, organizations use information systems to gather and analyze data and information from internal and external sources in order to make better business decisions. To improve organizational performance, business executives are seeking answers to questions such as “How effective is this year’s promotion as compared with last year’s?” “Which customer segments should we focus on?” “Which customers are most likely to switch to a competitor if we raise prices by X percent?” or, even more important, “Do we care if those customers switch?” Answers to such questions require analyzing data of past and current transactions to understand what happened. **Business intelligence (BI)**, referring to tools and techniques for analyzing and visualizing *past* data, can provide such answers. In contrast, **advanced analytics** refers to tools and techniques used to understand why something happened, predict *future* outcomes, or discover hidden patterns in large data sets (sometimes **business analytics** is used as an umbrella term for these concepts). Today, the need for business intelligence and advanced analytics goes beyond traditional “businesses”; rather, all types of organizations, ranging from political parties to hospitals, utilize business intelligence and analytics to improve their data-driven decision making (see Table 6.1). Next, we will discuss the need for business intelligence and advanced analytics for making better business decisions.

Why Organizations Need Business Intelligence and Advanced Analytics

Although an organization’s overall direction is decided on at the strategic level, business processes span all organizational levels and are highly interconnected. As discussed in Chapter 2, business processes refer to the activities that organizations perform in order to reach their business goals. Unfortunately, the business processes outlined within strategic plans are often not implemented as envisioned at the managerial and operational levels of the organization because the information needed to effectively monitor and control these processes is simply not available. This “missing” information, in fact, often exists but resides in disconnected spreadsheets, reports, or databases.

DATA-DRIVEN ORGANIZATIONS. In today’s dynamic world, organizations must have up-to-date, accurate, and *integrated* information to monitor and fine-tune a broad range of business processes and to realize the goals of their strategic plans. Consequently, many organizations are trying to create meaningful insights from a variety of data sources to make better business decisions. Organizations that make decisions that can be backed up with verifiable data are referred to as **data-driven organizations**; such organizations are measurably more productive and profitable (McAfee & Brynjolfsson, 2012), can better respond to ongoing threats and opportunities, and can better plan for the future. Also, by letting data drive decisions, decision making can be pushed lower into the organization, freeing up senior management time for more important decisions (Redman, 2013). Thus, information systems—such as business intelligence and advanced analytics tools—that enable collecting and analyzing large amounts of data from various sources and delivering needed information to the right decision maker at the right time facilitate the transition to a data-driven organization. As with any technologies,

TABLE 6.1 Sample Uses of Business Intelligence and Analytics in Non-Business Contexts

Context	Example
Political parties	Model the influence of social media on election outcomes
Government	Analyze performance of public benefits programs
Defense	Manage maintenance and logistics during overseas deployments
Hospitals	Predict patient volume and resource utilization
Nonprofit organizations	Manage fundraising campaigns and target donors

however, having the right tools is not sufficient for business success. In data-driven organizations, familiarity with data analysis and analytics tools is not only the responsibility of data analysts but is a skill required of every business user. In addition, whereas business intelligence and advanced analytics can provide valuable insights, it is human judgment and creativity that are needed to translate these insights into action and make better business decisions.

RESPONDING TO THREATS AND OPPORTUNITIES. External factors such as globalization, competitive pressures, consumer demands, societal changes, and governmental regulations can create opportunities as well as threats for modern organizations. For example, globalization provides opportunities to compete in new markets, but it also creates the challenge of gathering new types of data in order to effectively exploit these opportunities. Globalization can also lead to the threat of increased competition from developing countries, forcing organizations to rethink strategies or to further improve business processes. Thus, as the world becomes increasingly interconnected, market opportunities will expand, but at the same time, markets will become more competitive, forcing companies to develop new products at an ever-increasing rate. Similarly, today's consumers have increasing access to information via social media and mobile devices and can much more easily switch to a competitor's products or services. Further, large corporate and banking failures have brought about more stringent rules and regulations (such as the Sarbanes–Oxley Act; see Chapter 10, "Securing Information Systems"), and organizations have to comply with ever-increasing government reporting requirements. In sum, today's business environment is characterized by factors such as unstable market conditions, fierce competition, shorter product life cycles, more stringent regulations, and wider choices for customers than ever before. Business intelligence and advanced analytics can help organizations make better decisions in this increasingly complex, fast-changing, and competitive environment by enabling them to more effectively collect and analyze both internal and external data (Figure 6.2).

With increasing pressure to reduce costs, organizations have to focus on investing in systems that provide the greatest returns. Business intelligence and advanced analytics solutions can provide quick returns, as they help to quickly react to problems by providing the right information at the right time. Further, these tools help to leverage existing systems (such as enterprise-wide information systems; see Chapter 7, "Enhancing Business Processes Using Enterprise Information Systems") by enabling decision makers to extract and analyze data provided by those systems. Finally, focusing on customer satisfaction can provide quick returns by helping to retain the most profitable customers.

BIG DATA. One significant opportunity for organizations is the abundance of data available for decision making. As highlighted in Chapter 1, "Managing in the Digital World," with

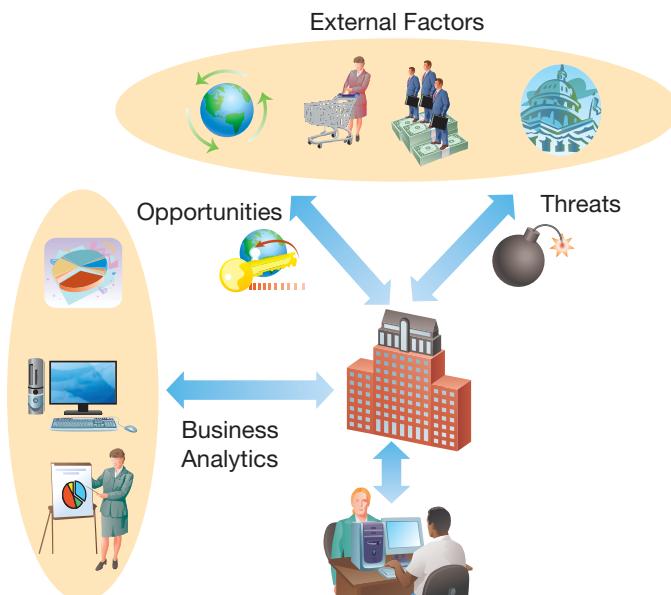
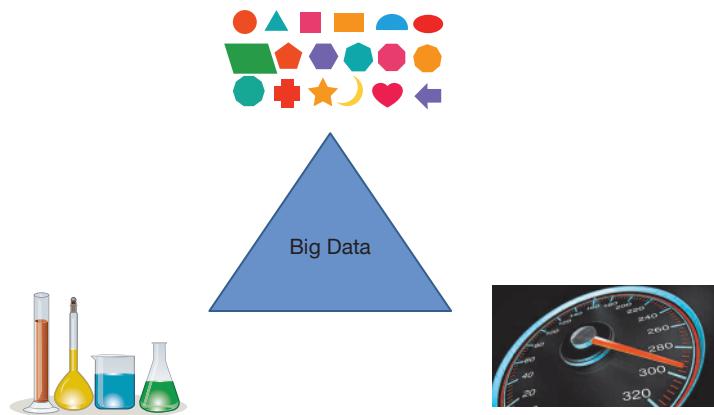


FIGURE 6.2

Business analytics helps organizations swiftly respond to external threats and opportunities.

FIGURE 6.3

Big Data is characterized by volume, variety, and velocity.
Source: Alswart/Fotolia.



decreasing costs for capturing and storing data, data are now not only ubiquitous but also cheap. With ever-increasing amounts of data increases the ability to detect meaningful relationships and regularities; thus, insights gained from analyzing Big Data can not only contribute to business success but can also help to address the tremendous challenges society faces. Research has demonstrated a strong linkage between effective data management and organizational performance, and organizations have long tried to collect, analyze, and use internal and external data to gain and sustain competitive advantage. The megatrends mobile and social, as well as the Internet of Things, have led to a tremendous increase in potentially useful data, gathered from mobile devices, social media, automated sensors, and other devices. Big Data is typically characterized as being of high *volume*, *variety*, and *velocity* (see Figure 6.3). One of the biggest opportunities is the sheer volume of data, which, for example, enables organizations to make business decisions based on more factors; yet at the same time, storing, analyzing, and managing increasing amounts of data pose tremendous challenges. The second characteristic is variety; useful data can come in the form of **structured data** (such as transaction data), which fit neatly into spreadsheets or databases; **semistructured data**, such as clickstreams and sensor data; or **unstructured data**, such as text, audio and video data, comments on social networks, and so on. Especially semistructured and unstructured data tend to be messy and are often incomplete, and the quality and origins of data such as user-generated content are typically unclear and at times questionable; further, analyzing unstructured data tends to be expensive in terms of effort, time, and expertise needed. Finally, Big Data is characterized based on its high velocity. On the one hand, data flow into organizations at increasingly higher rates; on the other hand, data-driven organizations have to process and use the data ever more quickly, such as when online retailer Amazon.com is providing recommendations for additional products. Thus, Big Data, ranging from geospatial data to customer sentiments, can prove invaluable for formulating and executing an organization's strategy. Data are becoming increasingly abundant, yet many organizations find themselves unable to use these data to make sound business decisions; being able to ask the right questions and successfully utilize Big Data remains elusive for many organizations. Realizing the opportunities and challenges brought about by Big Data and its management, high-level company executives are increasingly focusing on designing an organization-wide data management strategy.

EFFECTIVE PLANNING IS CONTINUOUS. In the past, organizations lacked the necessary data and tools to continuously plan for their future. Typically, organizations would first develop a strategic plan for some planning cycle (say, a year); then, once a strategic plan was agreed on, managers of various business units would prepare budgets for executing their portion of the plan. These budgets were often “backward looking” because they were typically based on historical data rather than being based on a clear understanding of current conditions and forecasts of future trends. Over time, managers would then execute their portions of the plan. For many organizations, this method of planning and managing was adequate given the relatively slow pace of change.

Today, however, given the need to swiftly respond to a highly competitive and rapidly changing environment, organizations must implement new ways of planning. In fact, successful



GREEN IT

Big Data, Internet of Things, and Analytics Fuel Greener Facilities

Two megatrends, specifically Big Data and the Internet of Things (IoT), are transforming countless areas of business and society. One area that is being transformed through the use of Big Data and analytics is facilities management, an interdisciplinary business function that coordinates space, infrastructure, and people within an organization. Often associated with the administration of office blocks, arenas, schools, universities, sporting complexes, convention centers, shopping complexes, hospitals, hotels, or manufacturing and shipping, facilities management is big business, currently representing about 5 percent of global GDP.

Within a large building or campus of buildings, there are a variety of systems and components working together to light, heat, or cool the environment. For example, Microsoft's campus in the Puget Sound area consists of more than 100 separate buildings. In those buildings, there are more than 30,000 building systems components and more than 2 million points where building systems ranging from heating, ventilation, and air-conditioning (HVAC) to lighting to power monitoring are connected to sensors—i.e., each being a separate IoT device. In a 24-hour period, those systems produce more than a billion data points. These data provide the Big Data to fuel many analytical systems for better facilities operations and management.

For example, in addition to better management of heating and cooling, motion sensors can be used to identify underutilized space or to better organize departments so that collaboration can be enhanced. With such data, a facilities manager could identify the amount of employee time being wasted moving between

different parts of a workspace and then use these insights to plan more efficient workspace layouts. Likewise, if rooms are underutilized, they could be repurposed for a more fitting use.

Ultimately, Big Data—generated through IoT and other sensors—holds great promise for identifying cost savings, preventing equipment failures, and conserving energy when managing facilities. Today, we are just beginning to understand how to optimize facilities management using such Big Data insights. Also, older buildings with old systems are only slowly being retrofitted with sensors to provide better business intelligence. However, in the future, when new buildings are designed and constructed, they will include a plethora of sensors, truly providing smart buildings for improved facilities management.

Based on:

Facility management. (2016, May 27). In Wikipedia, *The Free Encyclopedia*. Retrieved May 27, 2016, from https://en.wikipedia.org/w/index.php?title=Facility_management&oldid=722364047

Laughman, C. (2013, September). Microsoft uses Big Data to manage buildings. *Facilitiesnet*. Retrieved May 27, 2016, from <http://www.facilitiesnet.com/energyefficiency/article/Microsoft-Uses-Big-Data-To-Manage-Buildings-Facilities-Management-Energy-Efficiency-Feature--14359>

Patel, B. (2015, May/June). Technology and FM: The Internet of Things. *Facility Executive*. Retrieved May 27, 2016, from <http://facilityexecutive.com/2015/05/the-internet-of-things>

Spence, D. (2016, April 16). What FMs need to know about Big Data. *Office Space Software*. Retrieved May 27, 2016, from <http://www.officespacesoftware.com/blog/what-fms-need-to-know-about-big-data>

organizations are utilizing a continuous planning process (Figure 6.4). In a continuous planning process, organizations *continuously* monitor and analyze data and business processes; the results lead to ongoing adjustments to how the organization is managed, but these results are also reflected in ongoing updates to the organizational plans. It is only through timely and accurate insights gained from analyzing relevant data that continuous planning can be executed.

Responding to threats and opportunities and continuous planning are based on analyzing internal data (primarily from the operational level of the organization) as well as external data. In the next section, we describe how databases can be used to provide the necessary inputs to business intelligence and advanced analytics applications.

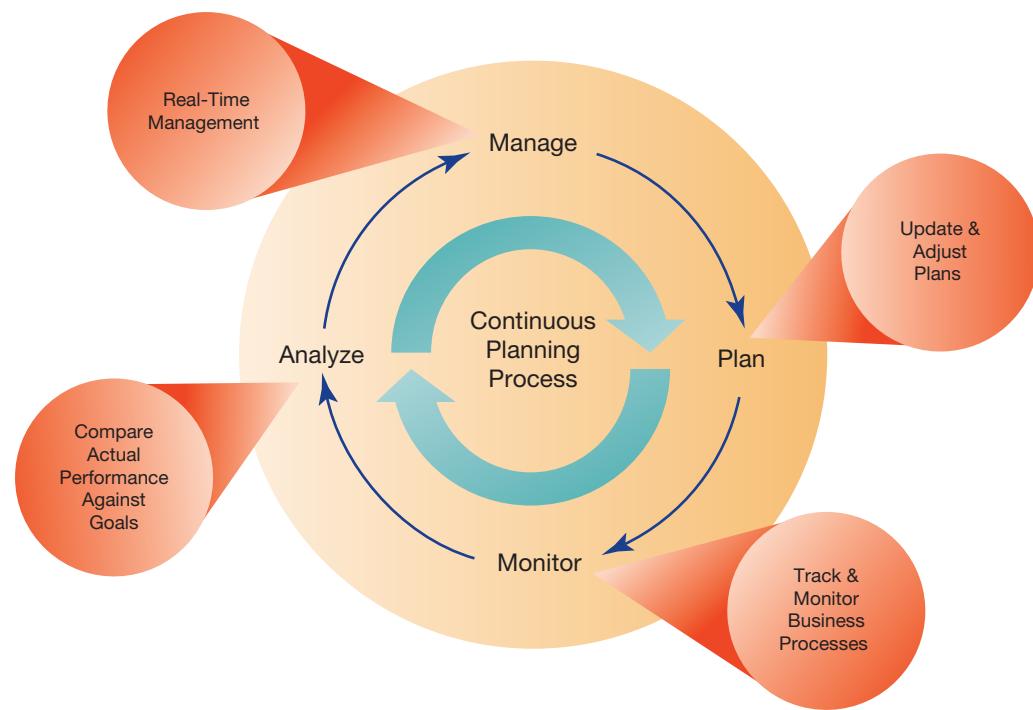
Databases: Providing Inputs into Business Intelligence and Advanced Analytics

Data and knowledge are probably among the most important assets an organization has, as both are essential for executing business processes, gaining business intelligence, and performing advanced analytics. Databases, which are collections of related data organized in a way that facilitates data searches, are vital to an organization's success.

For instance, databases are essential for maintaining customer records and supporting business processes such as sales transactions and tracking inventory but are also needed for marketing purposes, such as identifying target customers for personalized marketing communications. Additionally, database technology fuels electronic commerce, from tracking available products

FIGURE 6.4

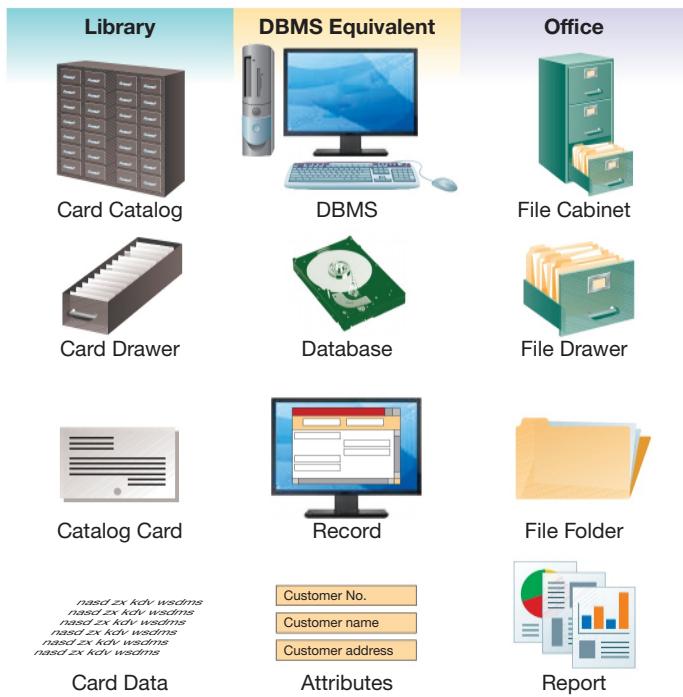
Effective business planning is continuous.



for sale to providing customer service. Databases are a foundation of the digital world. Data about all the products that are available for sale at Amazon.com are stored in databases, and data about all the courses available at your university are stored in a database. While you may expect organizations to use a variety of databases, databases are also powering many of the apps you are interacting with daily on your personal devices. For example, data (such as storage location, ratings, or comments) about all of the songs in your iTunes library, together with your playlists, are stored in a database. Databases not only store data about products, courses, songs, and playlists, they also store the interrelationships between various things. For example, Amazon.com has databases that keep track of its millions of customers and other databases that keep track of the billions of sales transactions linking products to specific customers. Without databases, much of what we take for granted in the digital world would be impossible.

ENABLING INTERACTIVE WEBSITES USING DATABASES. In today's highly dynamic digital world, any organization engaged in e-commerce makes extensive use of databases to provide dynamic and customized content on their web pages. As described in Chapter 3, "Managing the Information Systems Infrastructure," actions such as people using an organization's website to view product catalogs, check inventory, and place orders all ultimately read from and write to the organization's databases. Similarly, data about products (name, description, dimensions, shipping weight, and so on) are stored in databases and dynamically inserted into a web page template, freeing the company from having to develop a separate web page for each individual product. For example, companies such as Amazon.com need only a few page templates for different product categories. Depending on what the user is looking for, these templates are then populated dynamically with the relevant product data that are pulled from a database; similarly, whenever a registered user places an order, the customer's billing and shipping information is retrieved from a database and displayed to the customer for confirmation.

Some electronic commerce applications can receive and process millions of transactions per day. To ensure adequate system performance for customers, as well as to gain the greatest understanding of customer behavior, organizations must manage online data effectively. For example, Amazon.com, the world's largest bookstore, is open 24 hours a day, 365 days a year, and its servers log millions of transactions per day, with dozens of database reads and writes for every single transaction. This is but one example that shows that the key to effectively designing an online electronic commerce business is the effective management of online data. Beyond websites and e-commerce, it is important to stress that databases are at the heart of your university's student registration system, the inventory system at the local grocery store, Apple's iTunes store, and virtually anything

**FIGURE 6.5**

Computers make the process of storing and managing data much easier.

else you can think of that requires recording and analyzing large amounts of data. Next we examine some basic concepts, advantages of the database approach, and database management.

DATABASES: FOUNDATION CONCEPTS. The database approach dominates nearly all computer-based information systems used today. To understand databases, we must familiarize ourselves with some terminology. In Figure 6.5, we compare database terminology (middle column) with equivalents in a library (left column) and a business office (right column). We use database management systems (DBMSs, such as Microsoft Access, a popular DBMS for personal computers) to interact with the data in databases (see Chapter 3, “Managing the Information Systems Infrastructure and Services”). A DBMS is a software application with which you create, store, organize, and retrieve data from a single database or several databases. In the DBMS, the individual database is a collection of related attributes about entities. An **entity** is something you collect data about, such as people or classes (Figure 6.6). We often think of entities as **tables**, where each row is a **record** and each column is an **attribute** (also referred to as field). A record is a collection of related attributes about a single instance of an entity. Each record typically consists of many attributes, which are individual pieces of data. For example, a name and a Social Security number are attributes of a particular person.

The screenshot shows a Microsoft Access 2016 window with the 'Students' table open. The table has 10 records and 7 attributes. The attributes are: ID, LastName, FirstName, StreetAddress, City, State, and Zip. The data includes various student names and addresses from Pullman, WA, with zip codes ranging from 99164 to 99163.

ID	LastName	FirstName	StreetAddress	City	State	Zip
209345	Judson	Jackie	216 Main	Pullman	WA	99164
213009	Schirmer	Birgit	233 Webb	Pullman	WA	99163
345987	Valachich	James	1212 Valley View	Pullman	WA	99163
457838	Wright	Elizabeth	426 Main	Pullman	WA	99163
459987	Schmidt	Lisa-Marie	1824 Lamont	Pullman	WA	99164
466711	Ferrell	Lauren	412 C Street	Pullman	WA	99164
512678	Gatewood	Lael	200 Hill	Pullman	WA	99163
691112	Fuller	Grace	312 Mountain Drive	Pullman	WA	99164
910234	Hardin	Ethan	200 Sunset	Pullman	WA	99164
983445	Kabbe	Joshua	825 Skylark	Pullman	WA	99163

FIGURE 6.6

This sample data table for the entity *Student* includes 10 records and 7 attributes.

Source: Access 2016, Windows 10, Microsoft Corporation.

DATABASES: ADVANTAGES. Before the advent of DBMS, organizations used the file processing approach to store and manipulate data electronically. As data were usually kept in long, sequential computer files that were often stored on tape, data about entities often appeared in several different places throughout the information system; further, the data were stored along with and sometimes embedded within the programming code that used the data. People had not yet envisioned the concept of separately storing data about entities in non-redundant databases, so different files frequently contained repetitive data about a customer, a supplier, or another entity. When someone's address changed, it had to be changed in every file where it occurred, a tedious process. Similarly, if programmers changed the code, they had to change the corresponding data along with it. Further, the programmer would have had to know *how* the data were stored in order to make any changes. This was often no better than a pen-and-paper approach to storing data.

It is possible for a database to consist of only a single file or table. However, most databases managed under a DBMS consist of multiple tables or entities, often organized in several files. A DBMS can manage hundreds or even thousands of tables simultaneously by linking the tables as part of a single system. The DBMS helps us manage the tremendous volume and complexity of interrelated data so that we can be sure that the right data are accessed, changed, or deleted. For example, if a student or customer address is changed, that change is made through all the parts of the system where that data might occur. Using a database approach prevents unnecessary and problematic redundancies of the data, and the data are kept separate from the applications' programming code. This means that the database does not need to be changed if a change is made to an application. Consequently, there are numerous advantages to using a database approach to managing organizational data; these are summarized in Table 6.2.

DATABASES: TYPES. Traditionally, organizations have used **relational database management systems (RDBMSs)** to support their business processes. An RDBMS attempts to balance efficiency of storage needs, ease of retrieval, and other factors by storing data in tables linked via relationships. However, RDBMSs are not easily scalable in response to peaks in demand, as is often the case in data-intensive applications such as e-commerce and social media, and traditional RDBMSs may simply not be able to handle massive volumes of often-unstructured

TABLE 6.2 Advantages of the Database Approach

Advantages	Description
Minimal data redundancy	A single copy of data ensures that storage requirements are minimized.
Improved data consistency	Eliminating redundancy greatly reduces the possibilities of inconsistency.
Increased security	A centralized system makes it easier to enforce access restrictions.
Improved data quality	Centralized control, minimized redundancy, and improved data consistency help to enhance the quality of data.
Improved data accessibility and sharing	A centralized system makes it easier to deploy and control access for personnel within or outside organizational boundaries.
Enforcement of standards	A centralized system makes it much easier to enforce standards and rules for data creation, modification, naming, and deletion.
Program–data independence	It is much easier to evolve and alter software to changing business needs when data and programs are independent.
Increased productivity of application development	Data standards make it easier to build and modify applications.
Reduced program maintenance	Data changed in the central database is replicated seamlessly throughout all applications.



WHEN THINGS GO WRONG

Twitter Fever—Look Before You Tweet

Over the past several years, Twitter has successfully transformed both the ways of information transmission and the pulse of pop culture. Serving as a source of news for growing numbers of people, Twitter also works as a gathering place for expressing compassion, sharing grief, and supporting disaster relief efforts. When the rock star Prince died in 2016, for example, countless collaborators, friends, and well-known fans shared their sadness and memories over the tragic news. For example, actor Will Smith posted, “I am stunned and heartbroken. I just spoke with him last night. Today, Jada & I mourn with all of you the loss of a beautiful poet, a true inspiration, and one of the most magnificent artists to ever grace this earth.” The speed at which the “Twitterverse”—the collective of members who use the social media platform—reacts to important events has transformed how people learn about and react to important events throughout the world.

Indeed, Twitter users’ ability to post thoughts in small snippets (called tweets) allows quick and easy dissemination of content to a broad audience. A tweet cannot exceed 140 characters and can thus easily be read out of context; the sheer number of tweets, appearing at a rapid pace and often with little context, can easily result in endless confusion. Thanks to the network effect, Twitter has become capable of gathering momentum so quickly that it is sometimes difficult to differentiate between truth and fiction. And, because tweets can be sent so easily, often without a lot of thought by the sender, there are countless examples of so-called “dumb” tweets that instantly go viral. For example, Oprah Winfrey talked about her love of the Microsoft Surface tablet computer by tweeting: “Gotta say love that SURFACE! Have bought 12 already for Christmas gifts.” The Twitterverse was quick to identify that her adoring tweet was sent from her iPad!

In a more serious problem, Twitterbots are causing confusion in the Twitterverse. A Twitterbot is a program used to produce automated posts or to automatically follow Twitter users. Twitterbots come in various forms. For example, many post clickbait, enticing clicks on promotional links. Others post replies or automatically “retweet” (i.e., forward) messages that include a certain word or phrase. Malicious Twitterbots follow

the accounts of famous people who typically have millions of followers. In some macabre instances, the accounts of famous people who have passed away have been hijacked by bots, seemingly sending out messages from beyond the grave. In one instance, deceased journalist David Carr’s account was hijacked by a so-called “porn bot” in 2016, changing the account’s cover picture and sending out disturbing messages to Carr’s followers. Twitter currently doesn’t offer any access to the accounts of the deceased unless account credentials were given to friends or family members by the account owner prior to their death. However, family members can request to have an account deactivated. Otherwise, it continues to exist and can potentially be hacked. Many are discussing what is the most appropriate thing to do with the online accounts of the deceased. While there is no clear answer, it demonstrates some unintended consequences that occur in the digital world.

When properly used for good, Twitter is undoubtedly a meaningful platform for reaching out to people. Sometimes, however, people seem to retweet first and ask questions later; it may be better to do “due diligence” and try to Google a topic first to ensure that it indeed is true before retweeting. Also, if you follow some famous people on Twitter, if you get a crazy message from them, it *may* be from a bot.

Based on:

David Carr (journalist). (2016, April 11). In *Wikipedia, The Free Encyclopedia*. Retrieved May 26, 2016, from [https://en.wikipedia.org/w/index.php?title=David_Carr_\(journalist\)&oldid=714740240](https://en.wikipedia.org/w/index.php?title=David_Carr_(journalist)&oldid=714740240)

Fee, R. (2015, August 18). 20 of the dumbest celebrity Tweets of all times, Vol. 2. *Mandatory*. Retrieved May 26, 2016, from <http://www.mandatory.com/2015/08/18/20-of-the-dumbest-celebrity-tweets-of-all-time-vol-2>

Golding, S. (2016, April 21). When doves cry: Celebrities react on Twitter to Prince’s untimely death. Retrieved May 26, 2016, from <http://www.vibe.com/2016/04/twitter-reacts-prince-death>

Twitter. (2016, May 25). In *Wikipedia, The Free Encyclopedia*. Retrieved May 26, 2016, from <https://en.wikipedia.org/w/index.php?title=Twitter&oldid=722022910>

Twitterbot. (2016, May 25). In *Wikipedia, The Free Encyclopedia*. Retrieved May 25, 2016, from <https://en.wikipedia.org/w/index.php?title=Twitterbot&oldid=721939432>

Big Data. For example, fueled by the megatrends Internet of Things (IoT), mobile, and social, various types of data are now generated by countless sensors and millions of users. Further, as RDBMSs tend to be highly complex, any changes need to be carefully planned and managed, potentially reducing the agility of a business. To overcome these limitations, a new breed of database management systems, called *NoSQL*, is increasingly becoming popular. *NoSQL* databases such as Amazon.com’s SimpleDB are highly scalable, as they can be distributed across multiple machines, which works especially well in a cloud computing infrastructure. The ability to use not only a single computer but also a distributed computing environment, dividing the processing tasks among hundreds or thousands of machines and using frameworks such as Apache Hadoop (see the Technology Briefing), is key for handling and processing Big Data. Further, *NoSQL* databases often offer much flexibility in the types of data they can

handle (such as comments of various lengths made by Facebook users or audio or video data). However, implementing NoSQL databases comes at a cost, as they are still in their early stages of development; thus, some needed features may be lacking, and it may be difficult to find experienced NoSQL developers.

DATABASES: EFFECTIVE MANAGEMENT. Now that we have outlined why databases are important to organizations, we can talk about how organizational databases can be managed effectively. The best database in the world is no better than the data it holds. Conversely, all the data in the world will do you no good if they are not organized in a manner in which there are few or no redundancies and in which you can retrieve, analyze, and understand them. The two key elements of an organizational database are the data and the structure of those data. The structure of the data is typically captured in a **data model**, that is, a map or diagram that represents entities and their relationships. Further, the structure of the data is documented to facilitate management of the database.

Each attribute in the database needs to be of a certain type. For example, an attribute may contain text, numbers, or dates. This **data type** helps the DBMS organize and sort the data, complete calculations, and allocate storage space. If tables are designed correctly, they will be easier to update, and it will be faster to extract vital information to improve an organization's business intelligence capabilities.

Once the data model is created, the format of the data is documented in a **data dictionary**. The data dictionary (or metadata repository) is a document explaining several pieces of metadata for each attribute, such as its name, the type of data expected (dates, alphanumeric, numbers, and so on), and valid values. Data dictionaries can include information such as why the data item is needed, how often it should be updated, and on which forms and reports the data appear.

Data dictionaries often include **business rules**—that is, the policies by which a business runs—which help to prevent illegal or illogical entries from entering the database. For example, designers of a warehouse inventory database could capture a rule in the data dictionary to prevent an invalid ship date for a future order from being entered into the database. Although NoSQL databases may not be as rigid as RDBMSs or may not enforce business rules at all (leaving the enforcing to applications), it is wise to create data models and to consider what data will be captured, how the data will be related, and what rules should be enforced.

Master Data Management To make sound operational, tactical, and strategic business decisions, it is imperative that decisions made in different departments are based on the same underlying data, definitions, and assumptions—that is, there is a “single version of the truth.” For example, do the marketing and accounting departments have the same definitions of a customer or a sale? Does a “customer” entail anyone who may be interested in the company’s product or service (marketing view) or only those who actually made a purchase (accounting view)? Part of creating a single version of the truth is **master data management**. **Master data** are the data deemed most important in the operation of a business. Typically shared among multiple organizational units, master data include data about customers, suppliers, inventory, employees, and the like. You can think of master data as the “actors” in an organization’s transactions; for example, a *customer* purchases something, an *employee* is paid, and so on. Given the importance of an organization’s master data, master data management is a management- rather than a technology-focused issue, as different business units and different corporate levels have to come to consensus on the meaning of master data items or on how to deal with duplicates. Especially for large organizations, arriving at a single version of the truth can be a challenge, as master data often have to be integrated from multiple systems. Likewise, after mergers or acquisitions, organizations have to try to consolidate the master data from two or more companies. Once the meaning and format of the master data have been agreed on, business intelligence applications can base their analyses on the single version of the truth.

ENTERING AND QUERYING DATA. At some point, data must be entered into the database. Traditionally, a clerk or other data entry professional would create records in the database by entering data. These data may come from telephone conversations, preprinted forms that must be filled out, historical records, or electronic files. Today, much organizational data are captured electronically, as is the case with a user’s input in a web form; whenever you place an order on the web, sign up for a newsletter, or respond to an online survey, your input is directly stored

The screenshot shows a web-based form titled "Customer Information". The form consists of several input fields: "Last name" (with placeholder "e.g., Doe"), "First name" (with placeholder "e.g., John"), "Email address" (with placeholder "e.g., john@doe.com"), "Street" (empty), "City" (empty), "State" (with a dropdown arrow), and "ZIP" (empty). At the bottom of the form are two buttons: "Cancel" and "Create account". The browser window has a standard title bar with icons for minimize, maximize, and close, and a toolbar with back, forward, and search buttons. The URL "vs-inc.co/addCust.html" is visible in the address bar.

FIGURE 6.7

A computer-based form used for entering customer information.

in a database. A **form** (Figure 6.7) typically has blanks where the user can enter data or make choices, each of which represents an attribute within a database record (such as the user's first name, last name, gender, and so on). A form should be organized in an intuitive way so that the user can easily see the required items and enter the data. Forms are often used to capture data to be added, modified, or deleted from the database (e.g., for modifying your password or removing your old shipping address on Amazon.com). Further, in today's dynamic environment, data are increasingly generated and captured automatically. For example, capturing transactional data from a point-of-sale terminal or entering sensor data from smartphones or IoT devices requires no human intervention; likewise, autonomous agents (discussed later) can collect various data that are published on the web or posted in social media.

To retrieve data from a database, we use a **query**. In fact, whenever a web page is dynamically populated with content, a query is executed to retrieve the data from a database. The most common language used to interface with RDBMSs is **Structured Query Language (SQL)**. Figure 6.8 is an example of an SQL statement that an online bookstore would use to retrieve the information needed to populate a summary page containing all books written by the first author of this textbook, sorted by publication date. Writing SQL statements can be difficult, especially when you are dealing with complex databases with many entities or when you are writing complex queries with multiple integrated criteria—such as adding numbers while sorting on two different attributes. Many desktop DBMS packages provide graphical user interfaces, where the user can pick the desired data from the database to create queries quickly and easily (Figure 6.9).

AD HOC QUERIES AND REPORTS. Business users across an organization need the right information at the right time; thus, in order to support decision making, the results of queries are typically presented in the form of reports. A **report** is a compilation of data from the database that is organized and displayed to the user (either on screen or on paper). Sophisticated **report generators** and analysis tools such as Crystal Reports or Tableau can help users to quickly

```
SELECT AUTHOR, TITLE, PUBLICATION_DATE, PRICE
FROM BOOKS
WHERE AUTHOR="VALACICH"
ORDER BY PUBLICATION_DATE;
```

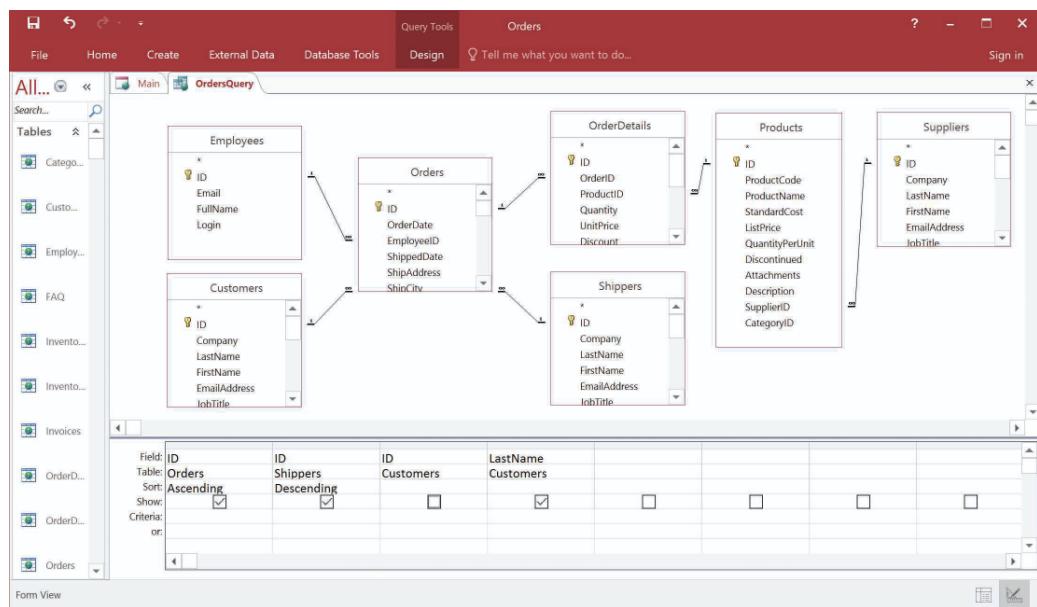
FIGURE 6.8

This sample SQL statement would be used to retrieve the information needed to populate a summary web page containing all books written by the first author of this textbook, sorted by publication date.

FIGURE 6.9

Microsoft Access provides a graphical user interface to let users select the required data.

Source: Access 2016, Windows 10, Microsoft Corporation.



build interactive reports and visualizations to present data in a useful format and help business users make sense of large amounts of data that are typically stored in organizational databases. Reports can take the form of **scheduled reports**, **drill-down reports**, **exception reports**, and **key-indicator reports** (Table 6.3) (as discussed in Chapter 2, key performance indicators are the metrics deemed most critical to assessing progress toward a certain goal). These reports are either produced at prespecified intervals or created whenever a prespecified event happens; often, this is combined with automated alerts if certain thresholds are reached. However, decision makers frequently have information needs that are unforeseen and may never arise again. In such instances, the users need to run **ad hoc queries** (i.e., queries created because of unplanned information needs that are typically not saved for later use). Ad hoc query tools provide an easy-to-use interface, allowing managers to run queries and reports themselves without having to know query languages or the structure of the underlying data. Installed on a person's desktop, notebook computer, or mobile device, these tools can be used to run queries and reports whenever an unplanned information need arises without having to resort to calling the IS department for help in creating a complex query or a special report.

ONLINE TRANSACTION PROCESSING. The systems that are used to interact with customers and run a business in real time are called **operational systems**. Examples of operational systems are sales order processing and reservation systems. As fast customer response is fundamental to having a successful Internet-based business, immediate automated responses to the requests of

TABLE 6.3 Common Reports and Queries

Report/Query	Description
Scheduled reports	Reports produced at predefined intervals—daily, weekly, or monthly—to support routine decisions
Key-indicator reports	Reports that provide a summary of critical metrics on a recurring schedule
Exception reports	Reports that highlight situations that are out of the normal range
Drill-down reports	Reports that provide greater detail, so as to help analyze why a key indicator is not at an appropriate level or why an exception occurred
Ad hoc queries	Queries answering unplanned information requests to support a nonroutine decision; typically not saved to be run again

users are required. **Online transaction processing (OLTP)** systems provide this and are designed to handle multiple concurrent transactions from customers. Typically, these transactions have a fixed number of inputs, such as order items, payment data, and customer name and address, and specified outputs, such as total order price or order tracking number. Common transactions include updating customer data, processing orders, and generating sales receipts. Consequently, OLTP is a big part of interactive electronic commerce applications. Because customers can be located virtually anywhere in the world, it is critical that transactions be processed efficiently. The speed with which OLTP systems can process transactions is, therefore, an important design decision. In addition to which technology is chosen to process the transactions, how the data are organized in the database is also a major factor in determining system performance.

Although the database operations behind most transactions are relatively simple, designers often spend considerable time making adjustments to the database design in order to “tune” processing for optimal system performance. Once an organization has all these data, it must design ways to gain the greatest value from its collection; each individual OLTP system could be queried individually, but the real power for an organization comes from analyzing the aggregation of data from different systems using methods such as online analytical processing (discussed later).

OPERATIONAL AND INFORMATIONAL SYSTEMS. Operational systems can generate a wealth of data that can serve as useful inputs into business intelligence and advanced analytics applications. For example, a grocery checkout system processes a specific transaction (the purchase) that can be linked to an inventory system (for reordering purposes), but it can also capture valuable data such as time of the purchase, items purchased together, form of payment, or loyalty program details. Coupled with external data (such as store location, weather data, or competitor information), these data can be analyzed for spending patterns, effectiveness of sales promotions, or customer profiling.

Systems designed to support decision making based on stable point-in-time or historical data are called **informational systems**. The requirements for designing and supporting operational and informational systems are quite different (Table 6.4). In a distributed online environment, performing real-time analytical processing diminishes the performance of transaction processing. For example, complex analytical queries require the locking of data resources for extended periods of execution time, whereas transactional events—data insertions and simple queries from customers—are fast and can often occur simultaneously; further, the operational databases typically only contain current data. Thus, a well-tuned and responsive transaction processing system may have uneven performance for customers while analytical processing occurs. As a result, many organizations replicate all transactions on a second database server so that analytical processing does not affect transaction processing performance. This replication typically occurs in batches during off-peak hours, when site traffic volumes are at a minimum. However, especially for situations where real-time analytics is needed (such as fraud detection), even a few hours’ delay is unacceptable. Therefore, modern database management systems provide real-time operational analytics—allowing OLTP and analytics to be performed simultaneously—for the analysis of data coming from a single data source (such as an organization’s ERP system).

TABLE 6.4 Comparison of Operational and Informational Systems

Characteristic	Operational System	Informational System
Primary purpose	Run the business on a current basis	Support managerial decision making
Type of data	Current representation of state of the business	Historical or point-in-time (snapshot)
Primary users	Online customers, clerks, salespersons, administrators	Managers, business analysts, and customers (checking status and history)
Scope of usage	Narrow and simple updates and queries	Broad and complex queries and analyses
Design goal	Performance	Ease of access and use

TABLE 6.5 Sample Industry Uses of Data Warehousing

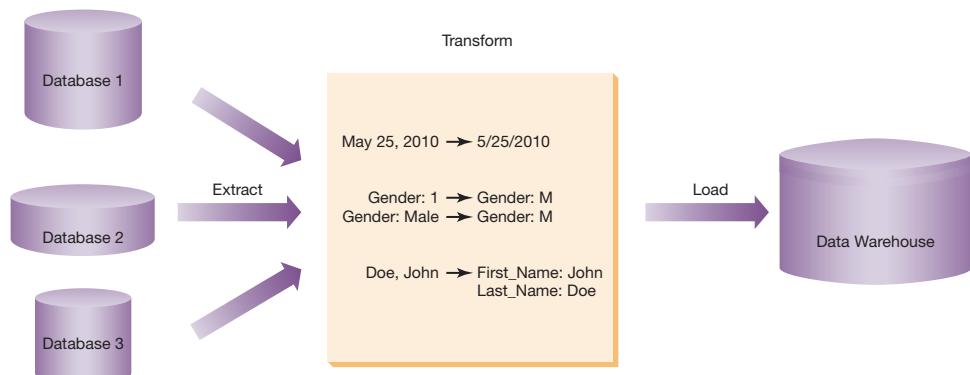
Uses of Data Warehousing	Representative Companies
Analysis of scanner checkout data	Safeway
Tracking, analysis, and tuning of sales promotions and coupons	Costco, CVS Corporation
Frequent customer program management	Target, United Airlines
Profitability analysis and market segmentation	Walgreens, Toyota
Product promotions for focused market segments	Walmart, Williams-Sonoma
Cross-segment marketing	Citigroup
Risk and credit analysis	HSBC
Customer profiling	Morgan Stanley

DATA WAREHOUSES. For many complex analyses, however, data from various sources are needed. Therefore, large organizations, such as Walmart, UPS, and Alaska Airlines, have built **data warehouses** that integrate multiple large databases and other data sources into a single repository. Such a repository, containing both historic and (almost) current data for analysis and reporting, is suitable for direct querying, analysis, or processing. Much like a physical warehouse for products and components, a data warehouse stores and distributes data on computer-based information systems. A data warehouse is a company's virtual storehouse of valuable data from the organization's disparate information systems and external sources. It supports the analysis of sales, inventory, and other vital business data that have been culled from operational systems. The purpose of a data warehouse is to put key business information into the hands of more decision makers, and an organization that successfully deploys a data warehouse has committed to pulling together, integrating, and sharing critical corporate data throughout the firm. Table 6.5 lists sample industry uses of data warehouses. Data warehouses can take up hundreds of gigabytes (even terabytes) of data. They usually run on fairly powerful mainframe computers and can cost millions of dollars.

While no changes to the existing, historical data contained in the data warehouse are made, the data in a data warehouse are periodically appended with "new" data from operational systems. Consequently, a crucial process for consolidating data from operational systems with other organizational data (to facilitate the use of data mining techniques to gain the greatest and broadest understanding from the data) is **extraction, transformation, and loading**. First, the data need to be extracted from various different source systems. In the transformation stage, data are being cleansed and manipulated to fit the needs of the analysis (such as by creating new calculated fields or summary values). **Data cleansing** refers to the process of detecting, correcting (e.g., standardizing the format), or removing corrupt or inaccurate data retrieved from different source systems (such as differences in the way dates or ZIP codes are stored). Finally, the transformed data are loaded into the data warehouse and are ready for being used for complex analyses (Figure 6.10).

FIGURE 6.10

Extraction, transformation, and loading are used to consolidate data from operational systems into a data warehouse.





COMING ATTRACTIONS

Emotion Aware Gaming

Imagine playing a video game that seems to be able to read your mind or at least know when you are confident or when you are scared. And, depending upon how you are feeling, it would adapt to either make things easier or tougher on you. Affectiva, a Boston area tech company, is using a webcam to capture a person's facial expression and uses complex algorithms to interpret how the person is feeling while playing a video game. With this information, game designers are able to adjust the level of play. In a recently released psychological thriller game called *Nevermind*, the technology makes the game harder when players are more frightened or more anxious. For example, the game will unexpectedly introduce a stressful challenge, such as trapping a player in a threatening environment, forcing the player to maintain calm as he or she plays the way to safety.

To build their technology, Affectiva's researchers have studied the faces of millions of people from throughout the world, asking them to watch videos and mapping how different people's faces change while different types of videos are watched. In addition, they are researching how changes in heart rates

align with changes in facial expressions. Affectiva's researchers have collected more than 40 billion data points for interpreting emotion from a person's face—a true Big Data problem. While video games are designed to take players on an emotional journey, they have not been able to adapt to changes in a player's emotional state. With its emotion-sensing technology, Affectiva hopes to design more immersive games. The application of this technology can be used far beyond video games and can be extremely useful for understanding how people are feeling when watching movies, political candidates, and advertising.

Based on:

Affectiva. (2016). Retrieved May 25, 2016, from <http://www.affectiva.com>
Subbaraman, N. (2016, March 1). Affectiva teams up with developers to make video games that know your feelings. *The Boston Globe*. Retrieved May 25, 2016, from <http://www.betaboston.com/news/2016/03/01/affectiva-teams-up-with-developers-to-make-video-games-that-know-your-feelings>

DATA MARTS. Rather than storing all enterprise data in one data warehouse, many organizations have created multiple data marts, each containing a subset of the data for a single aspect of a company's business, such as finance, inventory, or personnel. A **data mart** is a data warehouse that is limited in scope. It contains selected data from the data warehouse such that each separate data mart is customized for the decision support needs of a particular end-user group. As a data mart only contains the data needed by a limited segment of users (as opposed to a company-wide data warehouse), it is typically easier to query and reduces the time needed to perform analytical queries. Data marts have been popular among small and medium-sized businesses and among departments within larger organizations, all of which were previously prohibited from developing their own data warehouses because of the high costs involved.

Data marts typically contain tens of gigabytes of data as opposed to the hundreds of gigabytes in data warehouses. Therefore, data marts can be deployed on less powerful hardware. The difference in costs between different types of data marts and data warehouses can be significant. The cost to develop a data mart is typically less than US\$1 million, while the cost for a data warehouse can exceed US\$10 million. However, with the advent of cloud computing, several vendors are offering data warehousing as a service, which can help to significantly lower the company's initial investment (see Chapter 3); similarly, companies such as SAP are offering on-demand business intelligence as a service.

Business Intelligence and Advanced Analytics

Various different vendors offer a wide variety of tools for decision support; such tools are often classified as business intelligence and advanced analytics applications. Typically, business intelligence tools provide decision support by enabling business users to perform analyses to obtain an understanding what *has* happened. Advanced analytics tools, in contrast, provide decision support by enabling business users as well as business analysts and data scientist to gain a deeper understanding of *why* things happened and to build predictive models. Although each type of application by itself can be valuable to an organization, it is their convergence that enables

organizations to gain and sustain competitive advantage through enhanced decision making. In the following sections, we discuss these categories as well as the various systems and technologies that each encompasses.

Business Intelligence

Business intelligence tools are used by business users to analyze both structured and unstructured data to obtain an understanding of current and past performance, helping to guide planning processes. Given vast amounts of data, business intelligence tools help users perform analyses and interpret data. In the following sections, we describe some of these applications.

DECISION SUPPORT SYSTEMS. Traditionally, organizations used **decision support systems** (DSSs) to analyze structured data and support their decision making. DSSs are often used by managerial-level employees to help them solve problems such as sales forecasting or resource optimization, yet DSSs can be used to support decisions at virtually all levels of the organization. A DSS is designed to be an “interactive” decision aid that uses **models** to manipulate data. For example, if you have some historic sales data, you can use many different types of models to create a forecast of future sales. One technique is to take an average of past sales and adjust it for seasonal changes. The formula you would use to calculate and adjust the average is the model. A more complicated forecasting model might use time-series analysis or linear regression.

Using such models, DSSs can augment human decision-making performance and problem solving by enabling managers to perform “what-if” analyses to examine alternative solutions to a problem. A **what-if analysis** allows users to make hypothetical changes to the data associated with a problem (e.g., loan duration or interest rate) and observe how these changes influence the results. For example, a cash manager for a bank could examine what-if scenarios modelling the effects of various interest rates on cash availability. Some types of problems utilize a variety of input variables that each may have a different likelihood of occurring (e.g., there is a 25 percent likelihood that inflation will stay the same and a 75 percent likelihood that inflation will increase). Sensitivity analysis allows to understand how different input values and their probability of occurring (e.g., rate of inflation and its probability of occurring) will affect the results of a model. Similarly, goal-seeking analyses help in determining how input parameters need to be changed to achieve a desired end state. Finally, optimization models allow finding the best balance between certain parameters within given constraints. Together, DSSs provide managers with various decision analysis tools to either analyze data or create meaningful information to support the decision making related to a variety of organizational problems. See Table 6.6 for a summary of the ways organizations can use DSS to support decision making in organizations. While DSSs are useful for supporting a variety of managerial decisions, they are typically limited to relatively simple analyses of structured data, typically from transaction processing systems.

TABLE 6.6 Common DSS Uses for Specific Organizational Areas

Area	Common DSS Uses
Corporate level	Corporate planning, venture analysis, mergers and acquisitions
Accounting	Cost analysis, breakeven analysis, auditing, tax computation and analysis, depreciation methods, budgeting
Finance	Discounted cash flow analysis, return on investment, buy or lease, capital budgeting, bond refinancing, stock portfolio management, compound interest, after-tax yield, foreign exchange values
Marketing	Product demand forecast, advertising strategy analysis, pricing strategies, market share analysis, sales growth evaluation, sales performance
Human resources	Employee business expenses, fringe benefit computations, payroll and deductions
Production	Production scheduling, transportation analysis, product mix, inventory levels, quality control, plant location, material allocation, maintenance analysis, machine replacement, job assignment, material requirements planning

ONLINE ANALYTICAL PROCESSING. Online analytical processing (OLAP) refers to the process of quickly conducting complex, multidimensional analyses of data stored in a database that is optimized for retrieval, typically using graphical software tools. OLAP tools enable users to perform ad hoc analyses of different dimensions of data beyond simple data summaries and data aggregations of normal database queries. A typical question asked would be “What were the profits for each week in 2018 by sales region and customer type?” In contrast to relatively simple queries on two-dimensional tables, running such multidimensional queries requires a deeper understanding of the underlying data. Given the high volume of transactions within Internet-based systems and the potential business value in the data, business intelligence tools must provide extensive OLAP capabilities to business users. The chief component of an OLAP system is the **OLAP server**, which understands how data are organized in the database and has special functions for analyzing the data. The use of dedicated databases allows for tremendous increases in retrieval speed. In the past, multidimensional queries against large transactional databases could take hours to run; in contrast, OLAP systems pre-aggregate data so that only the subset of the data necessary for the queries is extracted, greatly improving performance. Given the decrease in cost of random access memory (RAM, see the Technology Briefing), a recent trend is **in-memory computing**, where the data are stored in a computer’s main memory rather than on a comparatively slow hard drive, removing the bottlenecks associated with reading and writing data. Further, using in-memory computing for both transaction and analytical processing can help provide answers to questions as they arise and enable making business decisions based on real-time data.

Measures and Dimensions Whenever a business transaction occurs, associated data can be stored and then analyzed from a variety of perspectives. To facilitate efficient processing of transactions, databases supporting online transaction processing systems treat all data in similar ways. In contrast, OLAP systems are designed for efficient retrieval of data and categorize data as measures and dimensions. **Measures** (or sometimes called **facts**) are the values or numbers the user wants to analyze, such as sales revenues or the number of orders placed. **Dimensions** provide a way to summarize the data, such as region, time, or product line. Thus, sales revenue (a measure) could be analyzed by product, time (year, quarter, or week), geographical region, or distributor (the dimensions). To enable the analysis of data at more or less detailed levels, the dimensions are organized as hierarchies (such as in year, quarter, month, or day). For example, when analyzing sales by geographical regions, a user can **drill down** from state, to county, to city, or to the individual store location or **roll up** from state to sales region (northwest, south, southeast, and so on), to country, or to continent.

Cubes, Slicing, and Dicing To enable such multidimensional analyses, OLAP arranges the data in so-called cubes. An **OLAP cube** is a data structure allowing for multiple dimensions to be added to a traditional two-dimensional table (Figure 6.11). Although the figure only shows three dimensions, data can be analyzed in more than three dimensions. Analyzing the data on subsets of the dimensions is referred to as **slicing and dicing**. For example, a slice may show sales by product type and region only for the second quarter of 2018. Another slice may only show sales for desktops in the western region (Figure 6.12).

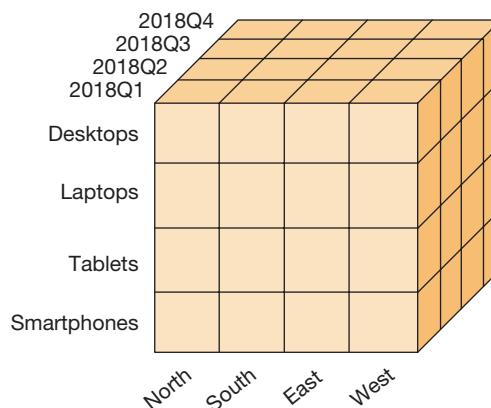
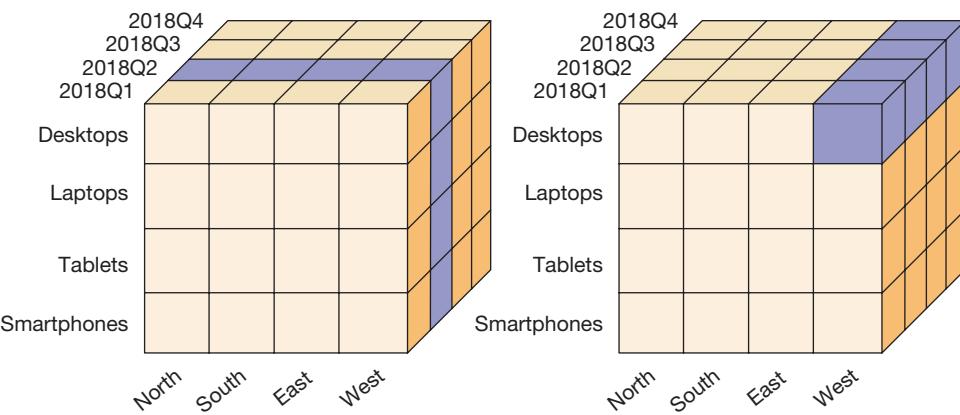


FIGURE 6.11

An OLAP cube allows for analyzing data by multiple dimensions.

FIGURE 6.12

Slicing and dicing allows for analyzing subsets of the dimensions.



INFORMATION VISUALIZATION. In addition to allowing business users to perform various queries and analyses, an important aspect of business intelligence applications is information visualization. **Visualization** refers to the display of complex data relationships using a variety of graphical methods, enabling managers to quickly grasp the results of the analyses.

Digital Dashboards Digital dashboards are commonly used to visually present key performance indicators and other summary information used by managers and executives to make decisions. To provide the greatest benefits for decision makers, digital dashboards typically support three usage models: push reporting, exception reporting and alerts, and pull reporting. Digital dashboards not only provide the decision makers with a quick, visual overview of key performance indicators and other key operational statistics and trends (i.e., push reporting) but also alert the user of any items that require immediate attention (i.e., exception reporting and alerts); if the user wants to analyze the root causes of an exception or perform other analyses, he or she can drill down or perform self-service ad hoc queries (i.e., pull reporting).

Digital dashboards (sometimes called executive dashboards) provide top-level managers with the needed information to support business processes, such as cash and investment management, resource allocation, and contract negotiation. Typically, executives require information presented in a highly aggregated form so that they can scan information quickly for trends and anomalies (Figure 6.13).

Although data are typically provided in a highly aggregated form, the executive also has the capability to drill down and see the details if necessary. For example, suppose a digital dashboard summarizes profits by states. If the executive wants to get a deeper understanding about a particular state, a selection on the screen can provide the details behind the aggregate. By drilling down into the data, the executive can see that the majority of the profits were made in a particular region or city or even store. Also, the information provided can be easily shared throughout the organization so that the executive can quickly send a message to the appropriate managers to discuss solutions to the problem discovered in the drill-down.

Dashboards make use of a variety of design elements to present the data in the most user-friendly way. To highlight deviations that need to be addressed or to symbolize changes over time, dashboards use maps, charts, spark lines, or graphics symbolizing traffic lights, thermometers, or speedometers (Figure 6.14); conditional formatting is often used to highlight exceptions and draw the user's attention to deviations from the normal course of business.

One recent trend influencing the design of dashboards is mobile business intelligence. With the advances in mobile communication technology, today's executives want to be in touch with their organizational performance anytime, anywhere. Further, most of today's knowledge workers are increasingly mobile in terms of the device they're using—during a workday, one may use a desktop computer, a laptop, a smartphone, or an iPad. Hence, dashboard vendors are offering solutions for multiple devices and screen sizes so that each user can get the most current information regardless of location and device used, facilitating business decisions based on real-time data (Figure 6.15).

One of the growing trends of mobile business intelligence (BI) is the use of location data that can easily be gained from GPS or Wi-Fi networks. This capability can be an important part

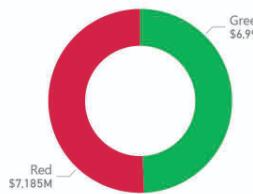
Revenue & Profitability

Microsoft | Power BI

December, 2016

Revenue by Division

Revenue Trend - This Year vs Last Year (LY)



Top 10 Customers

Company	State	R...	Revenue (M)
Pharma Equipme...	CA	1	\$32,482.8
Water Cleaning ...	IL	2	\$14,206.1
AI and Beyond Inc	TX	3	\$11,192.1
Insure Us, Corp	NC	4	\$9,036.8
Retail Everywhere	IL	5	\$8,095.8
Clothes and Sup...	IL	6	\$8,040.6
World Wide Publ...	PA	7	\$6,101.8
LA Financial Serv...	CA	8	\$5,824.7
Rails and Bails	IL	9	\$5,026.3
Holdings and Inv ...	IL	10	\$4,347.7

Gross Margin Trend



of an innovative BI solution because location-relevant information can be delivered to the device based on its location. For example, details about particular people, such as customers, colleagues, and staff, within a particular vicinity can be sent to the device in addition to location-specific reports. With such capabilities, the mobile device uses its data generation capabilities to enhance the intelligence of the user.

Visual Analytics As discussed in previous sections, business intelligence systems can provide business decision makers with a wide variety of analyses to support decision making. However, in the end, it is still the humans who have to interpret the output from these systems. With the growing complexity of the underlying data (such as multiple dimensions, including spatial dimensions), interpreting the outputs becomes extremely

FIGURE 6.13

A digital dashboard presents information in a highly aggregated form, enabling executives to scan information quickly for trends and anomalies.

Source: Power BI 2016, Windows 10, Microsoft Corporation.

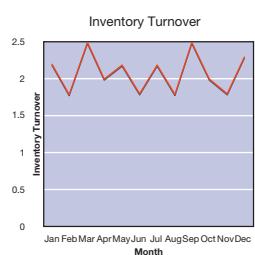
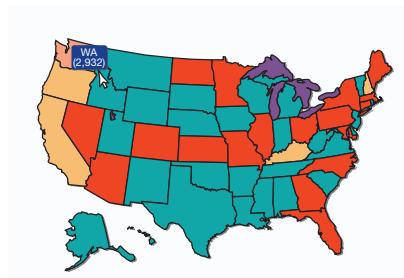
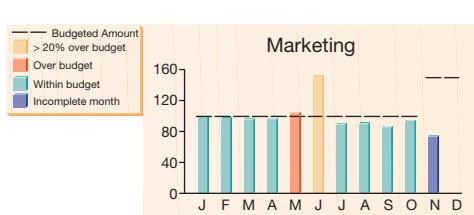


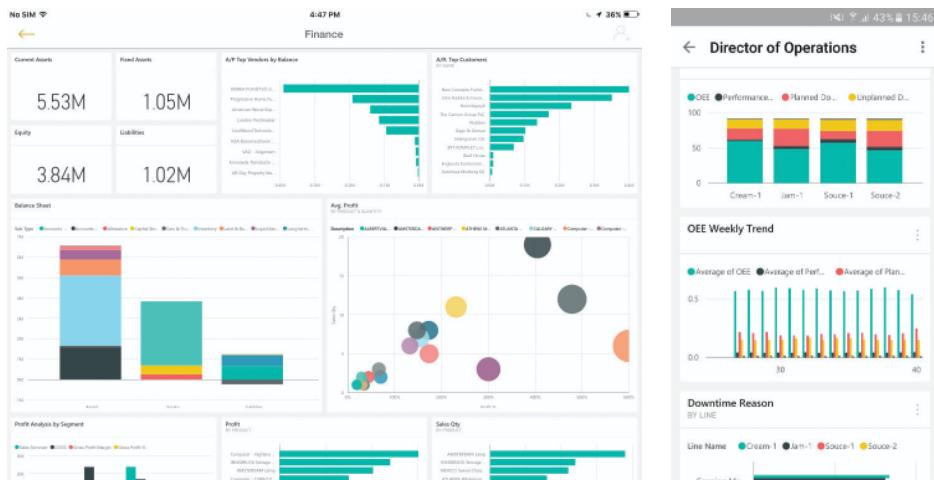
FIGURE 6.14

Dashboards use various graphical elements to highlight important information.

FIGURE 6.15

Mobile business intelligence can provide executives with relevant information regardless of location and device.

Source: Power BI 2016, Windows 10, Microsoft Corporation.

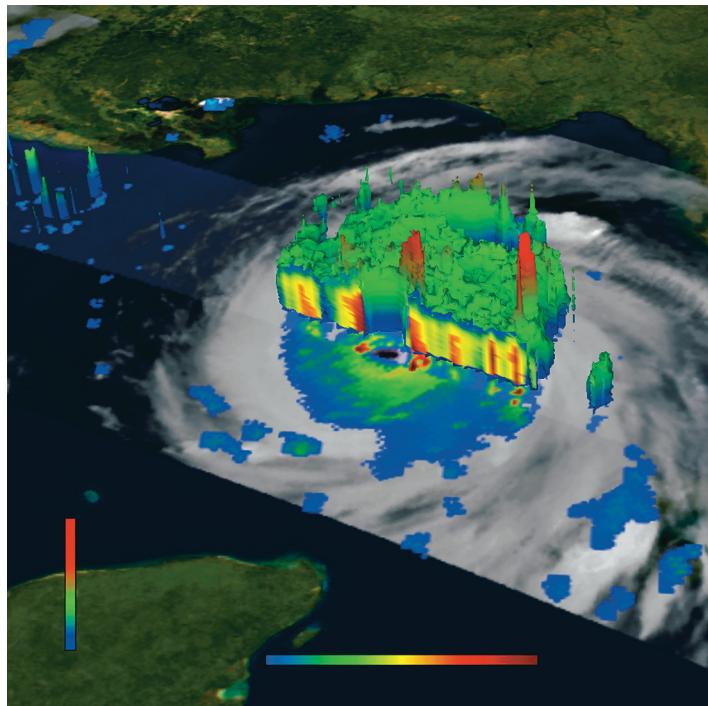


challenging. **Visual analytics** (sometimes called **visual data discovery**) is the combination of various analysis techniques and interactive visualization to solve complex problems. By combining human intelligence and reasoning capabilities with technology's retrieval and analysis capabilities, visual analytics can help in decision making, as the strengths of both the human and the machine are merged. With the humans' ability to make sense of "noisy" data, unexpected patterns or relationships in the data can be discovered, and results of complex queries can be quickly interpreted. Visual analytics is used in a variety of settings, ranging from homeland security to disaster relief. For example, making sense of tabular data about the strength of a hurricane (including information about location of clouds, etc.) is nearly impossible. Figure 6.16 shows the visualization of a hurricane as it is gaining strength. The image shows towering thunderclouds (in red), called hot towers, that were spotted just before the hurricane intensified to a Category 5 hurricane. Once the hurricane is represented visually, analysts can view changes over time to better understand its behavior. In similar ways, organizations around the world are utilizing visualization technologies to enhance business intelligence.

FIGURE 6.16

Visual analytics can help making sense of complex data relationships using a variety of graphical methods.

Source: NASA.





WHO'S GOING MOBILE

Identifying Malaria Hotspots

A hotspot is a place of significance—whether it be a place for commerce or a place that is popular for dining and dancing. When we think about mobile technology and hotspots, we tend to think of busy places with free public access to Wi-Fi. Such Wi-Fi hotspots are often located where people gather together such as airports, train stations, libraries, convention centers, coffee shops, and hotels. Because hotspots are often surrounded by a large and dynamic number of individuals, researchers can use them to study a broad range of topics ranging from crowd movements to fashion and entertainment trends. To aid in this work, researchers have also created algorithms for estimating the number of people in a room that cannot be seen or even the number of people in a large crowd by analyzing the number of smartphone devices with their Wi-Fi antenna turned on within a given area. In the United States and in much of the developed world, there are lots of restrictions related to cell phone tracking due to numerous privacy concerns, but there are currently no laws restricting the tracking of devices connected to Wi-Fi. While using such techniques to estimate the number of people cannot lead to a *perfect* measure—as researchers have to make assumptions about the number people without devices, the number with Wi-Fi turned off, and even those with more than one device—it allows for a pretty good estimate. With a good estimate of the total number of people, forecasts of various things can be made based on random sampling and knowing the population size.

In rural Africa, however, such Wi-Fi hotspots are not prevalent, but cell towers are. In contrast to much of the developed world, many parts of the developing world allow cell phone tracking either through agreements with wireless providers or with local governments. While privacy concerns remain, researchers are using cell phone tracking data to study various health and infrastructure issues. Because many of these regions do not have complete wireless coverage, individuals intentionally travel near cell towers in order to be able to make calls or send and receive messages. Thus, in many ways, a cell tower is a bigger version of the popular Wi-Fi hotspots we have all

become accustomed to utilizing through our daily routines. When a mobile phone is within range of a cell tower, it communicates with the tower to let it know it is there. And, if there are messages stored in the network, they can be delivered to the device. By knowing which phones are there, when, and for how long, researchers are able to identify who lives near a tower and who is traveling through the region. By studying the communication patterns, they can also gain insights on an individual's social network of friends and family members.

Given lacking medical services in many areas of sub-Saharan Africa, infectious diseases are a big problem, with outbreaks often spreading within members of a social network. Thus, health researchers are studying cell phone traffic data to not only understand social networks but also gain insights related to the transmission of infectious diseases. For example, in studying the data from a single tower in Kenya, researchers found that people making calls or sending text messages from a particular tower were more likely to be carriers of malaria. As malaria is transmitted from person to person through mosquito bites, researchers could predict who was likely to become infected by studying whom these people communicated with. They were also able to identify the source of the outbreak, a busy tea plantation that had many migrant workers. While the tracking of cell phone traffic raises many privacy concerns, using data mining and advanced analytics on these data is allowing researchers to better combat the spread of disease. Typical in the digital world, many advances come with equally troubling concerns.

Based on:

Liszewski, A. (2015, June 9). Wifi networks can count people—no phones required. *Gizmodo*. Retrieved June 28, 2016, from <http://gizmodo.com/wifi-networks-can-count-people-no-phones-required-1710033051>

Talbot, D. (2013). Big Data from cheap phones. *Technology Review*. Retrieved June 28, 2016, from <https://www.technologyreview.com/s/513721/big-data-from-cheap-phones>

Advanced Analytics

In contrast to business intelligence tools, which primarily focus on analyzing structured or semi-structured data to examine past and current performance, advanced analytics are designed to help users gain a deeper understanding of why things happened and build predictive models to support human and automated decision making (the term *data science* is used to describe the advanced analytics field of study and practice). As such, advanced analytics uses both structured and unstructured data to automatically gain meaningful insights by discovering patterns, trends, and relationships. Whereas business intelligence tools are primarily used by business users, advanced analytics are often used by business analysts or data scientists due to the complexity of the models and the underlying data. Enabled by advanced analytics are intelligent systems, which are designed to take some of these decisions out of the hands of the human decision makers, thus freeing up valuable resources.

DATA MINING. Data mining complements OLAP in that it provides capabilities for discovering “hidden” predictive relationships in the data. Using complicated algorithms on powerful multiprocessor computers or cloud computing architectures, data mining applications can analyze massive amounts of data to identify characteristics of profitable customers, purchasing patterns, or even fraudulent credit card transactions. An **algorithm** refers to the step-by-step procedures used to make a calculation or perform some type of computer-based process. Typically, data mining algorithms search for patterns, trends, or rules that are hidden in the data so as to develop predictive models. Results from a data mining exercise (such as the characteristics of customers most likely to respond to a marketing campaign for a specific new product) can then be used in an ad hoc query (e.g., to identify customers sharing those characteristics so as to target them in the next campaign). It is important to note that any interesting predictive model derived from data mining should be tested against “fresh” data to determine if the model actually holds what it promises.

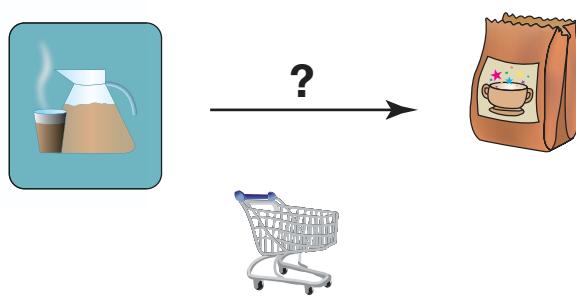
Sometimes, data mining is completely atheoretical, and companies search for hidden relationships between data, akin to panning for gold. In other cases, business users formulate hypotheses (such as “customers with a household income of US\$150,000 are twice as likely to respond to our marketing campaigns as customers with an income of US\$60,000 or less”), and these hypotheses are tested against existing data. However, as with other business intelligence tools, being able to ask the right questions is the most crucial skill and should come before jumping into conclusions about the outcomes.

In order to increase predictive power, data mining algorithms are run against large data sets. Depending on the size of the data set (large data sets can contain many terabytes of data), data mining algorithms can take a long time to run; thus, an important preparatory step to running data mining algorithms is **data reduction**, which reduces the complexity of the data to be analyzed. This can be achieved by rolling up a data cube to the smallest level of aggregation needed, reducing the dimensionality, or dividing continuous measures into discrete intervals.

Association Discovery One frequently used application of data mining is association discovery. **Association discovery** is a technique used to find associations or correlations among sets of items. For example, a supermarket chain wants to find out which items are typically purchased together in order to redesign the store’s layout and optimize the customers’ “navigational path” through the store or to launch a new promotion. Mining sales transactions over the past 5 years may reveal that 80 percent of the time, people who purchase coffee also purchase sugar (Figure 6.17). Association rules typically contain two numbers: a percentage indicating support (e.g., the combination of coffee and sugar occurs in 20 percent of all transactions analyzed) and a confidence level indicating the reliability (e.g., 80 percent of all transactions that contain coffee also contain sugar). These numbers help managers decide if the association rule is meaningful and if any changes (e.g., to store layout or pricing) based on the findings are worthwhile. Similar to association discovery, **sequence discovery** is used to discover associations over time. For example, it may be discovered that 55 percent of all customers who purchase a new high-definition TV set also purchase a Blu-ray disc player within the next 2 months.

FIGURE 6.17

Association rules symbolize associations among sets of items.



Coffee → Sugar [Support 20%, Confidence 80%]



ETHICAL DILEMMA

Orwellian Internet of Things

In 1949, English author George Orwell wrote the novel "1984," which described a futuristic tyrannical society with omnipresent government surveillance by an entity known as "Big Brother." Big Brother was not a helpful and nurturing sibling but an entity that seeks power for its own sake and not for the good of others. Since his writing, *Orwellian* is an adjective reflecting actions that could be destructive to the welfare of a free and open society. Privacy advocates are concerned that many types of gadgets and home automation devices, falling under the Internet of Things (IoT) megatrend, when paired with advanced analytics capabilities, have the potential to have *Orwellian* impacts on society.

There are a wide range of IoT devices that are designed to scoop up massive amounts of data to aid humans and other systems in our modern society. But as more and more data are collected and analyzed, many privacy advocates fear we are losing more and more of our anonymity and individual freedom. For example, when considering IoT devices, privacy advocates are concerned with a variety of questions. What data are IoT devices collecting? Who has access to these data? How can these data be used? And, as news reports demonstrate, IoT data can be used in unexpected, interesting, and legally significant ways.

Imagine all of the things that could be equipped with a sensor and have data collected about their use. For example, *things* like your toaster, refrigerator, thermostat, lighting, and even the front door lock on your apartment. All of those seem kind of cool, right? What about your toilet? That doesn't sound too cool. If you have any concerns about a government reading your e-mail, how would you feel about a database collecting information on every time your toilet flushes? Imagine what a medical research group could do with such data. In sum, the data collected for every *thing* could end up in the hands of law enforcement, the government, marketing companies, and even malicious hackers. And this is not science fiction.

In 2016, the U.S. government admitted it was using IoT devices for spying and snooping on possible terrorists and criminals. The U.S. director of national intelligence, James Clapper, made it clear that IoT sensors and devices are providing ample opportunities for intelligence agencies to spy on targets. "In the future, intelligence services might use the [Internet of Things] for identification, surveillance, monitoring, location tracking,

and targeting for recruitment, or to gain access to networks or user credentials," Clapper told a Senate panel as part of his annual "assessment of threats" against the United States.

In combination with advanced analytics, the IoT will allow companies to provide unprecedented services to customers. Reminders, automatic ordering, activity tracking, and a plethora of other conveniences will become a normal part of our lives. However, with all of these conveniences, we will also be providing an abundance of data about our daily lives that can at a minimum be a privacy invasion or be misused by malicious hackers or even our own government. While such Orwellian concerns were not possible in 1984, in today's digital world, Big Brother has arrived.

Questions

1. If you use a fitness tracker or some other IoT device, should the company be able to sell your data? Would it be acceptable to share the data with some but not others? Explain.
2. Typically, the company providing an IoT device owns its customers' data. What laws or rules are needed to balance the needs of the company and the privacy of customers?

Based on:

Krieger, M. (2016, February 10). Top U.S. official admits—government will use "Internet of Things" to spy on the public. *Liberty Blitz Krieg*. Retrieved May 27, 2016, from <http://libertyblitzkrieg.com/2016/02/10/top-u-s-official-admits-government-will-use-internet-of-things-to-spy-on-the-public>

Sullivan, C.C. (2016, January 20). FTC chairwoman raises concerns over the Internet of Things. *FindLaw*. Retrieved May 27, 2016, from <http://blogs.findlaw.com/technologist/2016/01/ftc-chairwoman-raises-concerns-over-the-internet-of-things.html>

Swanson, B. (2015, February 25). The FCC's Orwellian Internet policy. *ComputerWorld*. Retrieved May 27, 2016, from <http://www.computerworld.com/article/2888366/the-fcc-s-orwellian-internet-policy.html>

Timm, T. (2016, February 9). The government just admitted it will use smart home devices for spying. *The Guardian*. Retrieved May 27, 2016, from <http://www.theguardian.com/commentisfree/2016/feb/09/internet-of-things-smart-devices-spying-surveillance-us-government>

Ts, M. (2014, July 2). The Internet of Things is watching. *Security Intelligence*. Retrieved May 27, 2016, from <https://securityintelligence.com/internet-of-things-all-well-or-orwell>

Clustering and Classification Another useful application of data mining is clustering and classification. Clustering is the process of grouping related records together on the basis of having similar values for attributes, thus finding structure in the data. For example, a manufacturer of consumer electronics may find clusters around model preferences, age groups, and income levels. These results can then be used for targeting certain groups of customers in marketing campaigns. In contrast, classification is used when the groups ("classes") are known beforehand, and records are segmented into these classes. For example, a bank may have found that there are different classes of customers who differ in their likelihood of defaulting on a loan. As such, all customers can be classified into different (known) risk categories in order to

ensure that the bank does not exceed a desired level of risk within its loan portfolio. Typically, classification would use a decision tree to classify the records.

UNSTRUCTURED DATA ANALYSIS. Although the methods just described can help decision makers get a better view of their organization's performance or their customers' behavior, they only provide a partial picture. By focusing purely on structured data (such as transactions, credit lines, and so on), a wealth of unstructured data (such as customer sentiments voiced in online forums, letters, or service-related call center records) is left untapped; in fact, researchers estimate that 80 percent of all enterprise data consist of unstructured or semistructured data (Andriole, 2015), and with the tremendous increase of user-generated content on the web, this figure is likely to increase further. Therefore, making important business decisions purely based on structured data can be dangerous, as the massive amounts of unstructured data could either strengthen or contradict findings derived from analyzing only structured data. Hence, organizations are trying not only to reach a single version of the truth but also to get the whole truth by analyzing unstructured data using *text mining*, *web content mining*, or *web usage mining*.

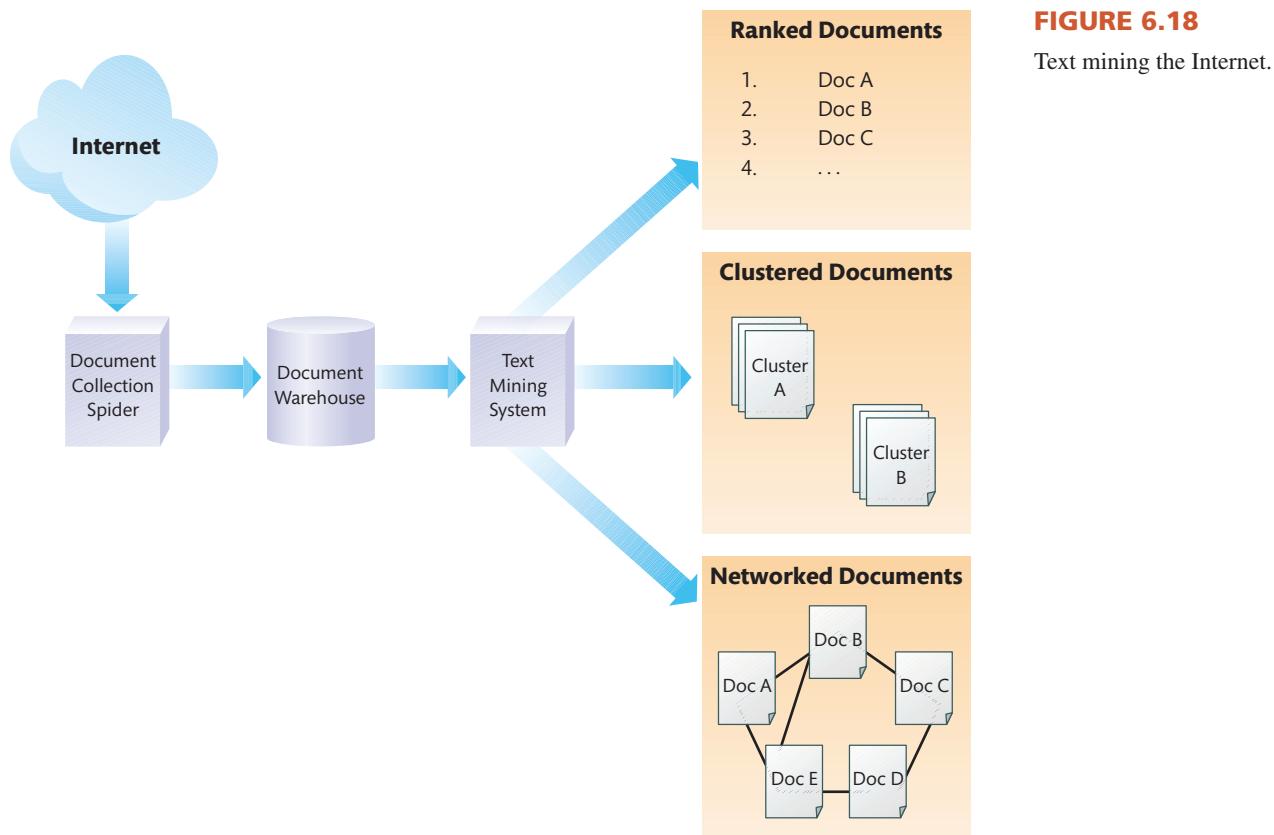
Text Mining and Web Content Mining *Text mining* refers to the use of analytical techniques for extracting information from textual documents. For organizations, the analysis of textual documents can provide extremely valuable insights into business performance, competitors' activities, or regulatory compliance. Such textual documents can include internal data such as letters or e-mails from customers, customer calls, internal communications, or external data such as blog posts, wikis, Twitter messages, and Facebook posts as well as competitor's web pages, marketing materials, patent filings, and so on. Text mining systems use text processing, statistical analyses, *machine learning*, and other techniques to analyze a document's linguistic structures to extract data such as places, companies, concepts, or dates. Most systems can easily extract a wide range of content and can be customized to meet an organization's needs by adding specific key words related to competitors, product names, persons of interest, and the like. Obviously, when analyzing and using user-generated content, companies have to be aware of issues related to ethics and privacy but also security.

Web content mining refers to extracting textual information from web documents. To extract information from the overall Internet (or from some subset of websites), a document collection spider, or *web crawler* (discussed later), would gather web pages and documents that match some prespecified criteria and place their content in a massive document warehouse. Once collected, the text mining system would apply a variety of analytical techniques to produce reports that can be used to gain additional insights beyond what is typically gained when only mining structured data (Figure 6.18). The next challenge for organizations will be extracting useful information from audio or video streams on the web (so-called multimedia mining).

Analyzing textual documents can help organizations in various ways:

- The marketing department can use **sentiment analysis** to learn about customers' thoughts, feelings, and emotions by analyzing not only customer e-mails or letters but also blogs, wikis, or discussion forums.
- The operations department can learn about product performance by analyzing service records, customer calls, or online product reviews and improve the product's features or performance based on insights gained.
- Strategic decision makers can gather **competitive intelligence** by analyzing press releases, news articles, or customer-generated web content about competitors' products.
- The sales department can learn about major accounts by analyzing news coverage.
- The human resources department can monitor employee satisfaction or compliance with company policies by analyzing internal communications (this is especially important in order to comply with regulations such as the Sarbanes–Oxley Act; see Chapter 10).
- News reporters or intelligence agencies can find out what topics are trending when trying to understand public sentiments in unstable countries.
- Investigators can identify possible instances of noncompliance and fraud by analyzing e-mail communication within a company in a regulated industry.

Many major companies, including Capital One, Marriott International, United Airlines, and Walmart, use text mining solutions to assess customer sentiments and increase customer satisfaction. Similarly, raveable.com provides hotel ratings by aggregating information from sources

**FIGURE 6.18**

Text mining the Internet.

such as Tripadvisor, Expedia, and Travelocity as well as individual travel blogs; in addition to aggregating numerical ratings given for aspects such as cleanliness, value, or location, raveable.com uses text mining to analyze review comments based on key words such as *earplugs*, *noise*, or *clean* and the associated sentiments so as to categorize the reviews and classify them as positive or negative. We will further discuss social media monitoring and sentiment analysis and their role in customer relationship management in Chapter 8, “Strengthening Business-to-Business Relationships via Supply Chain and Customer Relationship Management.”

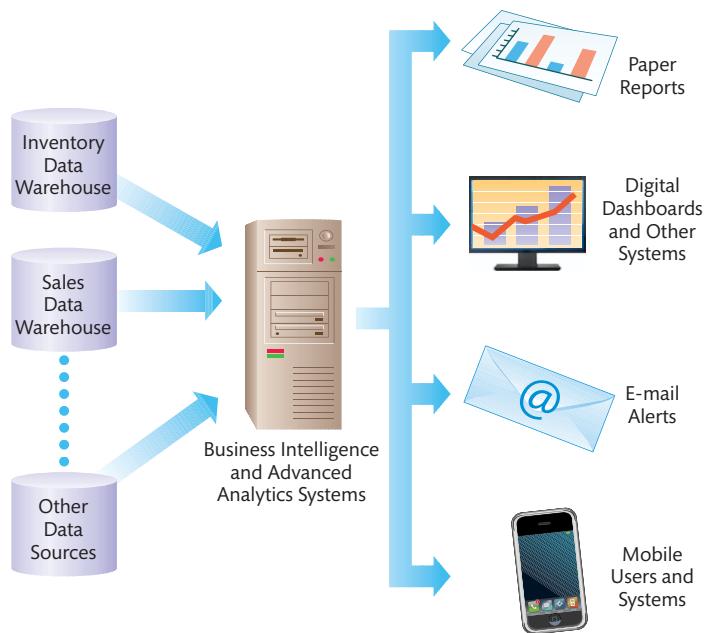
Web Usage Mining Web usage mining—also referred to as web analytics—is used by organizations such as Amazon.com to determine patterns in customers’ usage data, such as how users navigate through the site or how much time they spend on different pages. By analyzing users’ clickstream data (i.e., a recording of a user’s path through a website), a business such as Amazon.com can assess its pages’ stickiness (i.e., the ability to attract and keep visitors) and how customers navigate through different item categories, ultimately helping Amazon.com to optimize the structure of its website. In addition, organizations can monitor users’ mouse cursor movements to infer which areas of a web page get most attention by the visitors.

As with other business analytics systems, results from these analyses can be provided on digital dashboards, paper reports, web portals, e-mail alerts (using monitoring or data mining agents), and mobile devices as well as used by a variety of other information systems (Figure 6.19).

MACHINE LEARNING. Whereas “conventional” computers are very adept at processing large amounts of data by rapidly executing a program’s instructions, they cannot easily adapt to different circumstances or deal with noisy data. If a conventional computer is presented with a novel problem that it is not programmed to solve, it cannot deal with this situation. **Machine learning** is a branch of artificial intelligence that allows systems to learn by identifying meaningful patterns when processing massive amounts of structured or unstructured data. Machine learning has enabled great advances in various fields; intelligent systems (discussed below) such as Google’s self-driving cars but also speech recognition, natural language processing, computer vision, web searching, image recognition, or predictive typing

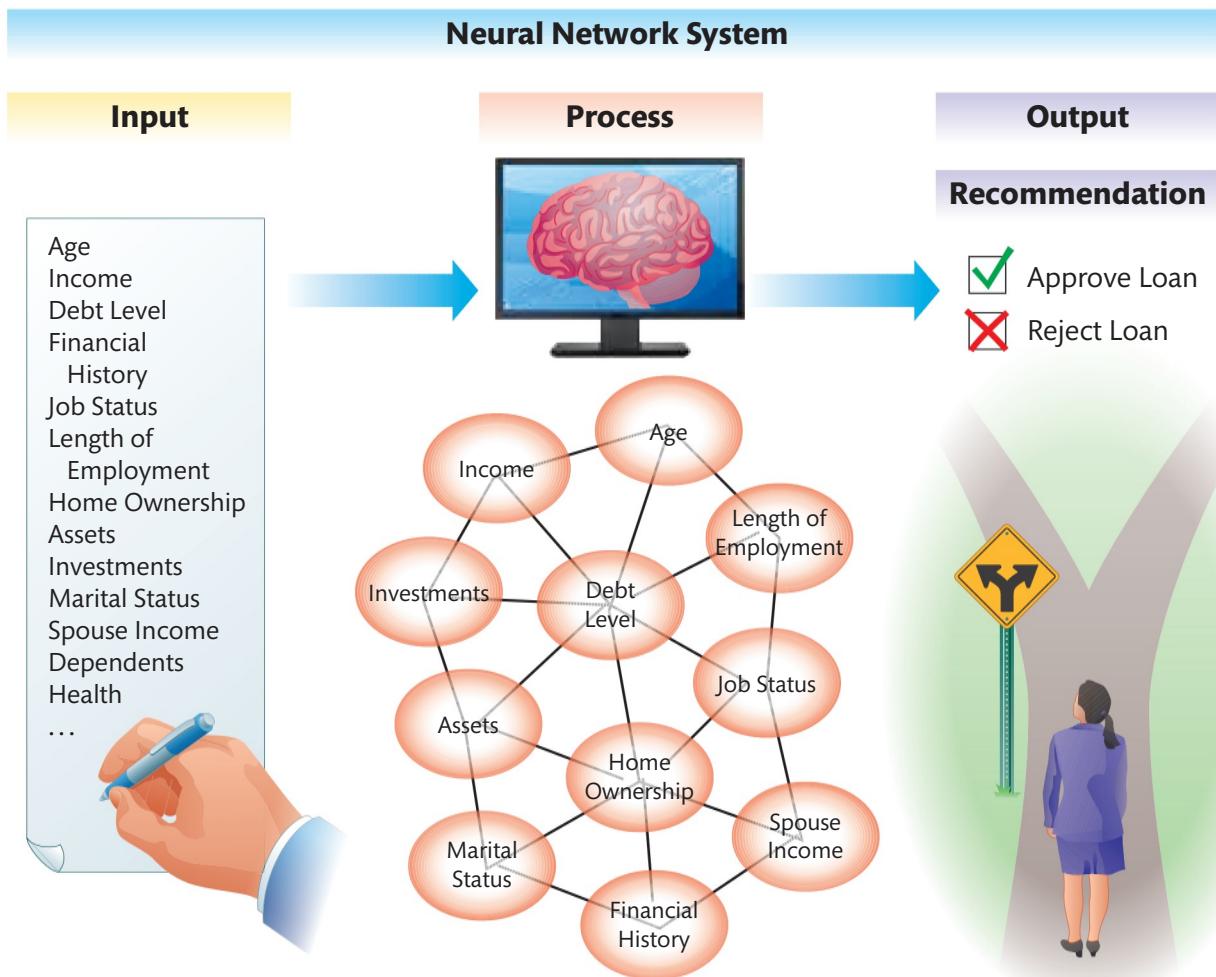
FIGURE 6.19

Business intelligence can be delivered to users in a variety of ways.



(e.g., using smartphone keyboards such as SwiftKey or Swype) are based on advances in machine learning algorithms. Recently, Netflix started applying machine learning algorithms to improve movie recommendations. One frequently used approach to machine learning is the use of artificial neural networks; **neural networks**, composed of a network of processing elements (i.e., artificial “neurons”) that work in parallel to complete a task, attempt to approximate the functioning of the human brain and can learn by example. Typically, a neural network is *trained* by having it categorize a large database of past information (e.g., a database of handwritten digits) for common patterns so as to infer rules (e.g., what features differentiate the digit 1 from a 7). These rules can then be applied to new data and conclusions drawn. For example, many financial institutions use neural network systems to analyze loan applications. These systems compare a person’s loan application data with the neural network containing the *intelligence* of the success and failure of countless prior loans, ultimately recommending loan acceptance (or rejection) (Figure 6.20). Newer neural-network based approaches—called deep learning—are getting ever closer to mimicking the human brain and enable great advances in areas such as voice or speech recognition; in 2016, banks started using voice recognition to identify online banking customers. In recent years, machine learning algorithms have made great progress, especially in applications where inputs and tasks are imprecise, such as classifying images. In particular, using Bayesian statistics or **fuzzy logic** allows using approximations or subjective values in order to handle situations where information about a problem is incomplete or imprecise. For example, a loan officer, when assessing a customer’s loan application, may generally categorize some of the customer’s financial information, such as income and debt level, as high, moderate, or low rather than using precise amounts. In addition to numerous business applications, fuzzy logic is used to better control antilock braking systems and household appliances as well as when making medical diagnoses or filtering offensive language in chat rooms.

PREDICTIVE MODELING. Traditional business intelligence applications are designed to focus on past and current performance, thus helping decision makers to get a detailed picture about the current state of a business. Advanced analytics augments business intelligence by using combinations of statistical analysis, data mining, and machine learning for **predictive modeling** to build explanatory models, which help understand the data, identify trends, or predict business outcomes; whereas business intelligence is good for knowing what *is*, advanced analytics helps in understanding *why* something is a certain way and foreseeing what *will be*. As such, predictive modeling tools extend traditional DSS and other BI tools by supporting forecasting, simulation, and optimization based on large volumes of structured, semistructured, and sometimes unstructured data. For example, predictive modeling can help

**FIGURE 6.20**

Neural networks approximate the functioning of the brain by creating common patterns in data and then comparing new data to learned patterns to make a recommendation.

in developing predictive patterns based on not only historic purchase data (structured data) but also customer sentiments voiced in social media or call center records (unstructured data). Likewise, Uber is attempting to improve its pricing mechanism using predictive modeling. Under Uber's current "surge pricing" mechanism, fares increase if there is increased demand (such as after concerts or during bad weather), which, in theory, should bring more drivers into an area where this increase in demand takes place. However, customers are often frustrated by being charged higher prices. Thus, Uber tries to build predictive models that are better able to forecast increased demand in certain areas at certain times, decreasing the effect of surges. However, predictive modeling is heavily dependent on statistical models and their underlying assumptions; likewise, as with all advanced analytics, analyzing unstructured data still remains relatively costly.

INTELLIGENT SYSTEMS. Artificial intelligence (AI) is the science of enabling information technologies—software, hardware, networks, and so on—to simulate human intelligence, such as reasoning and learning, as well as gaining sensing capabilities, such as seeing, hearing, or feeling. AI has had a strong connection to science fiction writers, who have written stories about AI-enabled technologies aiding humans (e.g., Mr. Data in *Star Trek: The Next Generation*), attempting world domination (e.g., *The Matrix*), or enabling humans to exist on an alien planet (e.g., *Avatar*). The current reality of AI is that it is lagging far behind the imagination of most science fiction writers; nevertheless, great strides have been made.

Based on complex machine learning algorithms, **intelligent systems**—composed of sensors, software, and computers embedded in machines and devices—emulate and enhance

human capabilities. Intelligent systems are having a tremendous impact in a variety of areas, including banking and financial management, medicine, engineering, and the military. Big Data has been both a challenge and an opportunity for artificial intelligence. On the one hand, vast amounts of different forms of data make machine algorithms increasingly complex; on the other hand, Big Data provides a treasure trove of potential insights and applications of intelligent systems. For many applications, intelligent systems assist in or perform real-time decision making, often using vast amounts of data. For example, many see vast promises in the use of AI for trading, removing the influence of traders' emotions, which often lead to suboptimal trading decisions. Likewise, advanced driver assistance systems (such as adaptive cruise control or lane-keeping systems offered in various new car models) or driverless cars of the future rely on intelligent systems to make real-time decisions based on up to 1GB of data per second, coming from various sensors, cameras, or radar. Over the past few years, the cost of sensors has been in free fall; for example, accelerometer sensors (built into many smartphones to measure motion) now cost only around US\$0.50. The combination of machine learning and decreasing prices of sensors is fueling the development of sensor-driven computing. Sensors providing data about everything from motion to voltage to pressure or even chemistry can provide a tremendous amount of useful data, which can then be used to improve performance, a device's life span, and so on. Artificial intelligence also fuels the rapid advances in drone technology and robotics that we see today, such as drones that can monitor product placement and stock levels in Walmart's warehouses or robots built to replace human pickers in Amazon's warehouses. Further, the combination of AI and sensors has enabled the creation of collaborative robots, which can work alongside human workers (and react if there is possible danger) instead of having to be placed in segregated areas.

However, advances in artificial intelligence have fueled many ethical debates, such as how to ensure that AI (and robots) only learns in the way humans intend. For example, using unsupervised learning, a robot (or other intelligent system) can improve its own learning by making changes to learning rules and monitoring the results; as a consequence, such intelligent systems must be programmed to stop the system without the system learning how to circumvent this.

Intelligent Agent Systems An **intelligent agent**, or simply an *agent* (also called a **bot**—short for “software robot”), is a program that works in the background to provide some service when a specific event occurs. There are several types of agents for use in a broad range of contexts, including the following:

- **User Agents.** Agents that automatically perform a task for a user, such as automatically sending a report at the first of the month, assembling customized news, or filling out a web form with routine information.
- **Buyer Agents (Shopping Bots).** Agents that search to find the best price for a particular product you wish to purchase.
- **Monitoring and Sensing Agents.** Agents that keep track of key data, such as data provided by various sensors, meters, cameras, and the like, notifying the user when conditions change.
- **Data Mining Agents.** Agents that continuously analyze large data warehouses to detect changes deemed important by a user, sending a notification when such changes occur.
- **Web Crawlers.** Agents that continuously browse the web for specific information (e.g., used by search engines)—also known as **web spiders**.
- **Chatbots.** Agents that simulate human conversations, such as in online help systems.
- **Destructive Agents.** Malicious agents designed by spammers and other Internet attackers to farm e-mail addresses off websites or deposit spyware on machines.

One example of an intelligent agent is Apple's Siri personal assistant, built into its iPhones. Similarly, Cortana is a personal assistant built into various Microsoft platforms. Over time, Cortana learns about a user's habits and performs certain actions based on certain triggers such as time of the day, location, incoming or outgoing phone calls, searches, and so on. For example, in the morning, the user automatically receives an alert about the weather in his or her current location; when passing by a subway station, public transport information is presented; when on a trip, the time to travel back home is automatically calculated (taking into consideration factors such as traffic situation); and so on (Figure 6.21).



SECURITY MATTERS

Hacktivists Versus Fembots: The Ashley Madison Case

On July 15, 2015, the Impact Team, a group of hacktivists, broke into the systems of the extramarital dating website Ashley Madison, which it accused of deceptive business practices, such as requiring users to pay for having their account (and the associated data) deleted. Having gained access to several gigabytes of data, including login names, identifying information, and even expressed sexual desires of the site's users, the hacktivists demanded the site to shut down, threatening to publish user data. To reinforce the demand, the Impact Team released a small amount of its data several days later, after the site was not shut down as requested by the hackers. Later in August 2015, the hackers posted data about 32 million users, resulting in a chain reaction of events in the lives of many of those named in the posted data. Some denied involvement, some committed suicide, and many others began a long ordeal of explaining to loved ones how their names, credit card data, and other personal data became part of the released data.

Later analysis of the hacked data revealed that a large proportion of the female accounts were chatbots—so-called fembots, (more or less) intelligent agents designed to start a chat with unsuspecting men, enticing them to purchase credits to contact the make-believe female members. As most people, Ashley Madison's users probably had not read Ashley Madison's terms and conditions before agreeing to them: In the terms and conditions, Ashley Madison stated that conversations may not be authentic, may be exaggerated, or may even be fictitious.

Whether or not running a dating portal for extramarital affairs in the pursuit of earning money is ethical is debatable. Whether asking users to pay for deleting account data or using chatbots to lure unsuspecting customers would be considered deceptive business practices is debatable. Likewise, whether or not the Impact Team's actions in response to Ashley Madison using deceptive business practices were warranted is debatable. What is clear is that Ashley Madison did not sufficiently protect user data, allowing the hacktivists to gain access to the data, resulting in an avalanche of negative consequences for many.

Based on:

Ashley Madison data breach. (2016, May 19). In Wikipedia, *The Free Encyclopedia*. Retrieved May 28, 2016, from https://en.wikipedia.org/w/index.php?title=Ashley_Madison_data_breach&oldid=721001290

Calpito, D. (2015, September 16). Ashley Madison's terms of service says so: Users are cheating on their spouses with fembots. *TechTimes*. Retrieved June 17, 2016, from <http://www.techtimes.com/articles/85172/20150916/ashley-madison-s-terms-of-service-says-so-users-are-cheating-on-their-spouses-with-fembots.htm>

Dreyfuss, E. (2015, August 19). How to check if you or a loved one were exposed in the Ashley Madison hack. *Wired*. Retrieved June 15, 2016, from <https://www.wired.com/2015/08/check-loved-one-exposed-ashley-madison-hack>

McHugh, M. (2015, September 4.). The dangers of looking at Ashley Madison hack infographics. *Wired*. Retrieved June 15, 2016, from <http://www.wired.com/2015/09/dangers-looking-ashley-madison-hack-infographics>

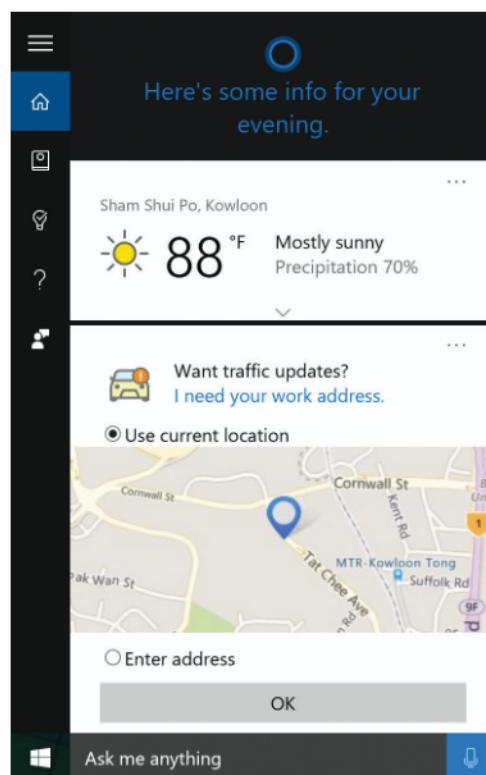


FIGURE 6.21

Cortana, an intelligent agent built into various Microsoft platforms, presents pertinent information based on factors such as the user's habits, location, and time of day. Source: Cortana, Windows 10, Microsoft Corporation.

In sum, there are ongoing developments to make information systems *smarter* so that organizational decision makers gain business intelligence. Although intelligent systems have yet to realize the imagination of science fiction writers, they have taken great strides in helping organizations enhance decision making.

Knowledge Management and Geographic Information Systems

As you have seen, there are various tools organizations can use to enhance their decision making. In addition to analyses and predictions using various types of structured and unstructured data, organizations draw on other sources of data and knowledge. In particular, organizations use knowledge management systems to manage organizational knowledge assets and use geographic information systems to manage and analyze spatially referenced data to provide spatial decision support. These are discussed next.

Knowledge Management Systems

There is no universal agreement on what exactly is meant by the term *knowledge management*. In general, however, **knowledge management** refers to the processes an organization uses to gain the greatest value from its knowledge assets. In Chapter 1, we contrasted data, information, and knowledge. Recall that data are raw, unformatted symbols such as characters or numbers. Information is data that have been formatted, organized, or processed in some way so that the result is useful to people. We need knowledge to understand relationships between different pieces of information. Consequently, what constitutes **knowledge assets** are all the underlying skills, routines, practices, principles, formulas, methods, heuristics, and intuitions. All databases, manuals, reference works, textbooks, diagrams, displays, computer files, proposals, plans, and any other artifacts in which both facts and procedures are recorded and stored are considered knowledge assets. From an organizational point of view, properly used knowledge assets enable an organization to improve its efficiency, effectiveness, and, of course, profitability. Additionally, as many companies are beginning to lose a large number of baby boomers to retirement, companies are using knowledge management systems to capture these crucial knowledge assets. Clearly, effectively managing knowledge assets will enhance business intelligence.

Knowledge assets can be categorized as being either explicit or tacit. **Explicit knowledge assets** reflect knowledge that can be documented, archived, and codified, often with the help of information systems. Explicit knowledge assets reflect much of what is typically stored in a DBMS. In contrast, **tacit knowledge assets** reflect the processes and procedures that are located in a person's mind on how to effectively perform a particular task (Figure 6.22). Identifying key

FIGURE 6.22

Explicit knowledge assets can easily be documented, archived, and codified, whereas tacit knowledge assets are located in a person's mind.

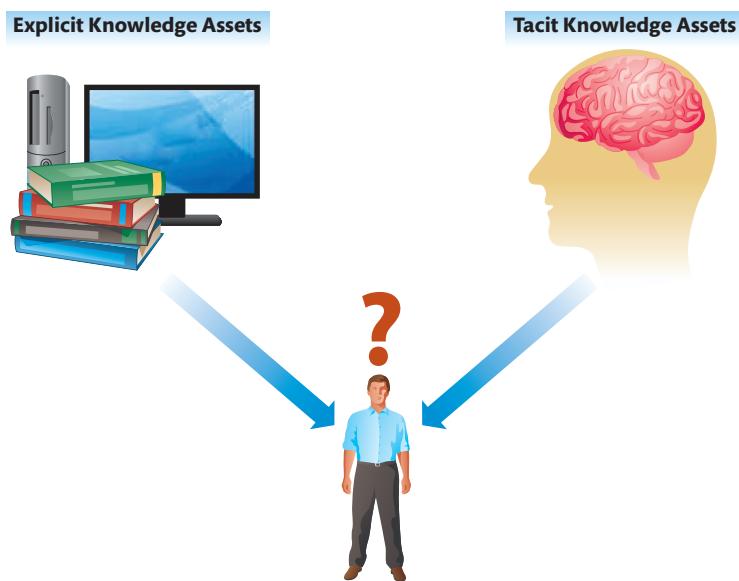


TABLE 6.7 Benefits and Challenges of Knowledge Management Systems

Benefits	Challenges
Enhanced innovation and creativity	Getting employee buy-in
Improved customer service, shorter product development, and streamlined operations	Focusing too much on technology
Enhanced employee retention	Forgetting the goal
Improved organizational performance	Dealing with knowledge overload and obsolescence

tacit knowledge assets and managing these assets so that they are accurate and available to people throughout the organization remains a significant challenge.

Tacit knowledge assets often reflect an organization's *best practices*—procedures and processes that are widely accepted as being among the most effective and/or efficient. Identifying how to recognize, generate, store, share, and manage this tacit knowledge is the primary objective for deploying a knowledge management system. Consequently, a **knowledge management system** is typically not a single technology but rather a collection of technology-based tools that include communication technologies—such as e-mail, groupware, instant messaging, and the like—as well as information storage and retrieval systems, such as wikis or DBMSs, to enable the generation, storage, sharing, and management of tacit and explicit knowledge assets (Malhotra, 2005).

Benefits and Challenges of Knowledge Management Systems Many potential benefits can come from organizations' effectively capturing and utilizing their tacit knowledge assets (Levinson, 2010) (Table 6.7). Although there are many potential benefits for organizations that effectively deploy knowledge management systems, to do so requires that several substantial challenges be overcome.

First, effective deployment requires employees to agree to share their personal tacit knowledge assets and to take extra steps to utilize the system for identifying best practices. Therefore, organizations must create a culture that values and rewards widespread participation.

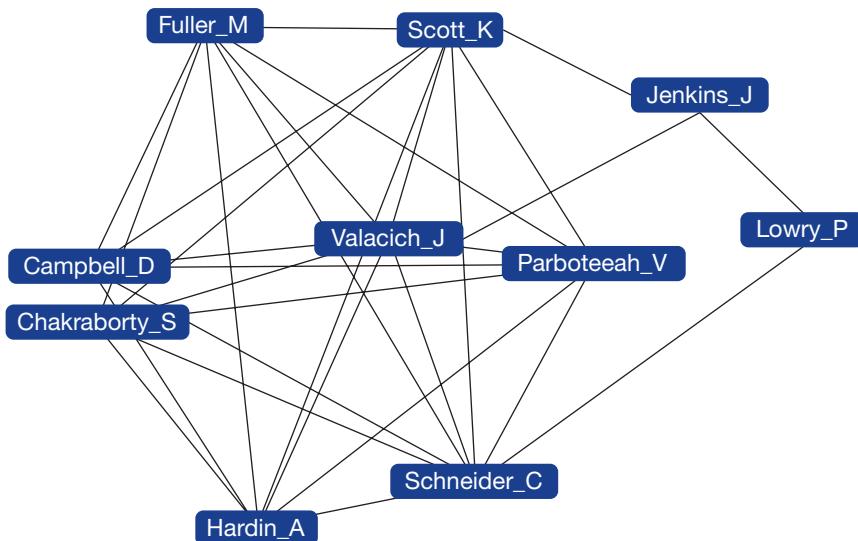
Second, experience has shown that a successful deployment must first identify what knowledge is needed, why it is needed, and who is likely to have this knowledge. Once an organization understands "why, what, and who," identifying the best technologies for facilitating knowledge exchange is a much easier task.

Third, the successful deployment of a knowledge management system must be linked to a specific business objective (e.g., increase innovativeness); and fourth, the knowledge management system must be easy to use, not only for entering but also for retrieving knowledge. Similarly, the system cannot overload users with too much information or with information that is obsolete. Just as physical assets can erode over time, knowledge can also become stale and irrelevant. Therefore, an ongoing process of updating, amending, and removing obsolete or irrelevant knowledge must occur, or the system will fall into disarray and will not be used.

How Organizations Utilize Knowledge Management Systems The people using a knowledge management system will be working in different departments within the organization, performing different functions, and will likely be located in different locations around the building, the city, or even the world. Each person—or group of people—can be thought of as a separate island that is set apart from others by geography, job focus, expertise, age, and gender. Often, a person on one island is trying to solve a problem that has already been solved by another person located on some other island. Finding this "other" person is often a significant challenge. The goal of a successful knowledge management system is to facilitate the exchange of needed knowledge between these separate islands. To find and connect such separate islands, organizations use **social network analysis**, a technique that maps people's contacts to discover connections or missing links (sometimes called structural holes) within the organization (Figure 6.23); thus, social network analysis can be used to attempt to find groups of people who work together, to find people who don't collaborate but should, or to find experts in particular subject areas. In addition to social network analysis, organizations use social bookmarking and social cataloging to capture and structure employees' knowledge and harness

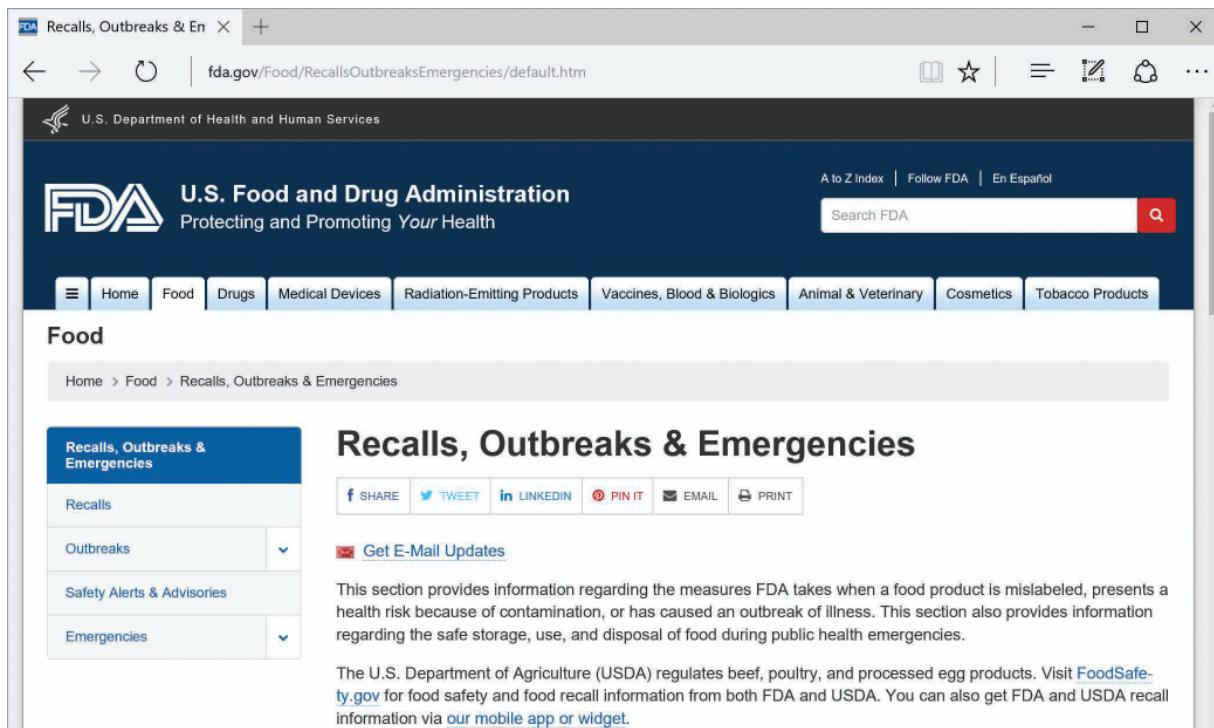
FIGURE 6.23

Social network analysis can help to analyze collaboration patterns.



their collective intelligence (see Chapter 5, “Enhancing Organizational Communication and Collaboration Using Social Media”).

Once organizations have collected their knowledge into a repository, they must find an easy way to share it with employees (often using an intranet), customers, suppliers (often using an extranet), or the general public (often using the Internet). These **knowledge portals** can be customized to meet the unique needs of their intended users. For example, the U.S. Food and Drug Administration (FDA) uses a web-based knowledge portal for keeping the public (e.g., citizens, researchers, and industry) informed on the most up-to-date information related to food (e.g., information on mad cow disease or product recalls) and drugs (e.g., the status of a drug trial) (Figure 6.24).

**FIGURE 6.24**

Countless organizations are using web-based knowledge portals to provide information to employees, customers, and partners.
Source: United States Food and Drug Administration.

In addition to the FDA, countless other organizations, such as Ford Motor Company, Eli Lilly, Walmart, and Dell Computers, are also using knowledge management systems. We are learning from these deployments that all organizations, whether for-profit or nonprofit, struggle to get the right information to the right person at the right time. Through the use of a comprehensive strategy for managing knowledge assets, organizations are much more likely to gain a competitive advantage and a positive return on their IS investments.

Geographic Information Systems

One type of information system used to enhance decision making is called a **geographic information system (GIS)**. A GIS is a system for creating, storing, analyzing, and managing geographically referenced data. In other words, GISs augment and extend other business analytics tools by adding a spatial dimension to data; a GIS captures various characteristics about geographic locations, allowing these characteristics to be coupled with other data to support querying, analysis, and decision making (sometimes referred to as **location analytics**). For example, a GIS could link the square footage of commercial real estate to its exact location in terms of latitude and longitude. These data could be paired with population density, average incomes of people living within an area, travel accessibility (e.g., interstate highways and major thoroughfares), proximity to services (e.g., fire, police, restaurants, public transportation stops), or virtually any other characteristic. A business such as a restaurant chain could use this information to identify optimal locations for the placement of new outlets. On a personal level, you probably frequently interact with GISs. For example, when you're accessing Google Maps to search for a restaurant in your town, you can view geographic data (such as the map or the satellite image) as well as attribute data about restaurants, including name, address, opening hours, and customer reviews. With the increase in mobile devices, geospatial data is increasingly becoming part of many applications and often serves as the foundation for many business models. For example, companies such as the car-hailing app Uber could not provide services without being able to match the locations of riders and drivers.

Businesses typically face many decisions with a spatial dimension: Where are my customers located? Where is the best location to open a new store? Which areas should be included in the next mailing? How far are my customers willing to drive? One application of GISs is their use as spatial decision support system, helping to create models used to answer questions such as where a company such as Levi Strauss should add authorized resellers or how, where, and what kinds of fertilizers farmers should apply, enabling precision farming (see Table 6.8 for various industry uses of GISs). Depending on the problem to be solved, spatial decision support systems can use factors such as climate, water, transportation, resource management, agriculture, and so on, to build models that help forecast potential outcomes of land use decisions.

In organizational settings, analysts can use GISs to combine geographic, demographic, and other data for locating target customers, finding optimal site locations, or determining the right product mix at different locations; additionally, GISs can be used to perform a variety of analyses, such as market share analysis and competitor analysis. Cities, counties, and states also use GISs for aiding in infrastructure design and zoning issues (e.g., where should the new elementary school be located?). For the various geospatial aspects you can map with GISs, refer to Table 6.9. How does a GIS help in visually analyzing geospatial and related data? Typically, a GIS provides a user with a blank map of an area. The user can then add data stored in different **layers**, each resembling a transparency containing different information about the area; for example, one layer may contain all roads, another layer may contain ZIP code boundaries, and yet other layers may contain floodplains, average household sizes, locations of coffee shops, or other information of interest (in Google Earth, you can view various layers, such as roads, traffic patterns, weather, earthquakes, golf courses, and so on; see Figure 6.25). Adding or removing those layers helps to view the relevant information needed to answer questions that have a spatial dimension.

One question that organizations often face is where the customers come from. In order to answer this question, organizations typically use data from survey respondents (or the cashier asks for customers' ZIP codes); these data are then geocoded (i.e., transformed into coordinates) to create a layer containing customer data that can then be added to a map. Comparing customers' locations with the location of one's business can help in deciding whether the store has the

TABLE 6.8 Various Industry Uses of GISs

Industry	Sample Uses
Agriculture	Analyze crop yield by location, soil erosion, or differences in fertilizer needs (precision farming)
Banking	Identify lucrative areas for marketing campaigns
Disaster response	Analyze historical events, set up evacuation plans, and identify areas most likely to be affected by disasters
Environment and conservation	Analyze wildlife behaviors or influences of climate change
Insurance	Risk analysis (e.g., earthquake insurance)
Government	Urban planning, zoning, and census planning
Law enforcement	Analyze high-crime areas
Marine biology	Track movements of fish swarms
Media	Create maps to visualize locations of events and analyze circulation
Mining and drilling	Locate potential areas for extraction of natural resources
Real estate	Create maps to visualize locations of properties
Retail	Analyze sales, inventory, customers, and so on, by location; identify new retail locations; and visualize and present business data
Transportation and logistics	Route planning

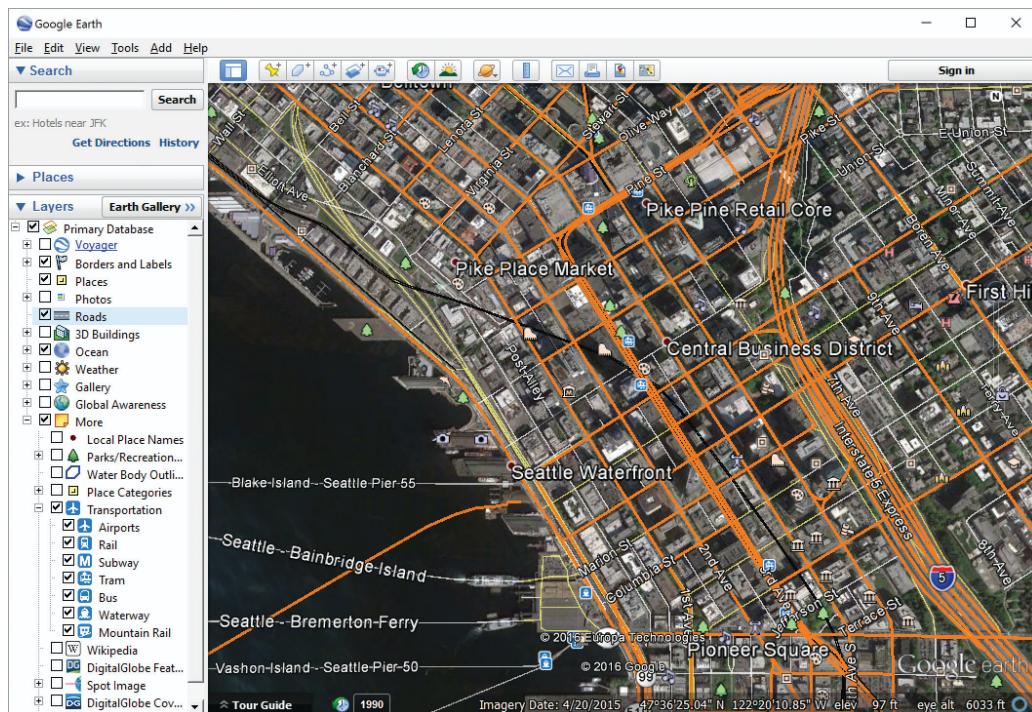
Source: Based on ESRI, <http://www.esri.com/what-is-gis/who-uses-gis>.

optimal location or whether opening a new store would be warranted. Relatedly, trade area analysis helps to assess where customers are coming from by combining location information with, for example, drive time information to determine if certain areas are underserved or if two stores' trade areas overlap. Another way to visualize geospatial data is by using thematic maps. Thematic maps color-code data that are aggregated for specific geographic regions. For example, a thematic map could display the median household income in different blocks, or it could display average household sizes, helping a business to identify areas with the most promising target population; similarly, an insurance company could use GISs to determine where certain crimes

TABLE 6.9 Various Ways of Representing Geospatial Data

Mapping	Example
Features and patterns (i.e., distribution of features)	Earthquake epicenters (features) and areas where the hazard may be highest (patterns)
Quantities	The number of young families with a high income in a census district
Densities	Number of high-income families per square mile in a census district
What's inside	Does a luxury real estate development fall within a 15-minute driving radius of a store?
What's nearby	How many Starbucks stores are within 5 miles of my new coffee shop?
Change	How have store sales changed after a large ad campaign?

Source: Based on ESRI, <http://www.esri.com/what-is-gis/overview>.

**FIGURE 6.25**

Google Earth uses layers to display information related to a specific geographical area.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.

(such as car theft) most frequently occur. Another use of GIS is analyzing paths shoppers take in a retail store, allowing retailers to assess whether the placement of products or promotional displays is effective.

GIS benefit greatly from advances in machine learning, especially for recognizing and classifying geographical features, such as land or soil. In particular, many situations (such as in agriculture, resource extraction, or nature conservation) require the analysis of aerial imagery (acquired using satellites or drones). Typically, such classification tasks are inherently imprecise and do not lend themselves easily to binary classifications. Machine learning algorithms, however, enable such analyses, offering much potential for applications ranging from agriculture to disaster recovery.

Further, the Internet of Things and mobile technologies have enabled far more meaningful analyses than ever. For example, Google Maps performs real-time analyses of location data from literally hundreds of millions of mobile phone users (such as Android users who have location services enabled or iPhone users running Google Maps) to estimate the number of cars and traffic conditions on any given road; such analyses enable Google to provide information about traffic conditions and suggest alternative routes in case there are traffic jams on a given route. In addition, Google has used these data to build a tremendous repository of historical traffic data, allowing Google to predict how traffic conditions are likely to be once a user reaches a certain area. Likewise, the data collected by countless IoT devices can be augmented with geospatial data, allowing users to harness the benefits of IoT technologies in mobile settings, where precise information about a sensor's location is needed.

In addition to helping in analysis, GISs are also increasingly used by governments and organizations to effectively communicate with stakeholders. For example, many retail chains such as Best Buy and Walmart incorporate map-based store locators into their websites. When users search for a store by city, state, or ZIP code, the website returns a map showing the store's location (geographic data) along with attribute data such as distance, street address, phone number, and opening hours. Similarly, organizations use output from GISs to communicate to their stockholders about expansion plans, retail store density, and the like.

Clearly, GISs, like all the systems described here, are providing organizations with business intelligence to better compete in the digital world.



INDUSTRY ANALYSIS

Healthcare

Do you remember the times when your doctor wrote a prescription and the handwriting was worse than your professor's, making you wonder how the pharmacist could ever decipher it and dispense the correct drugs? If you recently went to a doctor, you may have noticed that information systems have had a huge impact on the healthcare field; indeed, health informatics (or healthcare IS) has become a key focus of healthcare providers, insurance companies, and governments. Now, many doctors carry laptops or tablets, allowing them to digitally store any diagnosis, facilitating the sharing of information between the physician, nurses, and even your medical insurance provider. In addition to providing access to electronic patient records, the laptop or tablet provides your physician access to medical and drug information, as offered by the *Physician's Desk Reference* website (www.pdr.net), where your physician can obtain the latest information about drugs and clinical guidelines or check interactions between different drugs.

Information systems have also tremendously changed the diagnosis and monitoring of patients. For example, modern electroencephalogram (EEG) and electrocardiogram (EKG) devices heavily depend on computer technology, and, as the name implies, computed tomography (used to produce images of internal organs) could not be performed without computer technology. Even diagnostic tests such as X-rays now use digital technology, allowing the doctor to digitally enhance the image for improved diagnosis or to electronically transmit the image to a remote specialist. Following the diagnosis of a serious condition, technology can even help in the operating room. For example, many modern clinics use surgical robots and endoscopes for delicate procedures such as neurosurgery or gastrointestinal surgery. Taken a step further, such systems can be used for what is referred to as telemedicine, including remote diagnosis and remote surgery. Whereas traditionally a patient had to travel thousands of miles to visit a specialized surgeon, many surgeries can now be performed remotely, reducing the strain on the patient and potentially saving precious time. Further, telemedicine applications can be used for remote locations, battlefields, or even prisons, reducing costs for transporting patients and improving care.

Just as physicians, insurance companies, and healthcare providers are turning to information systems to improve business processes and better serve patients' needs, consumers are increasingly using the Internet for health information. For example, WebMD is one of the most popular websites providing health-related information, priding itself on having high-quality, timely, and unbiased information. In addition to objective information, people use social media to obtain information beyond what's published by the experts. Specifically, people seeking physician and hospital rankings or recommendations frequent blogs, health-related discussion forums, or review sites such as RateMDs (ratemds.com)

or Angie's List (angieslist.com). Further, major search engines such as Microsoft's Bing are constantly refining their search algorithms to provide the most relevant information to health-related queries. Another important trend is the use of personal sensors, devices, and services to keep track of a variety of things about your health and well-being. For example, there are numerous products to help you quantify various aspects of your life, from Wi-Fi-connected body scales and fitness trackers to mood monitoring, blood testing, sleep monitoring, and even DNA sequencing. The Internet of Things is playing a huge role in fueling various aspects of the *quantified self*, a movement to incorporate data acquisition on various aspects of a person's daily life in order to chart self-improvement and other objectives. These and other data sources throughout the digital world are creating massive amounts of data that can be used by researchers to better understand various health-related issues. Likewise, doctors and hospitals are increasingly using IoT-enabled healthcare devices, and healthcare providers are using data analytics for everything from researching drug interactions to monitoring healthcare costs, quality of service, and effectiveness of treatments. Needless to say, Big Data and analytics are transforming the healthcare industry.

Regardless of whether you're visiting your doctor about a condition or for a routine checkup or if you need more information about what your doctor is telling you, various information systems are likely to play a major role.

Questions

1. Discuss the benefits and drawbacks of online medical records.
2. Computer-aided diagnosis can replace years of experience, providing opportunities for young, inexperienced physicians. Contrast the benefits and drawbacks for the patients and the physicians.
3. Will there be a place for physicians without computer skills in the future? Why or why not?

Based on:

Anonymous. (n.d.). What is telemedicine? *American Telemedicine Association*. Retrieved June 29, 2016, from <http://www.americantelemed.org/about-telemedicine/what-is-telemedicine>

Massey, P. M. (2016). Where do U.S. adults who do not use the Internet get health information? Examining digital health information disparities from 2008 to 2013. *Journal of Health Communication*, 21(1), 118–24.

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Telemedicine. (2016, June 22). In Wikipedia, *The Free Encyclopedia*. Retrieved June 29, 2016, from <https://en.wikipedia.org/w/index.php?title=Telemedicine&oldid=726471226>

Key Points Review

1. Describe the need for business intelligence and advanced analytics and how databases serve as a foundation for making better business decisions.

Businesses need to quickly respond to external threats and opportunities arising from unstable market conditions, fierce competition, short product life cycles, government regulation, or fickle customers; business intelligence and advanced analytics tools can help organizations gain meaningful insights from ever-increasing amounts of structured and unstructured data. Organizations use databases to capture and manage the data that can later be used as input to business intelligence applications. A database is a collection of related data organized in a way that facilitates data searches and contains entities, attributes, records, and tables. A DBMS is a software application with which you create, store, organize, and retrieve data from a single database or several databases. The data within a database must be adequately organized so that it is possible to store and retrieve data effectively. To support more effective business processes, businesses use online transaction processing. Data from operational systems serve as an input to informational systems. Master data management helps organizations to arrive at a “single version of the truth” to gather business intelligence; data warehouses and data marts support the integration and analysis of large data sets.

2. Explain core concepts of business intelligence and advanced analytics. Business intelligence tools enable business users to analyze past and current data to obtain an understanding what has happened. Traditionally, decision support systems were used to support human

and automated decision making. OLAP tools offer the ability to perform complex multidimensional queries. Visualization refers to the display of complex data relationships using a variety of graphical methods. Results of complex analyses as well as key performance indicators are displayed on digital dashboards, which are often used to provide decision makers with the right information in an easy-to-understand way. Visual analytics combines the human visual system and analysis techniques to aid in the analysis of complex relationships and make sense of “noisy” data. Advanced analytics tools, in contrast, are used by business users as well as business analysts and data scientists to gain a deeper understanding of why things happened and to build predictive models. Advanced analytics models are often used to discover “hidden” relationships in data. Data mining is used for association discovery and clustering and classification. Unstructured data analysis is used to extract information from textual documents. Intelligent systems, based on machine learning and artificial neural networks, work to emulate and enhance human capabilities.

3. Describe how organizations can enhance decision making by using knowledge management and geographic information systems.

Knowledge management systems are a collection of technology-based tools that enable the generation, storage, sharing, and management of tacit and explicit knowledge assets. GISs aid in storing, analyzing, and managing geographically referenced data and provide spatial decision support for a variety of applications.

Key Terms

ad hoc query	236	data dictionary	234	explicit knowledge asset	254
advanced analytics	226	data-driven organization	226	extraction, transformation, and loading	238
algorithm	246	data mart	239	fact	241
artificial intelligence (AI)	251	data mining	246	form	235
association discovery	246	data mining agent	252	fuzzy logic	250
attribute	231	data model	234	geographic information system (GIS)	257
bot	252	data reduction	246	in-memory computing	241
business analytics	226	data science	245	informational system	237
business intelligence (BI)	226	data type	234	intelligent agent	252
business rules	234	data warehouse	238	intelligent system	251
buyer agent	252	decision support system (DSS)	240	key-indicator report	236
chatbot	252	destructive agent	252	knowledge assets	254
classification	247	digital dashboard	242	knowledge management	254
clickstream data	249	dimension	241	knowledge management system	255
clustering	247	drill down	241	knowledge portal	256
competitive intelligence	248	drill-down report	236	layer	257
continuous planning process	229	entity	231		
data cleansing	238	exception report	236		

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 machine learning 249
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 NoSQL 233
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 tacit knowledge asset 254
 text mining 248
 unstructured data 228
 user agent 252
 visual analytics 244
 visual data discovery 244
 visualization 242
 web content mining 248
 web crawler 252
 web spider 252
 web usage mining 249
 what-if analysis 240



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

Review Questions

- 6-1.** How can a continuous planning process help businesses respond to external threats and opportunities?
- 6-2.** Describe the differences between entities, tables, rows, and attributes in a database.
- 6-3.** What is the importance of master data management?
- 6-4.** What are the advantages of a DBMS?
- 6-5.** Explain the differences between OLAP and OLTP.
- 6-6.** How can visual analytics be used to improve decision making?
- 6-7.** Describe how OLAP enables a user to conduct multidimensional queries.
- 6-8.** Explain the difference between clustering and classification.
- 6-9.** What is the relationship between measures and dimensions?
- 6-10.** Describe and give examples of two types of web mining.
- 6-11.** What is a website's stickiness, and why is it important?
- 6-12.** Explain the purpose of a model within a DSS.
- 6-13.** Describe four types of intelligent agents. How can they be used to benefit organizations?
- 6-14.** What is a knowledge management system, and what types of technologies make up a comprehensive system?
- 6-15.** What is the purpose of using layers in GIS applications?

Self-Study Questions

- 6-16.** In an RDBMS, an entity is represented as a(n) _____.
- attribute
 - table
 - row
 - association
- 6-17.** A(n) _____ report provides a summary of critical metrics on a recurring schedule.
- scheduled
 - exception
 - key indicator
 - drill-down
- 6-18.** In order to swiftly respond to a highly competitive and rapidly changing environment, organizations utilize a _____.
- continuous planning process
 - structured decision-making process
 - structured decision support process
 - continuous decision-making process
- 6-19.** To determine the likelihood of new customers to default on a loan, a manager in a bank would typically use _____.
 A. association discovery
 B. sequence discovery
 C. classification
 D. clustering

- 6-20.** Web usage mining entails analyzing _____.
A. clickstream data
B. page content
C. associations among sets of items
D. unstructured data
- 6-21.** Market share analysis is typically used by the _____ function of an organization.
A. marketing
B. accounting
C. production
D. management science
- 6-22.** Big Data is characterized by all of the following except _____.
A. verifiability
B. velocity
C. variety
D. volume
- 6-23.** _____ agents keep track of key information such as inventory levels, notifying the users when conditions change.
A. User
B. Buyer
C. Monitoring and sensing
D. Data mining
- 6-24.** What is true about knowledge management?
A. As baby boomers retire at an increasing rate, knowledge management is helping organizations capture their knowledge.
B. A knowledge management system is not a single technology but a collection of technology-based tools.
C. Finding the right technology to manage knowledge assets is much easier than identifying what knowledge is needed, why it is needed, and who has this knowledge.
D. All of the above are true.
- 6-25.** Which of the following is an example of attribute data commonly used in GIS applications?
A. structured data
B. longitude
C. trade area
D. annual sales

Answers are on page 265.

Problems and Exercises

- 6-26.** Match the following terms with the appropriate definitions:
i. Social network analysis
ii. Measures
iii. Master data
iv. Web content mining
v. Continuous planning process
vi. Data mining
vii. Business intelligence
viii. Digital dashboard
ix. Geographic information system
x. DSS

a. An information system designed to store and analyze spatially referenced data
b. Tools and techniques for analyzing and visualizing both structured and unstructured data to obtain an understanding of current and past performance
c. A technique that attempts to find groups of people who work together, to find people who don't collaborate but should, or to find experts in particular subject areas
d. A set of methods used to find hidden predictive relationships in a data set
e. A strategic business planning process involving continuous monitoring and adjusting of business processes to enable rapid reaction to changing business conditions
f. The values or numbers a user wants to analyze
g. A special-purpose information system designed to support organizational decision making

h. Extracting textual information from web documents
i. A user interface visually representing summary information about a business's health, often from multiple sources
j. The data that are deemed most important in the operation of a business
- 6-27.** Interview a top-level executive within an organization with which you are familiar and find out the organization's most important external threats. Can business intelligence or advanced analytics tools help to respond to these threats? If so, how; if not, why not?
- 6-28.** Visit www.amazon.com and search for a product of interest to you. What attributes are likely stored in Amazon.com's database?
- 6-29.** Using a search engine, enter the key word "data warehousing." Who are the large vendors in this industry? What type of solutions do they offer to their clients? Do you see any common trends in data warehousing?
- 6-30.** Visit CNN Money (<http://money.cnn.com/calculator/retirement/retirement-need>) on the web to plan your retirement using a DSS. What did you learn? To what extent is the DSS useful in planning your retirement? If you browse through CNN Money, what other interesting stuff do you find?
- 6-31.** Interview a top-level executive within an organization with which you are familiar and determine the extent to which the organization utilizes tools for information visualization or digital dashboards. Does this individual utilize these tools in any way? Why or why not? Which executives do utilize such tools?

- 6-32.** Think about the junk mail you receive every day in your postal mail. Which mailings do you believe to be a result of data mining? How have the companies chosen you for their targeted mailings?
- 6-33.** Think about the junk mail in your e-mail program's spam folder. What types of advanced analytics methods does your e-mail program's spam filter use to identify spam e-mails?
- 6-34.** Describe your experiences with GIS. What tasks or problems have you used GIS for? For which personal decisions would a GIS be especially relevant? Provide specific examples.
- 6-35.** Go out onto the web and compare three shopping bots (e.g., www.mysimon.com, www.shopzilla.com, www.shopping.com, or www.pricegrabber.com) for a product you are interested in. Did the different agents find the same information, or were there any differences? Did you prefer one over the others? If so, why?
- 6-36.** Have you seen or used ad hoc, exception, key-indicator, and/or drill-down reports? What is the purpose of each report? Who produces and who uses the reports? Do any of these reports look or sound familiar from your work experience?
- 6-37.** Interview an IS manager within an organization. What types of information and knowledge discovery tools does the organization use? Was there an increase or decrease in the past few years? What predictions does this manager have regarding the future of these systems? Do you agree? Prepare a 10-minute presentation to the class on your findings.
- 6-38.** For your university, identify several examples of various knowledge assets, classify these as tacit or explicit, and rate them on their value to the university on a 10-point scale (1 = low value to 10 = high value).
- 6-39.** Examine your university's website to identify examples where a knowledge management system could be used or is being used to help provide improved services to students.
- 6-40.** How do you prefer your desired information to be presented? Do you use any type of visualization tools? If so, which ones?
- 6-41.** Visit Google maps (<http://maps.google.com>) and try out the different layers provided. What other information would you like to see? Are there any publicly available mashups that offer this information as layers on top of Google Maps?

Application Exercises

Note: The existing data files referenced in these exercises are available on the book's website: www.pearsonhighered.com/valacich.



Spreadsheet Application: Travel Loan Facility

- 6-42.** A new aspect of the business has been added to Campus Travel. Students can apply for a loan to help pay for their travels. However, loans for travel are available only to students who are traveling outside the country for at least 2 weeks. Because the costs for this type of international travel differ depending on how you travel, where you stay, and what you do at the destination, different loan packages are available. For a month in Europe, you have decided to take out a loan. You have already taken a look at several offers but are unsure whether you can afford it. Set up a spreadsheet to calculate the payments per month for the following situations:
- 2 weeks in Eastern Europe; price: US\$2,000; interest rate: 5.5%; Time: 1 year
 - 2 weeks in Western Europe; price: US\$3,000; interest rate: 6.0%; time: 1 year
 - 3 weeks in Eastern Europe; price: US\$3,000; interest rate: 6.5%; time: 2 years
 - 3 weeks in Western Europe; price: US\$3,500; interest rate: 5.5%; time: 2 years
 - 4 weeks in Eastern Europe; price: US\$4,000; interest rate: 6.0%; time: 2 years
 - 4 weeks in Western Europe; price: US\$5,000; interest rate: 6.5%; time: 2 years

Once you have calculated the payments, calculate the total amount to be paid for each option as well as the total interest you would pay over the course of the loan. Make sure to use formulas for all calculations and submit a professionally formatted page displaying the results and a page displaying the formulas. (Hint: In Microsoft Excel, use the “PMT” function in the category “Financial” to calculate the payments. Use Ctrl+` [grave accent] to switch between formula and data views; calculate the number of payments before using the formula.)



Database Application: Tracking Regional Office Performance at Campus Travel

- 6-43.** The general manager wants to know which offices were most profitable during the previous year and asks you to prepare several reports. In the file FY2012.mdb, you find information about the offices, sales agents, and destinations. Use the report wizard to generate the following reports:
- List of all sales agents grouped by office (including total number of agents per office)
 - List of all sales agents for each destination (grouped by destination, including total number of agents)
 - Destinations sold by each sales agent (including total number of destinations)

Hint: You will need to generate the necessary queries before creating the reports.

Team Work Exercise



Net Stats: The Demise of Broadcast TV

Recent studies of the broadcast TV industry indicate that it is in trouble. More and more people are choosing not to watch TV in the conventional “appointment” way. According to Nielsen, in 2015, 226 million people in the United States watched TV/video content via their TV set, either live or via a DVR, compared with 191 million who watched content on a smartphone, 162 million who watched content using a PC connected to the Internet, 106 million who watched on a tablet, and another 158 million who watched DVR (i.e., time-shifted) content. And, of course, many consume content using a combination of formats and methods. Nevertheless, while traditional radio and broadcast TV continue to reach the most users, their market share is eroding to Internet- and mobile-delivered content. These changes tend to be especially strong in young people, with broadcast TV consumption dropping steadily in favor of digital delivery on smartphones, tablets, and PCs.

Questions and Exercises

- 6-44. Search the web for the most up-to-date statistics. Try to find the statistics for other demographics and countries as well.
- 6-45. As a team, interpret these numbers. What is striking/important about these statistics? What may be the reason for differences between countries?
- 6-46. How have the numbers changed since 2016?
- 6-47. Using your spreadsheet software of choice, create a graph/figure that effectively visualizes the statistics/changes you consider most important.

Based on:

Anonymous. (2016, June 27). The total audience report: Q1 2016. *Nielsen*. Retrieved June 28, 2016, from <http://www.nielsen.com/us/en/insights/reports/2016/the-total-audience-report-q1-2016.html>

Answers to the Self-Study Questions

6-16. B, p. 231

6-17. C, p. 236

6-18. A, p. 229

6-19. C, p. 247

6-20. A, p. 249

6-21. A, p. 240

6-22. A, p. 228

6-23. C, p. 249

6-24. D, p. 254

6-25. D, p. 257

CASE 1 | NSA: National Surveillance Agency?

In the 1950s, shortly after the end of World War II, President Harry S. Truman oversaw the organization of a secret security and intelligence organization, tasked with gathering and analyzing intelligence data in defense of the interests and operations of the United States and its government. The organization—named the National Security Agency (NSA)—has since grown to become one of the largest intelligence organizations in the world, with an estimated workforce of about 40,000 employees and annual budget of nearly US\$11 billion (these are estimates because this type of information about the NSA is classified). The NSA has been involved in gathering intelligence on a wide range of issues and individuals, from the Vietnam War to Martin Luther King Jr. to the post-9/11 War on Terror. By design, many of the NSA’s successes are classified and not known to the general public, but the agency has been credited with providing key intelligence in support of major military and investigatory operations over the past several decades.

In its relentless pursuit of intelligence to defend U.S. national interests, the NSA has embraced technology and the vast amounts of digital data available across the globe. In late 2013, a series of disclosures of classified internal NSA documents revealed the extent of the NSA’s spying activities. Most of these disclosures were provided by a former NSA contractor named Edward Snowden. These documents revealed that the NSA regularly intercepts the telephone and Internet communications of more than a billion people worldwide. The NSA tracks the locations of hundreds of millions of cell phones per day. The organization reportedly has access to at least some communications made via services provided by AOL, Google, Microsoft, Facebook, and Yahoo! and collects hundreds of millions of contacts lists from personal e-mail and instant messaging accounts every year. The NSA also collects and stores cell phone call records from major cell phone providers. These surveillance activities have not been limited to countries considered to be enemies of the United States—they

include longtime friendly countries such as France, Germany, and Spain. Perhaps most unsettling for U.S. citizens is the fact that NSA surveillance has also been targeted at U.S. citizens within U.S. borders, which appears to many as a clear violation of the Foreign Intelligence Surveillance Act of 1978—a law designed to limit the practice of mass surveillance in the United States.

Given that many of the NSA’s activities are classified, it is hard to know how effective these massive surveillance practices have been in defending U.S. national interests and U.S. citizens. To some extent, many citizens likely expect the government to engage in spying and other intelligence-gathering practices to protect the public against terrorism, crime, or other dangers. To this end, the NSA reportedly provides foreign intelligence to the Central Intelligence Agency (CIA) regarding terrorist activities and domestic intelligence to the Drug Enforcement Administration (DEA) and Federal Bureau of Investigation (FBI) regarding drug and other criminal activities. But just how much

intelligence gathering the NSA should engage in, and from whom, is a matter that has come under strong debate. Judging by the public outcry in response to the revelations from Edward Snowden's leaked documents, many people, both within and outside of the United States, believe that the NSA has gone too far. It was disclosed in the Snowden documents that the NSA monitored who was reading specific related topics such as "car bomb" or "jihad." In 2016, researchers reported that people significantly reduced, by nearly 30 percent, their viewing of such information compared with before the NSA's surveillance program was revealed.

In some sense, the NSA surveillance activities are little more than advanced business intelligence initiatives. In the modern world, we leave digital footprints in nearly

all of our daily activities, from e-mail to text messages to phone calls to social media. The NSA has developed methods to collect and store these data, much to the consternation of many people now learning of these practices. But many large businesses engage in similar activities, perhaps not on the same scale but with equal disregard for the privacy of the people being tracked. Google, Facebook, and many online advertising networks that you have likely never heard of go to great lengths to record where we go and what we are watching, listening to, and reading. These activities provide powerful business opportunities for segmented marketing, and they are the revenue source supporting many of the online services that we enjoy for free.

So how do we balance the privacy issues caused by surveillance—both by governments

and online companies—with the valid purposes that these organizations use to justify their activities? Would you rather that the U.S. government miss the opportunity to stop a terrorist organization before it strikes because the NSA stopped monitoring electronic communications? Would you be willing to pay a yearly subscription fee to Google in order to use its search engine or e-mail services? Would you be willing to pay a fee each time you "friended" someone or posted a new photo album on Facebook? These are extreme examples, but they highlight the conflict inherent in any discussion that tries to weigh privacy against business intelligence practices. For governments and companies to succeed and provide the services we expect, we may need to become more comfortable with giving up some of our privacy.

Questions

- 6-48.** Do you think that the NSA has gone too far in its surveillance activities? Why or why not?
- 6-49.** What are the pros and cons inherent to data collection for business or national intelligence?
- 6-50.** Propose a set of guidelines for the NSA to direct its surveillance activities in the future.

Based on:

Blake, A. (2016, April 27). NSA surveillance has had a chilling effect on Internet browsing: report. *The Washington Times*. Retrieved June 29, 2016, from <http://www.washingtontimes.com/news/2016/apr/27/nsa-surveillance-has-had-chilling-effect-internet/>

Edward Snowden. (2016, June 29). In Wikipedia, *The Free Encyclopedia*. Retrieved June 29, 2016, from https://en.wikipedia.org/w/index.php?title=Edward_Snowden&oldid=727462069

Global surveillance disclosures (2013–present). (2016, June 18). In Wikipedia, *The Free Encyclopedia*. Retrieved June 29, 2016, from [https://en.wikipedia.org/w/index.php?title=Global_surveillance_disclosures_\(2013%E2%80%93_present\)&oldid=725872661](https://en.wikipedia.org/w/index.php?title=Global_surveillance_disclosures_(2013%E2%80%93_present)&oldid=725872661)

National Security Agency. (2016, June 26). In Wikipedia, *The Free Encyclopedia*. Retrieved June 29, 2016, from https://en.wikipedia.org/w/index.php?title=National_Security_Agency&oldid=727098938

PRISM (surveillance program). (2016, June 10). In Wikipedia, *The Free Encyclopedia*. Retrieved June 29, 2016, from [https://en.wikipedia.org/w/index.php?title=PRISM_\(surveillance_program\)&oldid=724687804](https://en.wikipedia.org/w/index.php?title=PRISM_(surveillance_program)&oldid=724687804)

Shane, S. (2013, November 2). No morsel too minuscule for all-consuming N.S.A. *The New York Times*. Retrieved June 29, 2016, from <http://www.nytimes.com/2013/11/03/world/no-morsel-too-minuscule-for-all-consuming-nsa.html>

CASE 2 | Gathering Social Intelligence

In recent years, social media have become pervasive throughout society. No one can deny that social media have completely changed the context of privacy, shaping and reshaping relationships, exaggerating ideals of sharing, and reconstructing daily routines in order to visit one's online friends at least once a day. Thanks to social media, people can now share every detail about the most mundane things in life. Updating where you are at any given moment alerts your friends to what you are up to but also allows enterprises to learn how to better market products and promote celebrities.

Responding to the growing influence of social media and, in turn, demonstrating another crucial function of the phenomenon, all types of organizations are finding value in monitoring and digesting the nonstop flow of posts in the social media world. For example,

traditional business intelligence (BI) will inform you where your products are selling well and where they are not. But it will not tell you *why* your product is selling well in one location but not another. By integrating social media with traditional BI tools, you can monitor everything that is being said about your products on various platforms. With such *social intelligence*, you can gain deeper and more timely insights about customers, learning why a product is not selling. As we all know, information can travel fast on social media sites, as information goes viral when people like, share, and retweet information. By carefully monitoring trends, companies can stay ahead of the competition as new information is starting to trend. Countless successful organizations are actively monitoring social media to gain social intelligence regarding the sentiments of current and future customers.

Social media has not only become an important source of up-to-date information for businesses, but it is also emerging as a valuable resource for police and other first responders. Social media users have demonstrated that information about crises can travel at a rate that rivals 911 services. Indeed, analyzing public information is not unusual in the world of intelligence gathering either. Today, social media have people racing to express who they are and what they think, information that has never been this vast and openly accessible. Using such information, the U.S. government is developing tools to forecast everything from revolutions to upheavals to economic changes. Recently released documents also reveal that the U.S. National Security Agency (NSA) uses Facebook and other social media profiles to create maps of social connections. From business

corporations to government agencies, insights about what is happening, or about to happen, can be gleaned from social media where people are compelled to share what they know or think with just about anyone.

Have you checked your Facebook newsfeed today? Or, more accurately, how many

times have you been on Facebook since you woke up this morning? It is astonishing to see what a large part of our lives social media have become. By just keeping an eye on the number of posts your feed gets in an hour, you can easily imagine how analyzing these massive numbers of posts can quickly

become a Big Data problem. On the other hand, gaining social intelligence has become a Big Data opportunity for countless organizations.

Questions

- 6-51.** How will organizations know what to look for when using social media for business intelligence?
- 6-52.** How can government organizations analyze social media activities to predict social upheavals?
- 6-53.** Given the speed and volume of activity on social media, what business analytics and visualization tools could be used to make sense of the information?

Based on:

Burbank, J. (2016, March 25). Why your business intelligence efforts need to involve social media. *TweetFavy*. Retrieved June 29, 2016, from <https://www.tweetfavy.com/blog/2016/03/why-your-business-intelligence-efforts-need-to-involve-social-media>

Martin, A. J. (2016, June 13). US plans intervention in EU vs Facebook case caused by NSA snooping. *The Register*. Retrieved June 29, 2016, from http://www.theregister.co.uk/2016/06/13/us_to_intervene_eu_vs_facebook_case

PRISM (surveillance program). (2016, June 10). In *Wikipedia, The Free Encyclopedia*. Retrieved June 29, 2016, from [https://en.wikipedia.org/w/index.php?title=PRISM_\(surveillance_program\)&oldid=724687804](https://en.wikipedia.org/w/index.php?title=PRISM_(surveillance_program)&oldid=724687804)

Trujillo, M. (2016, May 13). Feds to start mining social media in security clearance reviews. *The Hill*. Retrieved June 29, 2016, from <http://thehill.com/policy/technology/279805-fed-to-start-mining-social-media-in-security-clearance-reviews>



Go to **mymislab.com** for auto-graded writing questions as well as the following assisted-graded writing questions:

- 6-54.** What is the meaning of support and confidence in the context of data mining?
- 6-55.** Explain the difference between explicit and tacit knowledge.

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7

Enhancing Business Processes Using Enterprise Information Systems

Preview

This chapter describes how companies are deploying enterprise-wide information systems to support and enable core business processes. Enterprise systems help to integrate various business activities, to increase coordination among various business departments and partners, to streamline and better manage interactions with customers, and to coordinate better with suppliers in order to more efficiently and effectively meet rapidly changing customer demands.

Companies continue to find that they need systems that span their entire organization to tie everything together. As a result, an understanding of enterprise systems is needed to succeed in today's competitive and ever-changing digital world. This chapter focuses on how organizations are utilizing enterprise-wide information systems to best support internal business processes. In Chapter 8, "Strengthening Business-to-Business Relationships Via Supply Chain and Customer Relationship Management," we focus on systems that support business processes spanning multiple organizations, critical in today's competitive global environment.

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MANAGING IN THE DIGITAL WORLD:

Amazon.com

Amazon.com has transformed how we shop. Having started as an online bookseller, Amazon.com now retails nearly everything, from kitchen appliances to garden furniture and even groceries. Amazon.com strives to provide a superior product selection well beyond the biggest malls and big-box stores paired with the convenience of allowing customers to purchase the products with one click from their computers or mobile devices.

Founded and headed by Jeff Bezos, Amazon.com started in 1994 with a commitment to be "customer-centric." Amazon.com custom-tailors its home page with recommendations for books, music, and other products that may entice you; these recommendations are provided by analyzing your prior purchases and comparing them to those of millions of other customers with similar tastes. Amazon.com offers free shipping when you place orders over US\$25 for books or US\$49 for other types of products. In certain cities, Amazon.com offers same-day delivery on items placed before a cutoff time. Amazon.com is working on a package delivery system that uses small, unmanned drones to deliver small packages within 30 minutes of placing the order.

In order to keep its competitive advantages, Amazon.com uses enterprise-wide information systems to optimize its business processes, ranging from acquiring and receiving the right goods at the right time from its suppliers to efficiently shipping physical goods to its

**After reading
this chapter,
you will be
able to do the
following:**

1. Explain core business processes that are common in organizations.
2. Describe what enterprise systems are and how they have evolved.
3. Describe enterprise resource planning systems and how they help to improve internal business processes.
4. Understand and utilize the keys to successfully implementing enterprise systems.

customers. Amazon.com has built not only a network of dozens of North American and international fulfillment centers for its physical products but also a number of sophisticated data centers to support its operations and offer various digital products and services. Now, Amazon.com even manages online stores and sales fulfillment for many small and large companies, creating a win-win situation: For small, independent retailers, warehousing becomes a variable cost, and for Amazon.com, this creates additional revenue streams and helps to utilize excess capacity (Figure 7.1). Using its information systems (IS) infrastructure, Amazon.com offers Amazon Web Services (AWS), a solid and reliable IS infrastructure that allows companies to rent computing resources or storage space on an as-needed basis or even deploy enterprise resource planning systems in the cloud.

Clearly, Amazon.com is more than a vibrant online store. Having designed an impressive IS infrastructure, Amazon.com is constantly developing new and innovative products and services that utilize this infrastructure. In 2015, with more than 304 million active customer accounts worldwide, Amazon.com posted net sales of US\$107 billion (an increase of nearly US\$20 billion over 2014), making it the leading online retailer in the United States. What the future holds for Amazon.com is inconceivable, given its current rate of innovation and growth.

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

1. How do the core business processes differ for Amazon.com's various product and service offerings?



FIGURE 7.1

Companies can rent Amazon.com's warehouse infrastructure on an as-needed basis.

Source: Bombaert Patrick/Fotolia.

2. How do enterprise-wide information systems enable Amazon.com's strategy?
3. What benefits would an organization realize by running its enterprise resource planning system on Amazon.com's Amazon Web Services (AWS) cloud computing infrastructure?

Based on:

Amazon.com. (2016, April 26). In *Wikipedia, The Free Encyclopedia*. Retrieved April 29, 2016, from <https://en.wikipedia.org/w/index.php?title=Amazon.com&oldid=717233888>

Anonymous. (2016). Statistics and facts about Amazon. *Statista.com*. Retrieved April 29, 2016, from <http://www.statista.com/topics/846/amazon>

Bensinger, G. (2016, April 28). Cloud unit pushes Amazon to record profit. *Wall Street Journal*. Retrieved April 29, 2016, from <http://www.wsj.com/articles/amazon-reports-surge-in-profit-1461874333>

Core Business Processes and Organizational Value Chains

Traditionally, companies are organized around five distinct functional areas: marketing and sales, supply chain management, manufacturing and operations, accounting and finance, and human resources. Each of these functional areas is responsible for various well-defined business functions, such as marketing a product; sales forecasting; procuring raw materials and components; manufacturing goods; planning and budgeting; or recruiting, hiring, and training. Although this model suggests that a company can be regarded as being composed of distinct independent silos, the different functional areas are highly interrelated to perform value-added activities (Figure 7.2). In fact, most business processes cross the boundaries of business functions, so it is helpful for managers to think in terms of business processes from a customer's (both internal and external) point of view.

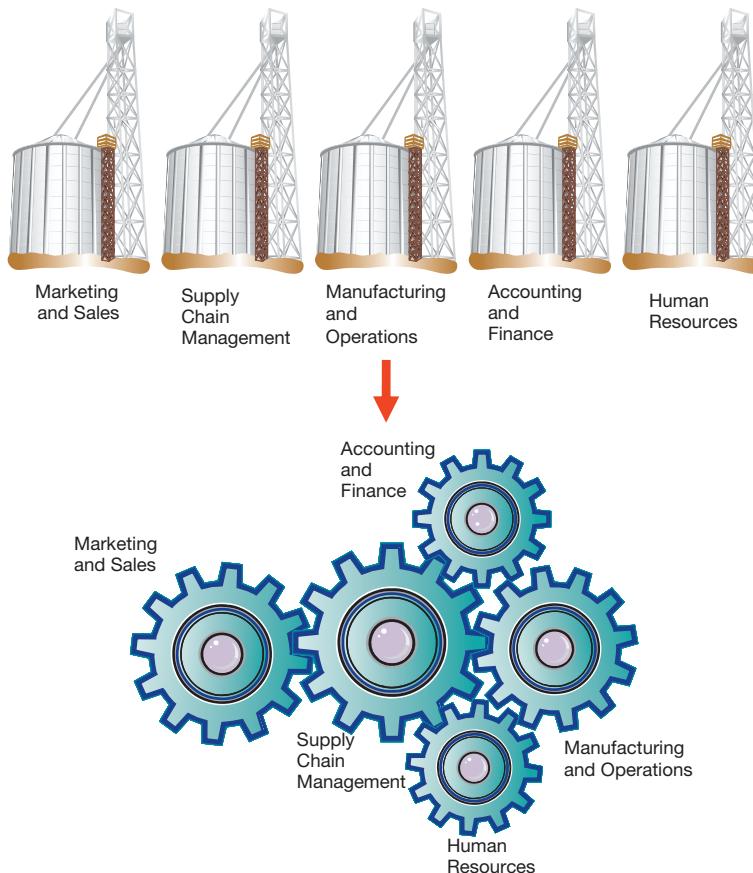
Core Business Processes

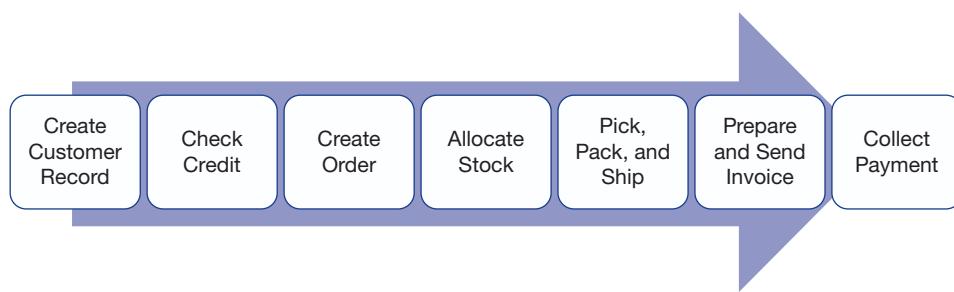
In most cases, customers do not care about how things are being done; they care only that things are being done to their satisfaction. When you buy a book at Amazon.com, you typically do not care which functional areas are involved in the transaction; you care only about quickly getting the right book for the right price. Buying a book at Amazon.com can help to illustrate one of the core business processes, namely, *order-to-cash*. Similarly, *procure-to-pay* and *make-to-stock* are core business processes also common to most business organizations. Other important business processes are related to tracking a firm's revenues and expenses, managing employees, and so on. Next, we discuss the core business processes involved in generating revenue.

ORDER-TO-CASH. For business organizations, selling products or services is the main way of generating revenue. In the example of Amazon.com, you need to create an account and add items to your shopping cart. You then need to complete your order by entering shipping and billing information and submitting the order. Amazon.com will then confirm that your address is valid and will check your credit card information. Your order will then be put together and

FIGURE 7.2

A company's functional areas should be interrelated.



**FIGURE 7.3**

The order-to-cash process.

shipped, and your credit card will be charged. Together, the processes associated with selling a product or service are referred to as the **order-to-cash process** (Figure 7.3). As with all business processes, the order-to-cash process can be broken down into multiple subprocesses (most of which are common across organizations). For most businesses, the order-to-cash process entails subprocesses such as creating a customer record; checking the customer's creditworthiness; creating an order; checking and allocating stock; picking, packing, and shipping; invoicing; and collecting the payment. Depending on the nature of the transaction, the individual subprocesses and the time in which these are completed can differ considerably. For example, a sale in a convenience store may take only several seconds, and many of the subprocesses mentioned (such as creating a customer record) are not needed (although many stores now try to gather information such as customers' ZIP codes for business intelligence). In contrast, large volume orders in business-to-business contexts may take months or years to fulfill and may involve many more steps. The subprocesses can be further broken down to a more granular level.

Obviously, an ineffective order-to-cash process can have various negative effects for organizations; for example, the manual input of order information often causes errors, as do suboptimal picking and shipping processes. Together, such errors can lead to a high rate of disputes that have to be resolved, ineffective collection processes, and, ultimately, defecting customers. In contrast, an effective order-to-cash process can create customer satisfaction, speed up the collection process, and serve to provide valuable inputs into business intelligence and customer relationship management applications (see Chapter 8).

PROCURE-TO-PAY. In order to be able to sell books and other products, Amazon.com needs to acquire these from its suppliers. Amazon.com needs to manage literally thousands of suppliers, place purchase orders, receive the products, allocate warehouse space, receive and pay invoices, and handle potential disputes. These processes associated with procuring goods from external vendors are together referred to as the **procure-to-pay process** (Figure 7.4). Subprocesses of the procure-to-pay process include price and terms negotiations, issuing of the purchase order, receiving the goods, and receiving and paying the invoice.

An ineffective procure-to-pay process can increase error rates in purchase order and invoice processing; further, it inhibits a company from developing close relationships with preferred vendors. Together, this can increase the cost per transaction, lead to an increase in disputes to be resolved, and prevent the company from obtaining the most favorable conditions from its vendors. In contrast, an effective procure-to-pay process can help to obtain favorable conditions, reduce transaction costs, and, ultimately, create customer goodwill as it helps to efficiently fulfill customer orders.

**FIGURE 7.4**

The procure-to-pay process.

MAKE-TO-STOCK/MAKE-TO-ORDER. A third set of core business processes is associated with producing goods (such as Amazon.com's Kindle e-book reader) and entails make-to-stock and make-to-order. In the **make-to-stock process**, goods are produced based on forecasts and are stocked in a warehouse (i.e., a push-based approach); customers' orders are then fulfilled from inventory. In contrast, in the **make-to-order process**, raw materials, subcomponents, and accessories are procured based on forecasts, but actual manufacturing does not start until an order is received (a pull-based approach); in extreme cases, even design and engineering start only when an order is received. For example, mass-produced goods, such as television sets or home appliances, are typically produced under a make-to-stock approach. Here, the organization stocks the produced goods, *pushing* the products out to customers after orders are received. In contrast, highly customizable or very expensive low-volume goods are often produced under a make-to-order approach, as is the case with Dell computers or with commercial aircraft, where the assembly starts only after a customer has placed an order. Here, the organization waits for an order, allowing it to initiate a *pulling* sequence to move the order through the production process. The processes associated with making products are composed of processing customers' orders, procuring the inputs to the manufacturing process, scheduling production, production, quality control, packaging, and stocking or shipping the product. Figure 7.5 illustrates the make-to-stock and make-to-order processes.

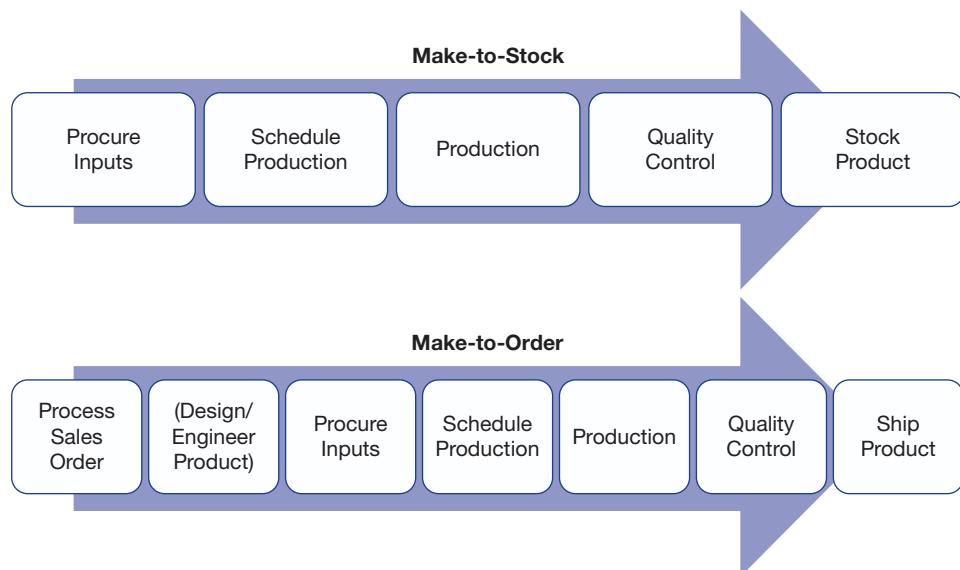
Together, these core business processes enable the creation of supply chains that are involved in transforming raw materials into products sold to the end customer. A typical supply chain resembles a river, where the raw materials start out at the source and move downstream toward the end customer; at each step, the goods are transformed to make the end product. To meet the needs for various different inputs, each organization typically has multiple upstream suppliers; similarly, each organization typically sells to multiple downstream customers. Figure 7.6 shows the supply chain of a book. Within this supply chain, one company's sales-related processes overlap with the downstream company's procurement-related processes (supply chains are discussed in detail in Chapter 8).

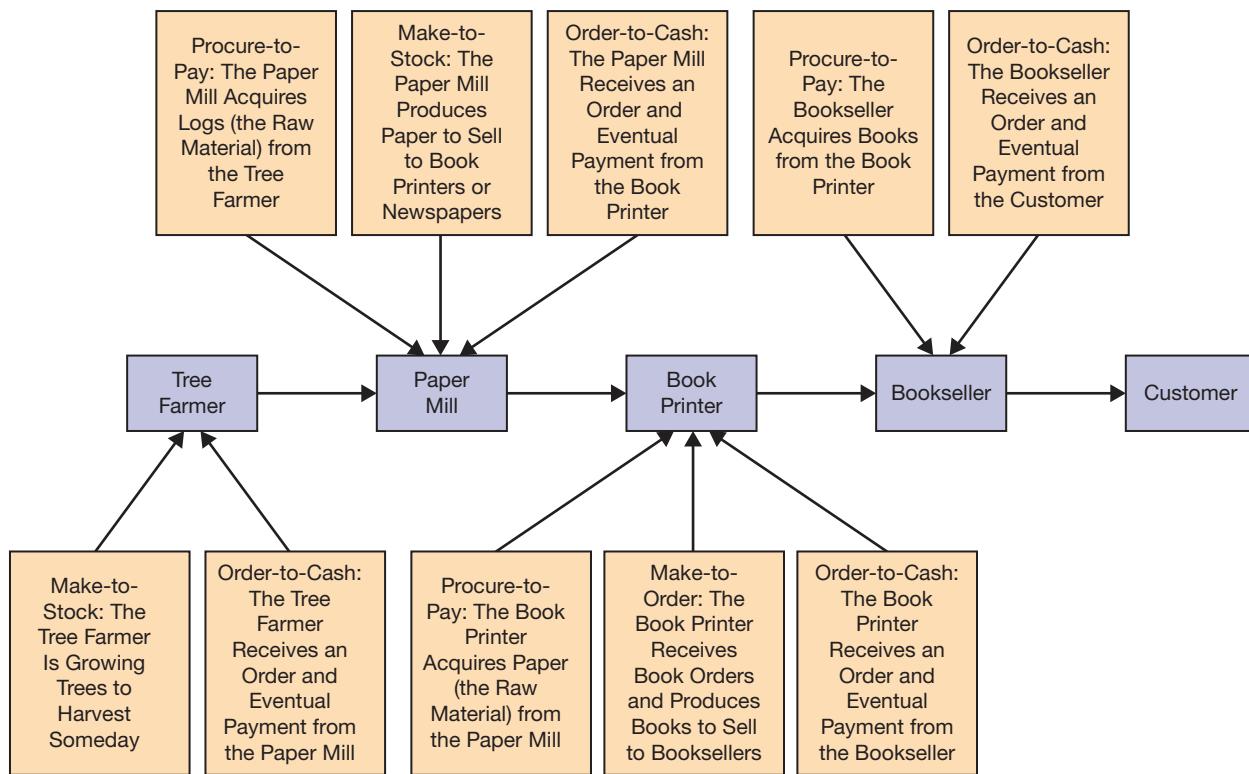
Organizational Activities Along the Value Chain

To gain competitive advantage over their rivals, companies are trying to optimize the core business processes in different ways so as to increase effectiveness and/or efficiency. One of the first challenges an organization must face is to understand how it can use information systems to support core and other business processes. For example, Amazon.com excels at using information systems to optimize both the procure-to-pay and the order-to-cash process. Generally, the set of business activities that add value to the end product is referred to as a *value chain* (Porter & Millar, 1985), in which information flows through functional areas that facilitate an

FIGURE 7.5

The make-to-stock versus the make-to-order process.



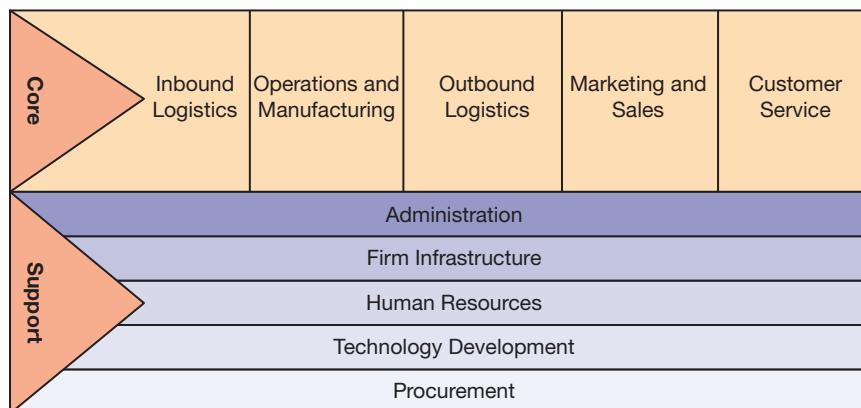
**FIGURE 7.6**

Supply chain of a book.

organization's business processes. Figure 7.7 depicts the value chain framework. In Chapter 2, "Gaining Competitive Advantage Through Information Systems," we spoke of the strategic value of analyzing a value chain. Here, we show you how the activities along the value chain support business processes.

Many business processes depend on activities performed by various functional areas within an organization; for example, Amazon.com's order-to-cash process involves activities performed by sales, shipping, accounting, and other functional areas. The functional areas directly involved in the process are responsible for the core activities, whereas other functional areas are performing support activities. In other words, *core activities* are performed by the functional areas that process inputs and produce outputs, and *support activities* are those activities that enable core activities to take place. In the following sections, we focus on core activities and then turn our attention to the support activities that make them possible.

CORE ACTIVITIES. Core activities include inbound logistics (receiving), operations and manufacturing, outbound logistics (shipping), marketing and sales, and customer service. These

**FIGURE 7.7**

Value chain framework.

Source: Based on How Information Gives You Competitive Advantage. Published by Harvard Business Review, 1985.

activities may differ widely depending on the unique requirements of the industry in which a company operates, although the basic concepts hold in most organizations.

Inbound Logistics Activities Inbound logistics involves the business activities associated with receiving and stocking raw materials, parts, and products. For example, inbound logistics at Amazon.com involves not only the receipt of books, e-book readers, and various other products for sale but also the receipt of packaging materials and shipping labels. Shippers deliver these products to Amazon.com, where employees unwrap the packages and stock the products in the company's warehouse or directly route the products to operations in order to fill open orders. Amazon.com can automatically update inventory levels at the point of delivery, providing purchasing managers access to up-to-date information related to inventory levels and reorder points. Inbound logistics activities (also referred to as supply chain management) are a crucial part of the procure-to-pay business process, as these activities enable the company to efficiently and effectively fill customer orders.

Operations and Manufacturing Activities Once the components have been stocked in inventory, operations and manufacturing activities transform the inputs into outputs. Operations and manufacturing can involve such activities as order processing (e.g., at Amazon.com) and/or manufacturing or assembly processes (e.g., at Dell) that transform raw materials and/or component parts into end products (i.e., the make-to-stock and make-to-order business processes). Companies such as Dell utilize web-based information systems to allow customers to enter orders online. This information is used to coordinate the manufacturing of a customized personal computer in which the component parts are gathered and assembled to create the end product. During this process, inventory levels from inbound logistics are verified; if the appropriate inventory exists, workers pick the components from existing supplies and build the product to the customer's specifications. When components are picked, items are deducted from inventory; once the product is assembled, inventory levels for the final product are updated.

Outbound Logistics Activities The activities associated with outbound logistics mirror those of inbound logistics. Instead of involving the receipt of raw materials, parts, and products, outbound logistics focuses on the distribution of end products within the order-to-cash business process. For example, outbound logistics at Amazon.com involves the shipping of books that customers have ordered. Orders that have been processed by operations are forwarded to outbound logistics, which picks the products from inventory and coordinates shipment to the customer. At that point, items are packaged and deducted from the company's inventory, and an invoice is created that will be sent to the customer. Amazon.com can automatically update sales data at the point of distribution, allowing managers to view inventory and revenue information in real time.

Marketing and Sales Activities Marketing and sales activities are associated primarily with the presales (i.e., before the sale) activities of the company. These activities include the creation of marketing literature, communication with potential and existing customers, and pricing of goods and services. Most companies support the business activity of marketing and sales by creating websites, building pages on Facebook, or communicating on other social media such as Twitter (for further discussion, see Chapter 4, “Enabling Business-to-Consumer Electronic Commerce”). Many companies, especially those focused on selling products or services to the end consumer (e.g., passenger airlines such as United or online retailers such as Amazon.com), use information systems to update pricing information and/or schedules. This information is entered directly into the pricing and scheduling systems, allowing the information to become immediately accessible throughout the organization and to end consumers through the organization’s website.

Customer Service Activities Whereas marketing and sales focus on presales activities, customer service focuses on post-sales (i.e., after the sale) activities. Customers may have questions and need help from a customer service representative. For most companies, such as Amazon.com, utilizing information systems to provide customer service is essential, especially given the vast number of products offered. These applications allow customers to search for and download information related to the products that they have purchased or the purchase itself.



GREEN IT

Why Your Enterprise Systems Should Be in the Cloud

Green IT refers to the practice of using computers and other IT resources in a more efficient and environmentally responsible way. A big part of the Green IT movement has focused on cloud computing. Recall that cloud computing refers to a computing model that enables ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., servers, applications, etc.) that can be rapidly provisioned and released as needed with very little human intervention. Compared with traditional in-house architectures, cloud-based architectures are very efficient, allowing for the sharing of resources among multiple organizations in a much more efficient manner, and are therefore widely considered to be a much greener alternative than separate dedicated facilities for each company. One of the largest and most resource-consuming computer application for many companies is their enterprise-level systems. Thus, moving a company's enterprise systems into the cloud can provide many benefits.

One obvious benefit of moving an enterprise system onto a greener platform is that the organization will become known for sustainable business practices. Being known as a sustainable business can provide a competitive advantage in a world where a company's social responsibility (or lack thereof) can play a great role in its success (or failure). In addition to the marketing benefits, the economics of a cloud-based architecture can be compelling. Benefits of using a cloud-based

architecture include low capital outlays to get a system up and running, lower operating costs, better IT resource utilization, increased security, better ability to adjust to demand changes, and faster and more efficient deployment and upgrading. By going to the cloud, companies are often concerned with the reduced control over data and operations, but as cloud architectures continue to mature, such concerns are rapidly diminishing.

Increasingly, companies are moving their enterprise systems to the cloud, feeling that the benefits outweigh the risks. When moving to the cloud, it is critical that a strong and reliable cloud service provider be chosen. If a provider unexpectedly shuts down, the benefits of choosing the lowest-priced provider will quickly turn into an IT nightmare. Likewise, companies moving their enterprise systems to the cloud should take into account the energy sources used by the cloud service provider.

Based on:

Boyce, A. (2016, April 27). The difference between on-premises and cloud ERP software. *TechTarget*. Retrieved May 17, 2016, from <http://searchmanufacturingerp.techtarget.com/feature/The-differences-between-on-premises-and-cloud-ERP-software>

Williams, S. (2016, January 13). How to give your business the competitive edge. *BizEdge*. Retrieved May 17, 2016, from <https://bizedge.co.nz/story/how-give-your-business-competitive-edge>

For example, on Amazon.com customers can view their order status or can view and print invoices of current and past orders. Similarly, customers can find additional information and support about the Amazon Kindle or other digital products. Rather than calling a customer service representative, customers can easily find the needed information through a self-service customer support application. Information systems also enable customer service representatives to quickly locate information about products or services offered.

Companies can also use information systems to track service requests. When a customer calls in for repairs to a product, customer service representatives can access a bevy of information related to the customer. For instance, an agent can access technical information concerning the specific product as well as review any problems the customer has encountered in the past. This enables customer service representatives to react quickly to customer concerns, improving the customer service experience.

SUPPORT ACTIVITIES. Support activities are business activities that enable the primary activities to take place. Support activities include administrative activities, infrastructure, human resources, technology development, and procurement.

Administrative Activities Administrative activities focus on the processes and decision making that orchestrate the day-to-day operations of an organization, particularly those processes that span organizational functions and levels. Administration includes systems and processes from virtually all functional areas—accounting, finance, marketing, operations, and so on—at all levels of an organization.

Infrastructure Activities Infrastructure refers to the buildings, machinery, and IS infrastructure components that must be implemented to provide the necessary components that

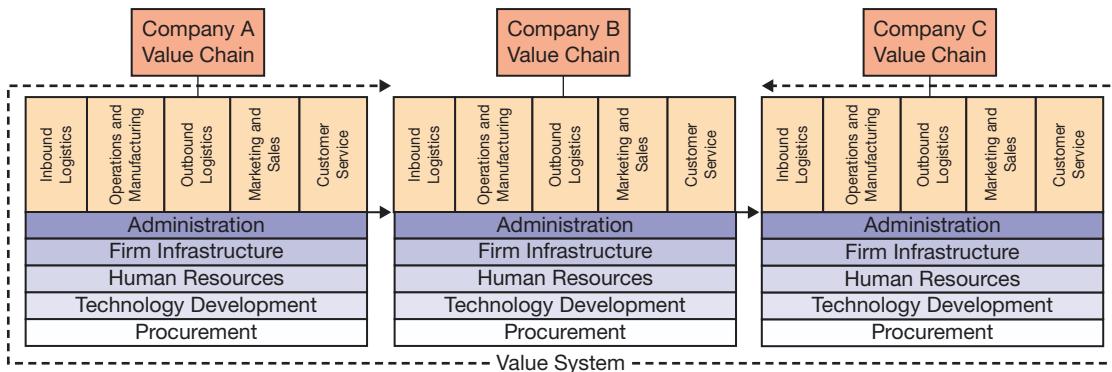
facilitate both primary and support activities (see Chapter 3, “Managing the Information Systems Infrastructure and Services”). For example, an order entry application requires that employees who enter orders have a computer that is connected via the network to a database containing the order information so that the order can be saved and recalled later for processing.

Human Resource Activities Human resource activities encompass all business activities associated with employee management, such as hiring, interview scheduling, payroll, and benefits management. Human resource activities are classified as support activities because the primary activities cannot be accomplished without the employees to perform them. In other words, all the primary activities rely on human resource-related business activities.

Technology Development Activities Technology development includes the design and development of applications that support the primary business activities so as to improve products and/or services. If you are planning on pursuing a career in the management information systems (MIS) field, you will frequently participate in activities related to the development or acquisition of new applications and systems. Technology development can involve a wide array of responsibilities, such as the selection of packaged software or the design and development of custom software to meet a particular business need. Many companies are leveraging the technology development business activity to build Internet, intranet, extranet, or mobile applications to support a wide variety of primary business activities. Likewise, technology development increasingly involves developing analytics solutions to support the transition to a data-driven organization.

Procurement Activities Procurement refers to the purchasing of goods and services that are required as inputs to the primary activities. Procurement receives, approves, and processes requests for goods and services from the primary activities and coordinates the purchase of those items. Allowing each functional area to send out purchase orders can create problems for companies, such as maintaining relationships with more suppliers than necessary and not being able to take advantage of volume discounts. The procurement business activity can leverage information systems by accumulating purchase orders from the different functional areas within the organization and combining multiple purchase orders containing the same item into a single purchase order. This facilitates negotiating volume discounts and allows the primary activities to concentrate on running the business rather than adding to their workload.

VALUE CHAIN ACTIVITIES IN SERVICE INDUSTRIES. Originally, the value chain framework was developed for analyzing the value-adding activities of manufacturing industries, but it can also be used to understand service-based industries. Many of the processes within service industries are similar to processes performed in manufacturing industries (e.g., customer service, sales, and support). However, whereas manufacturing industries deal with physical products, service industries deal with tangible and/or intangible products, which typically have to be experienced and often cannot be tried out in advance. As a result, activities such as inbound logistics and outbound logistics are sometimes less important in the service sector, and many activities can occur simultaneously (e.g., both delivery and consumption). Likewise, in the manufacturing sector, operations include the physical handling of goods when transforming them from raw materials or components to finished products; in contrast, operations in the service sector often encompass the manipulation of data and information. For example, consider the value chain activities for booking and taking a commercial airline flight. Such activities would include booking the flight, checking in, in-flight experience, baggage handling, and so on. While service activities don’t always perfectly map to Porter’s value chain steps, there are clearly a set of integrated or related service-oriented activities that together provide value to a customer. Additionally, in many service encounters, each separate activity is essentially a value chain in and of itself. For instance, booking a flight is a series of steps, from advertising to obtaining a ticket, including flight selection, payment, confirmation, and various types of customer services that might include seat selection and other changes. In such service encounters, a finished product equates to a booked ticket, a closed file such as a bank loan that has been issued, an insurance claim that has been filed, or an investment that has been made. As a result, optimizing the value-adding activities in the services sector does typically not include eliminating physical bottlenecks or improving inventory management but enhancing the flow of information.

**FIGURE 7.8**

Three companies combine their value chains, forming a value system.

Source: Based on How Information Gives You Competitive Advantage, July 1985.

Value Systems: Connecting Multiple Organizational Value Chains

The flow of information can be streamlined not only within a company but across organizational boundaries as well. A company can create additional value by integrating internal applications with suppliers, business partners, and customers. Companies accomplish this by connecting their internal value chains to form a **value system** (Porter & Millar, 1985), in which information flows from one company's value chain to another company's value chain. Figure 7.8 depicts the value system framework. In this diagram, three companies are aligning their value chains to form a value system. First, Company A processes information through its value chain and forwards the information along to its customer, Company B, which processes the information through its value chain and sends the information along to its customer, Company C, which processes the information through its value chain. Adding additional suppliers, business partners, and customers can create complex value systems. However, for our purposes, we simply view an organization's information systems as an important part of a value chain that interacts with the value chains of other organizations.

As information systems can be used to streamline an organization's internal value chain, they can also be used to coordinate a company's value chain with another company's value chain or with consumers (such as in business-to-consumer electronic commerce). Any information that feeds into a company's value chain, whether its source is another company's value chain or an end consumer, is considered part of the value system.

A supply chain can be viewed as a river, where physical goods "flow" from a source to an ultimate destination. Like a river, at any particular point there is a flow coming from upstream and progressing downstream. In a similar way, a value system can be viewed as a river of information, comprising upstream and downstream information flows. An **upstream information flow** consists of information that is received from another organization, whereas a **downstream information flow** relates to the information that is produced by a company and sent along to another organization. For instance, in the value system depicted in Figure 7.8, the upstream and downstream information flows for Company B become quite evident. In this case, Company B receives information from its upstream supplier, processes the information through its internal value chain, and subsequently passes information downstream to its distributors and/or customers (see Chapter 8 for a discussion of product and information flows in the opposite direction). These flows of external information into and from a company can be leveraged to create additional value and gain competitive advantage.

Enterprise Systems

Businesses have leveraged information systems to support business processes for decades, beginning with the installation of individual, separate applications to assist companies with specific business tasks, such as issuing paychecks. However, in order to efficiently and effectively conduct the core business processes (as well as other business processes), the different functional areas within a company need to share data. For example, data about your book order need

to be shared between accounting (for billing purposes), marketing and sales (e.g., to feed into product recommendations for other customers), and operations and supply chain management (e.g., to fulfill the order and replenish the inventory).

The Rise of Enterprise Systems

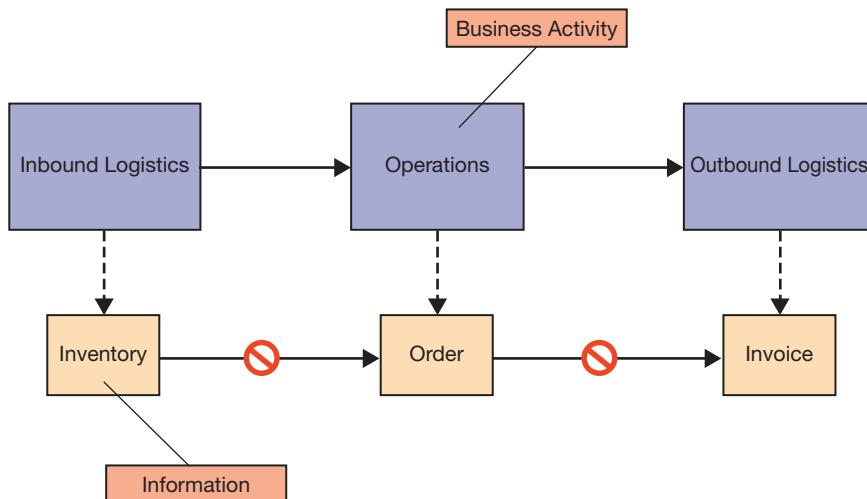
As companies began to leverage IS applications, they typically started out by fulfilling the needs of particular business activities in a particular department within the organization, and purchased a variety of proprietary software systems from different software vendors or developed department-specific software (e.g., accounting) to support specific business processes. Systems that focus on the specific needs of individual departments are typically not designed to communicate with other systems in the organization (essentially, they are “speaking different languages”) and are therefore referred to as **standalone applications**. Although such systems enable departments to conduct their daily business activities efficiently and effectively, these systems often are not very helpful when people from one part of the firm need information from another part of the firm. For example, if the applications for inbound logistics and operations are not integrated, companies will lose valuable time in accessing information related to inventory levels. When an order is placed through operations, personnel may have to access two separate applications to verify that the components are available in inventory before the order can be processed. Figure 7.9 provides an example of how information flows through standalone systems within an organization. As the diagram depicts, information is generated by the inbound logistics business activity, but it does not flow through to the next business activity, in this case operations; in other words, there are too many “rocks” in the river, impeding the flow of information. Since the inbound logistics and operations departments use different standalone systems, information cannot readily flow from one business activity to another.

Understandably, this creates a highly inefficient process for operations personnel, who must have access to two systems or a common interface that pulls data together in order to get both the order entry and the inventory information. This can be challenging, as applications running on different computing platforms are difficult to integrate, and IS managers are faced with the problem of “knitting together” a hodgepodge portfolio of discordant proprietary applications into a system that shares data; often, custom interfaces are required in order for one system to communicate with another, and such integration is typically very costly. In some cases, data may be stored on both systems, creating redundancy. Should data be updated in one system but not the other, the data become inconsistent. In addition, there are further unnecessary costs associated with entering, storing, and updating data redundantly. As a result, many standalone applications are typically either fast approaching or beyond the end of their useful life within the organization; such systems are referred to as **legacy systems**.

To utilize data stored in separate standalone systems to facilitate business processes and decision making, data must be reentered from one system to the next (by either manual typing, copying and pasting, or even downloads to Excel) or be consolidated by a third system. Further, the same data may also be stored in several (sometimes conflicting) versions throughout the

FIGURE 7.9

Information flows using standalone systems.



organization, making the data harder to consolidate, often causing the business to lose money because of inefficiencies or missed business opportunities. In addition, organizations need integrated data to demonstrate compliance with standards, rules, or government regulations. To address these challenges, organizations have turned to enterprise-wide information systems. An **enterprise-wide information system** (or **enterprise system**) is an integrated suite of business applications for virtually every business process, allowing companies to integrate data across functional areas on a company-wide basis. Rather than storing data in separate places throughout the organization, enterprise systems use an integrated database to provide a central repository common to all users. The central database alleviates the problems associated with multiple computing platforms by providing a single place where all data relevant to the company and particular departments can be stored and accessed. This, along with a common user interface, allows personnel to share information seamlessly, no matter where the user is located or who is using the application (Figure 7.10).

Enterprise systems come in a variety of shapes and sizes, each providing a unique set of features and functionality. When deciding to implement enterprise solutions, managers need to be aware of a number of issues. One of the most important involves selecting and implementing applications that meet the requirements of the business as well as of its customers and suppliers. In the following sections, we examine the ways in which information systems can be leveraged to support business processes and how companies are using these systems to support their internal and external operations.

Supporting Business Processes

As discussed previously, information systems can be used to gain and sustain competitive advantage by supporting and/or streamlining activities along the value chain. For example, an information system could be used to support a billing process in such a way that it reduces the use of paper and, more important, the handling of paper, thus reducing material and labor costs. This system can help managers keep track of that same billing process more effectively because they will have more accurate, up-to-date information about the billing process, enabling them to make smart, timely business decisions.

Information systems can be used to support either internally or externally focused business processes. **Internally focused systems** support functional areas, business processes, and decision making *within* an organization. These activities can be viewed as a series of links in a chain along which information flows within the organization. At each stage (or link) in the process, value is added in the form of the work performed by people associated with that process, and

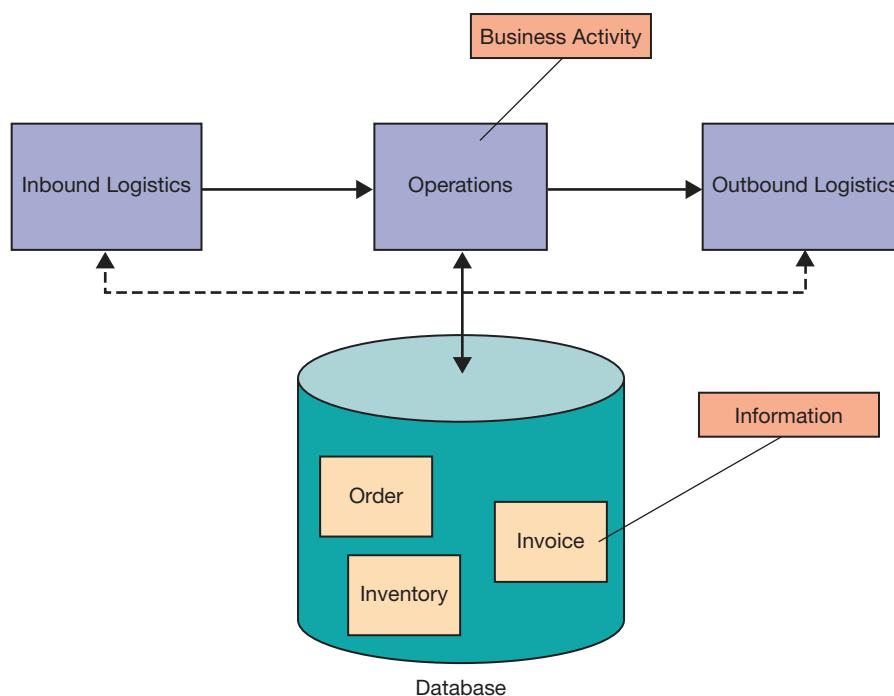


FIGURE 7.10

Enterprise systems allow companies to integrate information on a company-wide basis.



ETHICAL DILEMMA

Too Much Intelligence? RFID and Privacy

Radio frequency identification (RFID) tags have become increasingly popular for tracking physical objects. Each tag contains unique identification information that can be accessed by an RFID reader. The identification is then sent to the information system that can identify the product that was tagged. For example, the pharmaceutical industry tags certain drugs in large quantities, such as 100-pill bottles of Viagra and Oxycontin, in order to track them as they move through the supply chain and thus prevent counterfeits from reaching the public.

As with all electronic tracking devices, privacy advocates are concerned about misuse. Because RFID tags can be read by anyone who has an RFID reader, the tags have the potential of revealing data customers may wish to keep private. For example, if you buy a product that has an RFID tag, someone with an RFID reader could possibly identify where you bought the product and how much you paid for it, if the retailer does not have erasers that can clear data from the tags before you leave the store. The amount of data imprinted on an RFID tag is limited, however, and because few retail businesses have purchased RFID writers or readers, the likelihood of privacy abuse is currently slim.

In addition to tracking products, RFID technologies can be embedded within people. For example, Mexico's attorney general and senior members of his staff have been implanted with security chips from a company called VeriChip that give them access to secure areas of their headquarters. VeriChip has been actively working to promote its chips to be used in older

patients with Alzheimer's or patients with diabetes to aid medical staff in tracking their care and recently announced a partnership with the National Foundation for the Investigation of Lost and Kidnapped Children to promote embedding VeriChips in children to help prevent kidnappings.

Questions

1. Using RFID implants to speed up medical assistance may be a good thing, but what if crackers manage to access a person's medical conditions?
2. What are the ethical implications of using RFID chips to track one's child?

Based on:

Gillespie, I. (2014, April 17). Human microchipping: I've got you under my skin. *The Sydney Morning Herald*. Retrieved May 19, 2016, from <http://www.smh.com.au/digital-life/digital-life-news/human-microchipping-ive-got-you-under-my-skin-20140416-zqvho.html>

Griffiths, S. (2015, September 3). Would YOU be microchipped? *Daily-Mail.com*. Retrieved April 29, 2016, from <http://www.dailymail.co.uk/sciencetech/article-3221287/Would-microchipped-Kaspersky-implants-chip-man-s-hand-one-day-used-pay-goods-unlock-home.html>

Klugman, C. (2015, October 21). Human chipping: Fishing for uses. *Bioethics.net*. Retrieved April 29, 2016, from <http://www.bioethics.net/2015/10/human-chipping-fishing-for-uses>

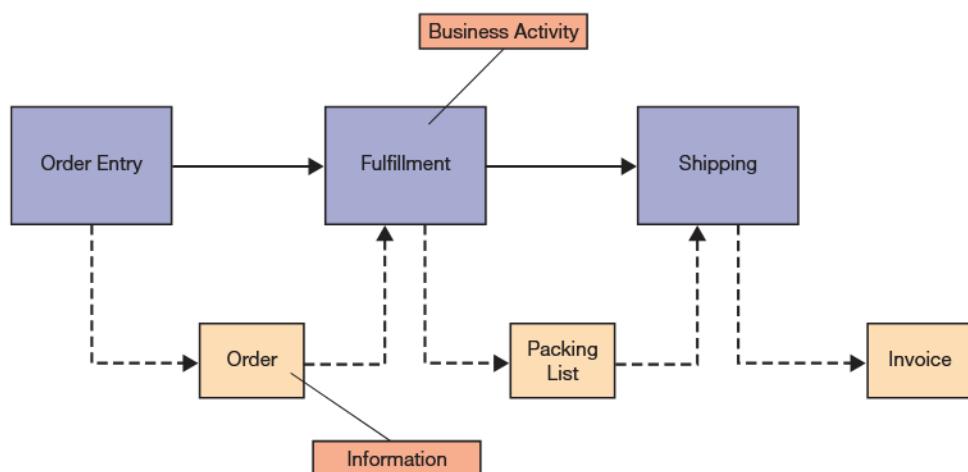
Microchip implant (human). (2016, April 13). In *Wikipedia, The Free Encyclopedia*. Retrieved April 29, 2016, from [https://en.wikipedia.org/w/index.php?title=Microchip_implant_\(human\)&oldid=715010273](https://en.wikipedia.org/w/index.php?title=Microchip_implant_(human)&oldid=715010273)

new, useful information is generated. Information begins to accumulate at the point of entry and flows through the various links, or business processes, within the organization, progressing through the organization with new, useful information being added every step of the way (Figure 7.11).

Companies can gain several advantages by integrating and converting legacy systems so that data stored on separate computing platforms can be consolidated to provide a centralized point of access. However, although internally focused systems do an excellent job of serving the needs of internal business operations on an organization-wide basis, they are not necessarily

FIGURE 7.11

Information flow for a typical order.



designed to completely accommodate the communication of information outside the organization's boundaries. The emergence of the Internet and the web has resulted in the globalization of customer and supplier networks, opening up new opportunities and methods to conduct business. For example, raw materials and component parts for a computer may come from China and be shipped to Europe for fabrication, and the final products are assembled and shipped to customers across the globe (see Chapter 1, "Managing in the Digital World"). Customers have an increasing number of options available to them, so they are demanding more sophisticated products that are customized to their unique needs. They also expect higher levels of customer service. If companies cannot keep their customers satisfied, the customers will not hesitate to do business with a competitor. Therefore, companies need to provide quality customer service and develop products faster and more efficiently to compete in global markets.

To this end, **externally focused systems** help to streamline communications and coordinate business processes with customers, suppliers, business partners, and others who operate *outside* an organization's boundaries. A system that communicates across organizational boundaries is sometimes referred to as an **interorganizational system**. The key purpose of an interorganizational system is to streamline the flow of information from one company's operations to another's (e.g., from a company to its potential or existing customers).

Competitive advantage can be achieved here by integrating multiple business processes in ways that enable a firm to meet a wide range of unique customer needs. Sharing information between organizations helps companies to adapt more quickly to changing market conditions. For instance, should consumers demand that an additional component be added to a product, a company can gain this information from its information systems that support sales and instantaneously pass it along to its component suppliers. Information systems allow the company and its suppliers to satisfy the needs of customers efficiently because changes can be identified and managed immediately, creating a competitive advantage for companies that can respond quickly. In addition, streamlining the information flows can help companies find innovative ways to increase accurate on-time shipments, avoid (or at least anticipate) surprises (such as shortages in raw materials or weather problems), minimize costs, and ultimately increase customer satisfaction and the overall profitability of the company. We can view processes and information flows across organizations just as we previously viewed the processes and information flows within an organization. At each stage (or link) in the process, value is added by the work performed, and new, useful information is generated and exchanged between organizations (Figure 7.12). Using an interorganizational system, one company can create information and transmit it electronically to another company.

Systems that facilitate interorganizational communications focus on the upstream and downstream information flows. On the upstream side, *supply chain management* applications integrate the value chains of business partners within a supply chain, improving the coordination

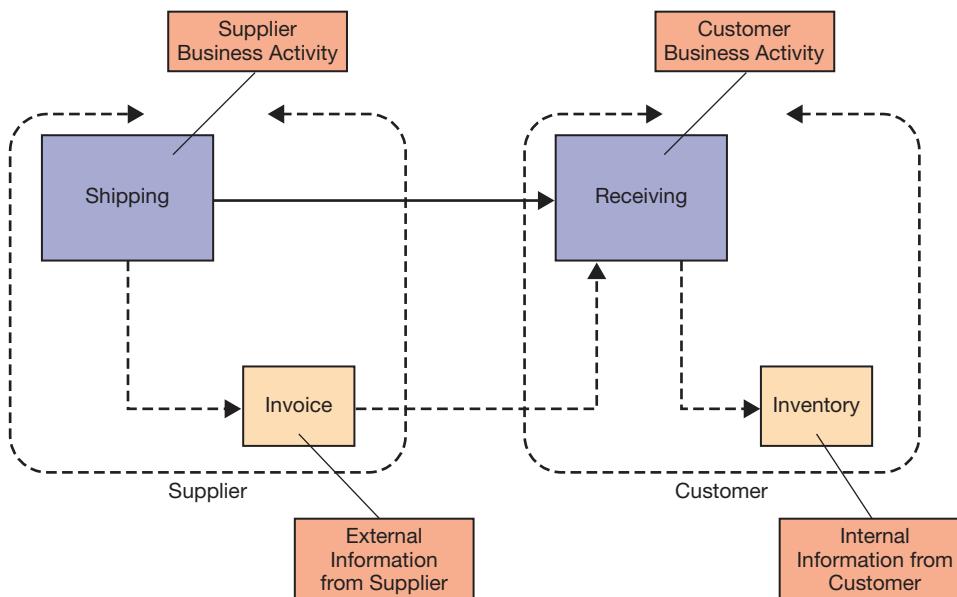


FIGURE 7.12

Information flow for a typical shipment across organizational boundaries.

of suppliers, product or service production, and distribution. On the downstream side, *customer relationship management* applications concentrate on the activities involved in promoting and selling products to the customers as well as providing customer service and nourishing long-term relationships (both types of applications are discussed in Chapter 8). Integrating internally focused and externally focused applications can be extremely valuable for companies operating in global markets.

IMPROVING BUSINESS PROCESSES THROUGH ENTERPRISE SYSTEMS. Software programs come in two forms—packaged and custom. **Packaged software**, sometimes referred to as **off-the-shelf software**, is written by third-party vendors for the needs of many different users and organizations, supporting standardized, repetitive tasks, such as word processing, payroll processing, or preparing taxes. These programs can be quite cost effective because the vendor that builds the application can spread out development costs through selling to a large number of users.

Yet packaged software may not be well suited for tasks that are unique to a particular business. In these cases, companies may prefer to develop (or have developed for them) **custom software**, which is designed and developed exclusively for specific organizations (see Chapter 9, “Developing and Acquiring Information Systems”) and can accommodate their particular business needs. However, obtaining custom software is much more expensive because the organization has to bear all costs (in terms of time, money, and other resources) associated with designing and developing the software. Furthermore, applications need to be maintained internally when changes are required. With packaged software, the vendor makes the changes and distributes new versions to its customers. In all, there are trade-offs when choosing between the packaged and custom software routes. Managers must consider whether packaged software can meet the business requirements and, if not, conduct a cost–benefit analysis to ensure that taking the custom software approach will prove worthwhile to the company.

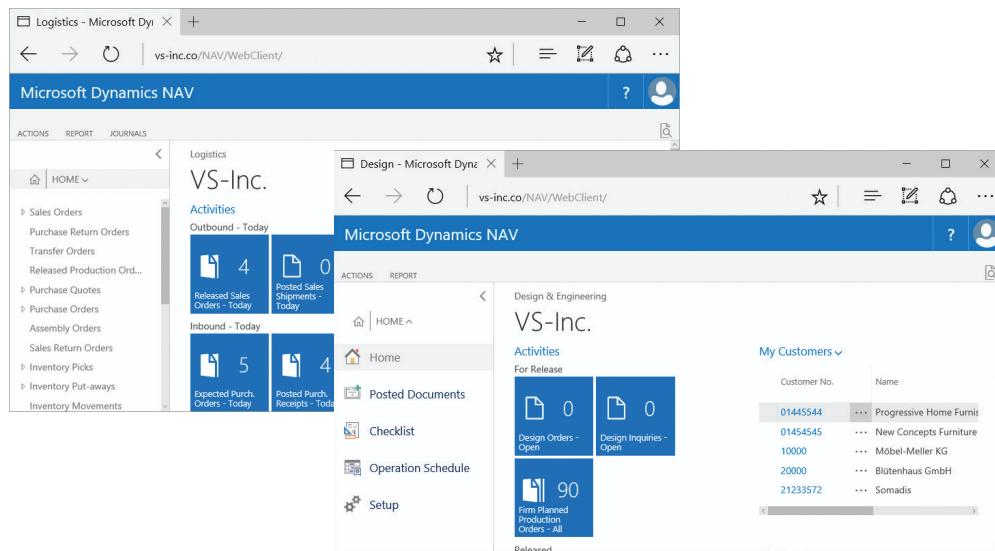
Because no two companies are alike, no packaged software application will exactly fit the unique requirements of a particular business. Thus, enterprise systems are designed around **modules**, which are components that can be selected and implemented as needed. In essence, each module is designed to replace a legacy system, be it a finance, human resources, or manufacturing system; after the conversion to an enterprise system, each business function has access to various modules that serve its needs, but the modules (and the underlying data) are tightly integrated and share the same look and feel (Figure 7.13).

Vanilla Versus Customized Software The features and modules that an enterprise system comes with out of the box are referred to as the **vanilla version**. If the vanilla version does not support a certain business process, the company may require a customized version. **Customization** provides either additional software that is integrated with the enterprise system or consists of direct changes to the vanilla application itself. Most enterprise systems include

FIGURE 7.13

Each module in an enterprise system is designed to replace a standalone legacy system.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.





COMING ATTRACTIONS

The Internet of Things Will Transform ERP and Organizations

The Internet of Things (IoT), which refers to a broad range of physical objects (such as computers, sensors, or motors) that are interconnected and automatically share data over the Internet, has seen rapid developments. Many think that the IoT is primarily about your toaster talking to your refrigerator. While this may (or may not) occur, there are many other applications of IoT, particularly when creating products and services, where IoT technologies can be transformative.

Early enterprise software focused on people; systems were designed to help people complete activities such as paying a bill, ordering a part, or paying an employee. The systems interacted with people. People provided data, people started processes, or people paid a bill. While all of these activities are needed and useful, the integration of “things” will significantly transform the way organizations do business. For example, there are many more *things* than people. When virtually every product, every assembly, and every machine is connected to the enterprise system, there is a lot more data available to understand what is happening. With such data, many operations can happen automatically without human intervention. Also, *things* can tell you more than people. Complex machines can have dozens of sensors that provide much more data than

could ever be generated by a single machine operator. And these data can be collected continuously (e.g., every millisecond if necessary) and, again, without human intervention. Finally, *things* never get tired or run out of things to say. Such things, and their sensors, will silently and diligently do their job sending updates as often as needed.

When IoT technologies provide data for enterprise-wide systems, the enterprise will have a better understanding of virtually every aspect of the business, and at a depth and precision never before possible. With such business intelligence, organizations not only will operate more efficiently and effectively, they also will learn much more about their business processes, such as where improvements can be made and what tasks are most vulnerable to disruption. Such insights will result in process improvements and better products. Over time, IoT technologies will help companies rapidly and iteratively improve how their business is performed.

Based on:

Chou, T. (2016, May 17). The wide world of IoT and precision technology. *CFO*. Retrieved May 18, 2016, from <http://www2.cfo.com/internet-of-things/2016/05/wide-world-iot-precision-technology>

literally thousands of elements that can be customized. Companies must take special care when dealing with customization, as customization can be extremely costly, and maintaining and upgrading customizations can be troublesome. For example, a customization made to the vanilla version will need to be reprogrammed when a new release of the system is implemented because subsequent releases of the software will not include the previous customizations. In other words, new vanilla versions must be continually upgraded to accommodate the company-specific customizations. This process can involve a substantial investment of time and resources, diverting attention away from other key business activities and reducing company profits.

Best Practices-Based Software One of the major hurdles facing companies that implement enterprise systems involves changing business processes to accommodate the manner in which the software works. Enterprise system implementations are often used as a catalyst for overall optimization of underlying business processes. As a result, most enterprise systems are designed to operate according to industry-standard business processes, or **best practices**, and vendors offer many industry-specific versions that have already been customized for particular industries based on best practices and the data types and requirements of the specific industries. Best practices reflect the techniques and processes, identified through experience and research, that have consistently shown results superior to those achieved with other means. In fact, because they have proven to consistently lead to superior performance, most enterprise system vendors build best practices into their applications to provide guidelines for management to identify business activities within their organizations that need to be streamlined. Implementations and future upgrades to the system will go more smoothly when companies change their business processes to fit the way the enterprise system operates, and companies that reject these best practices are in for a long and time-consuming implementation (although the vendors and external consultants typically offer help in the process).

However, many organizations have spent years developing business processes that provide them with a competitive advantage in the marketplace. Adopting their industry’s best practices may force these companies to abandon their unique ways of doing business, putting them on par

with their industry competitors. In other words, companies can potentially lose their competitive advantages by adopting the best practices within their industry. Given the importance and difficulty of changing business processes with enterprise and other systems implementations, we now briefly describe business process management.

Business Process Management Optimizing business processes is key for organizational efficiency, effectiveness, and agility, and over the years, various approaches for improving business processes have been developed. Given the magnitude of change that an enterprise system can impose on an organization's business processes, understanding the role of business process management in the implementation of an enterprise system is necessary. **Business process management (BPM)** is a systematic, structured improvement approach by all or part of an organization whereby people critically examine, rethink, and redesign business processes in order to achieve dramatic improvements in one or more performance measures, such as quality, cycle time, or cost.

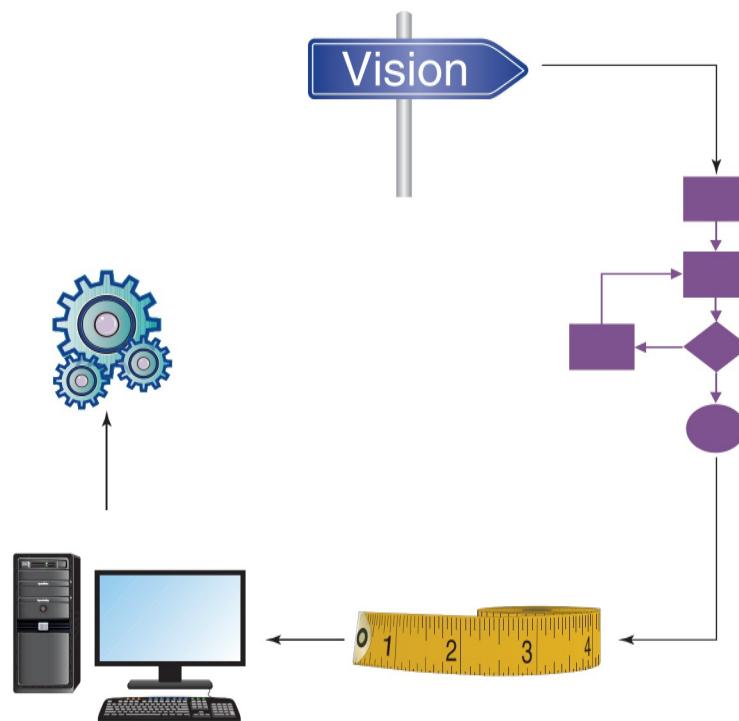
BPM, which became very popular in the 1990s (and was then called **business process reengineering [BPR]**), is based on the notion that radical redesign of an organization is sometimes necessary in order to lower costs and increase quality and that information systems are the key enabler for that radical change. The basic steps in BPM can be summarized as follows (Figure 7.14):

1. Develop a vision for the organization that specifies business objectives, such as reducing costs, shortening the time it takes to get products to market, improving quality of products and/or services, and so on.
2. Identify the critical processes that are to be redesigned.
3. Understand and measure the existing processes as a baseline for future improvements.
4. Identify ways that information systems can be used to improve processes.
5. Design and implement a prototype of the new processes.

At the heart of BPM initiatives are information systems that enable the streamlining of business processes. Given the importance of information systems in such endeavors, organizations are increasingly hiring IS consultants and business analysts who have a sound understanding of the business but who are also well versed in technology. In fact, business analysts and systems analysts are often listed among the hottest jobs because of good job prospects, high salaries, and the diversity of work. In enterprise systems projects, business analysts are deeply involved in

FIGURE 7.14

The basic steps of BPM include developing a vision, identifying the critical processes that are to be redesigned, understanding and measuring the existing processes, identifying ways that information systems can be used to improve processes, and designing and implementing the new processes.



analyzing and improving business processes and mapping the processes to the different enterprise systems modules.

BPM is similar to quality improvement approaches such as *total quality management* and *continuous process improvement* in that they are intended to be cross-functional approaches to improve an organization. BPM differs from these quality improvement approaches, however, in one fundamental way. These quality improvement approaches tend to focus on incremental change and gradual improvement of processes, while the intention behind BPM is radical redesign and drastic improvement of processes.

When BPR was introduced in the 1990s, many efforts were reported to have failed. These failures occurred for a variety of reasons, including the lack of sustained management commitment and leadership, unrealistic scope and expectations, and resistance to change. In fact, BPR gained the reputation of being a nice way of saying “downsizing.”

Nevertheless, BPR (and its successors such as BPM) lives on today and is still a popular approach to improving organizations. No matter what it is called, the conditions that appear to lead to a successful business process improvement effort include the following:

- Support by senior management
- Shared vision by all organizational members
- Realistic expectations
- Participants empowered to make changes
- The right people participating
- Sound management practices
- Appropriate funding

In any event, it is clear that successful business process change, especially involving enterprise systems, requires a broad range of organizational factors to converge that are far beyond the technical implementation issues.

Benefits and Costs of Enterprise Systems Beyond the improvements in critical business processes, there are various types of benefits and costs associated with the acquisition and development of enterprise systems. According to industry research, implementation costs run over budget 57 percent of the time (Panorama, 2016), and 11 percent of organizations surveyed had not recouped their implementation costs. On average, projects costs were around US\$10 million but running nearly US\$2 million over budget. Top reasons cited for budget overruns are that the initial project scope was expanded and that unanticipated technical or organizational change management issues resulted in additional costs.

Gaining a better understanding of both project benefits and costs can help to develop an improved understanding of the project’s total cost of ownership and help make the business case for a particular investment decision (see Chapter 9). Benefits of enterprise systems that can be used to make the business case include:

- Improved availability of information
- Increased interaction throughout the organization
- Improved (reduced) lead times for manufacturing
- Improved customer interaction
- Reduced operating expenses
- Reduced inventory
- Reduced IS costs
- Improved supplier integration
- Improved compliance with standards, rules, and regulations

The two mostly likely benefits realized from utilizing enterprise systems are improvements in information availability and increased interaction across the organization as a result of streamlining business processes.

Just as there are many possible benefits that can be realized when implementing an enterprise system, there are also many potential costs that can affect the total cost of ownership of these large and complex systems. Many companies underestimate these costs and, as a result, ultimately go over budget. Understanding all of the items that make up the total cost of ownership will help guide organizations into making better financial projections and project approval decisions. Beyond the system acquisition costs—for example, software licenses and

maintenance costs, technical implementation, and hardware costs—other costs that are often overlooked when estimating project costs include:

- Travel and training costs for personnel
- Ongoing customization and integration costs
- Business process studies
- Project governance costs

If all costs are not considered, it can result in unexpected budget increases, delayed project timelines, and angry management. Next, we examine enterprise resource planning systems.

Enterprise Resource Planning

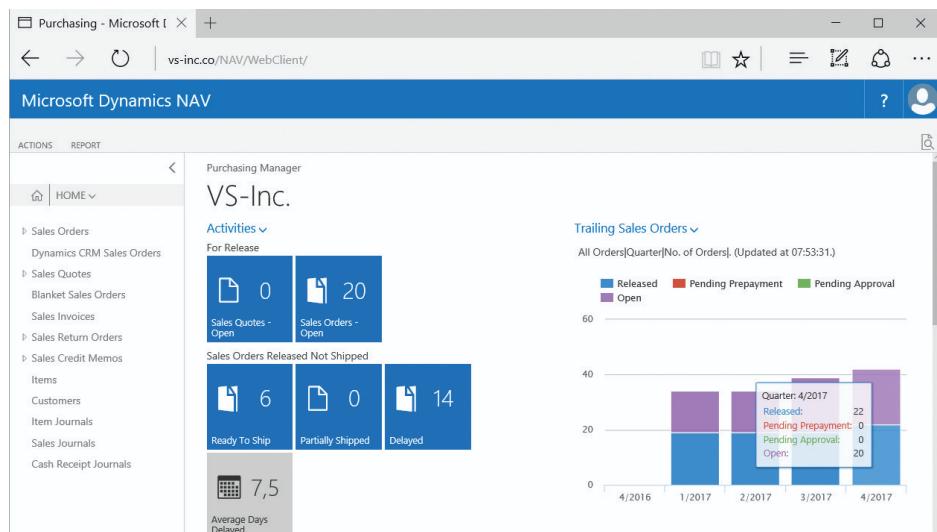
Today, most enterprise-wide information systems come in the form of **enterprise resource planning (ERP) systems**. In the 1990s, we witnessed companies' initial push to implement integrated applications, as exhibited by skyrocketing sales of ERP systems at that time. Be aware that the terms *resource* and *planning* are somewhat misnomers, meaning that they only partially describe the purpose of ERP systems, since these applications do much more than just planning or managing resources. The reason for the term *enterprise resource planning* is that these systems evolved in part during the 1990s from material requirements planning and manufacturing resource planning packages. Do not get hung up on the words *resource* and *planning*. The key word to remember from the acronym *ERP* is *enterprise*.

ERP systems replace standalone applications by providing various modules based on a common database and similar application interfaces that serve the entire enterprise rather than portions of it. Data stored on legacy systems is converted into a large, centralized database that stores data related to the various business activities of an organization. Thus, ERP systems make accessing data easier by providing a central repository, giving personnel access to accurate, up-to-date information throughout the organization. For example, inventory data is accessible not only to inbound logistics and operations but also to accounting, sales, purchasing, and customer service personnel (Figure 7.15). Storing data in a single place and making it available to everyone within the organization empowers all employees in the organization to be aware of the current state of business and to perform their jobs better. In addition, many ERP systems support business processes of globally operating organizations. For example, the ERP systems of SAP, the German enterprise systems pioneer, have multilingual interfaces and automatically convert measurement units (e.g., kilograms to pounds or centimeters to inches) and currencies. This way, engineers in Germany, Spain, or Italy can input the bill of materials, manufacturing engineers and factory specialists can buy the parts and set up the production run, and marketing and sales staff in the United States can easily communicate with their clients.

FIGURE 7.15

An ERP system can provide employees with relevant, up-to-date information.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.



ERP modules that access the database are designed to have the same look and feel regardless of the unique needs of a particular department. Inbound logistics and operations personnel will use a common user interface to access the same pieces of data from the shared database. Although the inbound logistics module and the operations module will have different features tailored to the unique needs of the business functions, the screens will look comparable, with similar designs, screen layouts, menu options, and so on. The Microsoft Office products provide a useful analogy. Microsoft Word and Microsoft Excel are designed to provide different functions (word processing and spreadsheets, respectively), but overall the products look and feel very similar to one another. Word and Excel have similar user interfaces but differ vastly in the purpose, features, and functionality that each application offers. Likewise, the look and feel of Microsoft Dynamics (Microsoft's suite of enterprise-wide information systems) resembles that of Microsoft Office so as to reduce the learning curve for new users.

Responding to Compliance and Regulatory Demands

In addition to helping improve business processes, ERP systems improve and ease an organization's ability to implement audit controls and comply with government-imposed regulations. Compliance with far-reaching government mandates like the Sarbanes–Oxley Act and other evolving and emerging regulatory standards is based on the implementation and documentation of internal controls, procedures, and processes. All ERP systems are designed to include an abundance of control features that can mirror an organization's business processes (e.g., controlling who has access to data and process steps, segregating duties across job functions, etc.). Such enterprise-wide capabilities provide organizations with tested solutions for developing and deploying a comprehensive compliance strategy. While the ERP system may not provide answers to all regulatory requirements, deploying an ERP system has been a central strategy for many organizations struggling to adhere to the myriad legal, regulatory, and supply chain mandates that are common in today's highly regulated business environment.

Choosing an ERP System

When selecting an appropriate ERP system for an organization, management needs to take many factors into careful consideration. Although ERP systems come in a variety of shapes and sizes, each designed to accommodate certain transaction volumes, industries, and business processes, they come as packaged software, which means that they are designed to appeal to many different companies. However, businesses have unique needs even within their own industries. In other words, like snowflakes, no two companies are exactly alike. Management must carefully select an ERP system that will meet the unique requirements of its particular company and must consider a number of factors in the ERP selection. Among the most prevalent issues facing management are ERP control and ERP business requirements.

ERP CONTROL. ERP control refers to the locus of control over the computing systems and data contained in those systems as well as decision-making authority. Companies typically either opt for centralized control or allow particular business units to govern themselves. In the context of ERP, these decisions are based on the level of detail in the information that must be provided to management. Some corporations want to have as much detail as possible made available at the executive level, whereas other companies do not require such access. For instance, an accountant in one company may want the ability to view costs down to the level of individual transactions, while an accountant in another company may want only summary information. Another area related to control involves the consistency of policies and procedures. Some companies prefer that policies and procedures remain consistent throughout an organization. Other companies want to allow each business unit to develop its own policies and procedures to accommodate the unique ways that they do business. ERP systems vary widely in their allowance for control, typically assuming either a corporate or a business-unit locus of control. Some ERP systems allow users to select or customize the locus of control. In either case, management must consider the ERP's stance on control to ensure that it will meet the business requirements of the company.



SECURITY MATTERS

To Update or Not to Update, *That Shouldn't Be the Question*

Virtually all commercial software has known or unknown security flaws. When such flaws are detected, the software vendor typically provides an update. Recall getting occasional updates on your personal computer, tablet, or smartphone. Such updates often provide a new capability, but more often than not, they provide updates to fix a discovered security problem.

For example, in May 2016, Homeland Security's Computer Emergency Response Team (US-CERT) released an alert that 36 unnamed organizations were running misconfigured or outdated SAP software that could leave them vulnerable to attacks by malicious hackers. According to US-CERT, if attackers successfully exploited the flaw, they would be able to gain full access and complete control of the enterprise system. While the flaw was detected and fixed in 2010, it persists in many organizations' computing platforms due to lax updating policies or other serious problems.

You might ask, "Why wouldn't the company update its software?" Well, there is no single reason for this. In fact, there are many reasons why organizations fail to upgrade software to its latest version. For example, some may not upgrade because they feel that some new features may not be needed or be necessary. Others may avoid an upgrade in order to avoid paying associated upgrading fees. Some may conclude that the system is running fine as is, so "why fix what isn't broken?" However, for ERP software, the biggest reason for organizations not to update outdated software is that many of these systems have been customized to a particular organization's manner of working and business processes. These custom software modules are often not compatible with the latest versions of the ERP without extensive rewriting and testing. So, rather than modifying the customized modules to be compatible with the ERP's latest release, many organizations literally "roll the dice" by keeping the older generating software so that they can continue to use their custom-designed features.

Failing to upgrade an ERP system is especially problematic and risks much more than losing some old text messages or photos. A single ERP system can support hundreds of different business process; the databases can be massive, often larger than many terabytes. ERP systems touch nearly every aspect of an organization, from sales to production and inventory to payroll. Given their massive size, scope, and complexity, a system failure can literally bankrupt a company. Just as you should always run updates on your computer and smartphone, so too should organizations. Which risk is greater, a change in business processes or bankruptcy? While the risks may be low, many companies are making the wrong choice when it comes to updating their ERP software.

Based on:

Grey, L. (2015, July 10). Why is ERP security so difficult? *HelpNetSecurity*. Retrieved May 17, 2016, from <https://www.helpnetsecurity.com/2015/07/10/why-is-erp-security-so-difficult>

Kronen, M. (2016, February 5). Top 6 reasons why your company shouldn't use outdated software. *LinkTek*. Retrieved May 17, 2016, from <http://www.linktek.com/top-6-reasons-why-your-company-shouldnt-use-outdated-software>

Monahan, M. (2013, May 30). Top six ERP implementation failures. *360 Cloud Solutions*. Retrieved May 17, 2016, from <http://blog.360cldsol.com/Top-Six-ERP-Implementation-Failures>

Shinder, D. (2015, January 14). Patch or not? Weighing the risks of immediate updating. *WindowsSecurity.com*. Retrieved May 17, 2016, from http://www.windowsecurity.com/articles-tutorials/misc_network_security/patch-or-not-weighing-risks-immediate-updating.html

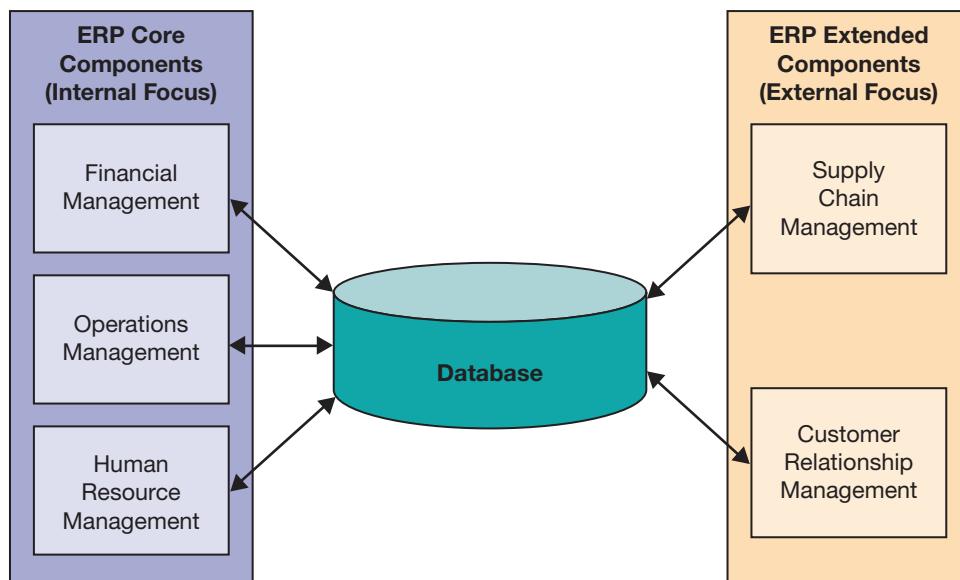
US-CERT (2016, May 11). Alert (TA16-132A) exploitation of SAP business applications. Retrieved May 17, 2016, from <https://www.us-cert.gov/ncas/alerts/TA16-132A>

Whittaker, Z. (2016, May 11). Homeland Security warns of hackers exploiting SAP security flaw. *ZDNet*. Retrieved May 17, 2016, from <http://www.zdnet.com/article/homeland-security-warns-of-hackers-exploiting-sap-security-flaw>

ERP BUSINESS REQUIREMENTS. When selecting an ERP system, organizations must choose which modules to implement from a large menu of options—most organizations adopt only a subset of the available ERP components. There are two major categories of ERP components—ERP *core* components and ERP *extended* components (Figure 7.16).

ERP Core Components ERP core components support the important *internal* activities of the organization for producing its products and services. These components support internal operations such as the following:

1. **Financial Management.** Components to support accounting, financial reporting, performance management, and corporate governance
2. **Operations Management.** Components to simplify, standardize, and automate business processes related to inbound and outbound logistics, product development, manufacturing, and sales and service
3. **Human Resource Management.** Components to support employee recruitment, assignment tracking, performance reviews, payroll, and regulatory requirements

**FIGURE 7.16**

An ERP system consists of core and extended components.

Whereas the operations management components enable the core activities of the value chain, financial management and human resources management are associated with activities supporting the core activities (Figure 7.17).

ERP Extended Components ERP extended components support the primary *external* activities of the organization for dealing with suppliers and customers. Specifically, ERP extended components focus primarily on supply chain management and customer relationship management. Both are discussed in detail in Chapter 8.

Enabling Business Processes Using ERP Core Components

To fit the needs of various businesses in different industries, an ERP system's core components are typically implemented using a building-block approach through a series of modules that support internally focused business processes. For example, Oracle's JD Edwards EnterpriseOne offers more than 70 different modules to support a variety of business processes. ERP vendors typically package the various modules that enable industry-specific processes and offer such systems as "industry solutions." This way, organizations have to spend less effort in selecting the needed modules and can more easily implement the ERP system. For example, SAP's ERP application is built around modules that are modeled after the best practices for 25 different

No.	Name	Income/Ba...	Account Type	Totaling	Ge
0000	Kontenplan SKR03	Balance Sheet	Heading		Ty
0001	... Aufw. für Ing./Erw. d. Gesch.	Balance Sheet	Posting		
0002	... Aufw. f.d. Umstell. a.d. Euro	Balance Sheet	Posting		
0009	... Immaterielle Vermögens...	Balance Sheet	Begin-Total		
0010	... Konzessionen u. Schutz...	Balance Sheet	Begin-Total		
0015	... Konzessionen	Balance Sheet	Posting		
0020	... Gewerbliche Schutzrech...	Balance Sheet	Posting		
0025	... Ähnliche Rechte und W...	Balance Sheet	Posting		
0027	... EDV-Software	Balance Sheet	Posting		

FIGURE 7.17

The financial management component of an ERP enables core value chain activities to take place.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.

TABLE 7.1 Industry-Specific Versions of the Microsoft Dynamics ERP System

Construction	Distribution
Education	Financial services
Government	Healthcare
Manufacturing	Not-for-profit
Professional services	Retail

industries. Depending on the industries, the modules are localized for different countries: Whereas the modules for the automotive industry are localized for Japan or Germany, the modules for apparel and footwear industries are localized for China and India, the modules for the pharmaceutical industry are localized for Germany and the United States, and so on. Similarly, Microsoft offers its Dynamics ERP system for various industries, including construction, healthcare, manufacturing, retail, and others (Table 7.1). Depending on the way processes are typically performed in an industry, the modules within each industry-specific ERP system work together to enable the business processes needed to run a business efficiently and effectively. However, the modules provided by different vendors may vary in the specific business processes they support as well as in what they are called, and it is critical for managers to understand the vendors' naming conventions and software modules to gain an understanding of how these features can be implemented to support the company's business processes.

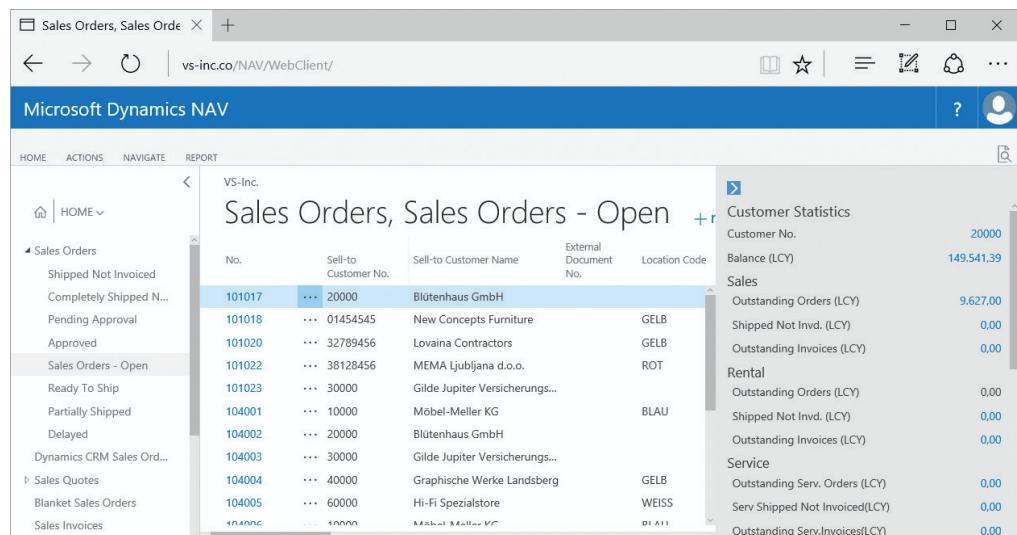
ORDER-TO-CASH. As discussed, the order-to-cash process entails the processes related to selling goods or services. Depending on the industry, the order-to-cash process can be very simple or extremely complex. In a retail environment, this process can be as simple as capturing product data, modifying the sale price (if needed), processing payment cards, and processing loyalty cards for customer profiling purposes. For a wholesale distributor, the order-to-cash process is more elaborate and consists of price quotation, stock allocation, credit limit check, picking, packing, shipping, billing, and receiving payment. For these processes to take place, different modules of the financial and operations management components work together. For example, the financial management component provides modules for checking credit limits, billing, and processing incoming payments. The operations management component provides modules related to sales and warehouse management operations, such as price quotation, stock allocation, picking, packing, and shipping (Figure 7.18).

PROCURE-TO-PAY. Recall that a generic procure-to-pay process entails negotiating price and terms, issuing purchase orders, receiving the goods, receiving the invoice, and settling the payment. As the order-to-cash process differs between industries, so does the procure-to-pay

FIGURE 7.18

An ERP system can support all aspects of the order-to-cash process.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.



The screenshot shows the Microsoft Dynamics NAV interface. The main window displays a list of items under the 'Items' category. Item 1000, 'Tourenrad', is selected and shown in a detailed view on the right side of the screen. The detailed view includes fields such as Item No. (1000), Description ('Tourenrad'), Assem... BOM (No), Base Unit of Measure (STÜCK), Cost is Adjusted (unchecked), Unit Cost (350.594), and Unit (not specified). The detailed view is divided into two sections: 'Item Details - Invoicing' and 'Item Details - Planning'. The 'Item Details - Invoicing' section contains fields like Costing Method (Standard), Cost is Adjusted (Yes), Cost is Posted to G/L (Yes), Standard Cost (350.594), Unit Cost (350.594), Overhead Rate (0.00), Indirect Cost % (0), Last Direct Cost (0.00), Profit % (91.23315), and Unit Price (4.000.00). The 'Item Details - Planning' section contains fields like Item No. (1000), Reordering Policy (Fixed Reorder Qty), and Fixed Reorder Qty (not specified).

FIGURE 7.19

An ERP system can support all aspects of the procure-to-pay process.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.

process. A grocery store, for example, typically orders a standard assortment of products but also faces additional constraints such as having to optimize order quantities, taking into account not only demand and storage costs but also seasonality and perishability of products. In contrast, a construction company procures diverse materials, depending on the project at hand, and the procurement process could entail a lengthy sourcing process, including requests for quotations, a bidding process, reviewing of bids, awarding the contract, and thoroughly inspecting the delivered products or materials (see also Chapter 9 for the process of purchasing a new information system). Similar to the order-to-cash process, different modules of the financial management and operations management ERP components work together to enable the different activities related to the procure-to-pay process (Figure 7.19).

MAKE-TO-STOCK/MAKE-TO-ORDER. The processes related to producing goods differ widely between different industries. The biggest distinction is between the make-to-stock and make-to-order processes. As indicated, the make-to-stock process is typically used for commodities, whereas the make-to-order process is used for highly customizable goods or big-ticket items (such as aircraft or highway bridges). Many beverage companies, for instance, use a make-to-stock approach, involving production planning, manufacturing, and quality control. In contrast, an aerospace company has to start with planning the project and ordering subassemblies or raw materials with long lead times before planning and executing the production for each specific project and finally checking quality and shipping the product. Many of the activities associated with the production process are supported by the operations management component of an ERP system (Figure 7.20).

The screenshot shows the Microsoft Dynamics NAV interface. The main window displays a list of production bill of materials (BOMs) under the 'Production BOMs' category. The list includes items such as Frame (Status: Certified, Unit of Measure Code: PCS), Rim (Front) (Status: Certified, Unit of Measure Code: PCS), Rim (Rear) (Status: Certified, Unit of Measure Code: PCS), Hub (Front) (Status: Certified, Unit of Measure Code: PCS), Hub (Rear) (Status: Certified, Unit of Measure Code: PCS), Spoke (Status: Certified, Unit of Measure Code: PCS), Chain (Status: Certified, Unit of Measure Code: PCS), Tube (Status: Certified, Unit of Measure Code: PCS), OSNALUX-Paint (Status: Certified, Unit of Measure Code: 10 L), and Handlebar (Status: Certified, Unit of Measure Code: PCS). The left sidebar shows various navigation links including Blanket Sales Orders, Sales Orders, Blanket Purchase Orders, Purchase Orders, Transfer Orders, Vendors, Items, Stockkeeping Units, Production BOMs (selected), Certified, Routings, and Production Structures.

FIGURE 7.20

An ERP system can support all aspects of the production process.

Source: Dynamics NAV 2016, Windows 10, Microsoft Corporation.

OTHER BUSINESS PROCESSES. In addition to these business processes, ERP systems typically enable a variety of other generic as well as industry-specific business processes. Any business needs to manage its workforce, including managing the hiring processes, scheduling the workforce, recording time and attendance, processing payroll, managing benefits, and so on. All these processes are supported by the human resources management component of an ERP system. Similarly, the financial management component supports generic processes such as financial and managerial accounting, corporate governance, and the like. Industry-specific processes and the modules supporting these can vary widely. For example, the business of an aircraft manufacturer consists to a large extent of aftermarket support; a retail chain, in contrast, needs modules supporting retail space planning and price and markdown management; a commercial real estate company needs modules for managing assets, leases, and common spaces; and a large part of an airline's operations is related to maintenance, repair, overhaul, flight operations, catering, and customer care.

ERP Installation

Previously, we discussed how organizations can benefit from the integration of standalone systems; further, you learned how business processes can differ between industries. Thus, any organization considering the implementation of an ERP system has to carefully evaluate the different options available not only in terms of the overall systems offered by different vendors but also in terms of the industry-specific solutions offered by the software vendors. An evaluation should entail the assessment of how far the different modules can support existing business processes, which modules may have to be added, and the extent to which existing business processes have to be modified in order to fit the modules offered by the ERP system.

An activity that is widely underestimated, however, is the *configuration* of ERP systems. Whereas customization involves the programming of company-specific modules or changing how business processes are implemented within the system and is often discouraged, configuration is an activity to be performed during any ERP implementation. Specifically, the system must be configured to reflect the way an organization does business and the associated business rules. As one of the most important parts of an ERP system is the underlying company-wide database, setting up the database is key to a successful ERP implementation, and organizations have to make countless decisions on how to configure hundreds or thousands of database tables to fit the business's needs. Similarly, organizations have to make thousands of decisions related to the different business processes. For example, what should be the format of the unique identifier for a customer, when will a bill be considered overdue, what is considered the “standard” method of shipping, and so on? To make all these decisions, a good understanding of the way the company does its business is needed. Hence, many organizations hire experienced business analysts or outside consultants to assist with these configuration tasks.

ERP Limitations

While ERP systems can help organizations streamline business processes, give personnel access to accurate, up-to-date information throughout the organization, and better respond to regulatory demands, they also pose limitations. In particular, ERP systems typically require organizations to modify various business processes; once an ERP system is implemented, the company is virtually locked in, and it is very difficult to make further changes, limiting organizations' flexibility and agility when facing new external challenges. Typically, even small changes to the way processes are implemented in the ERP system require programming changes, leading to higher costs for ongoing system maintenance.

Achieving Enterprise System Success

To summarize, the main objective of enterprise systems is to help achieve competitive advantage by streamlining business activities within and outside a company. However, many implementations turn out to be costlier and more time-consuming than originally envisioned. It is not uncommon to have projects that run over budget, meaning that identifying common problems and devising methods for dealing with these issues can prove invaluable to management. Industry surveys have shown that more than 80 percent of companies that undertake enterprise system implementations realize some benefits; around 46 percent realize about half of the expected benefits, and 10 percent report that they did not realize any benefits (Panorama, 2016).



WHO'S GOING MOBILE

Big ERP Systems Embracing Small Mobile Devices

As ERP technologies have transformed organizations of all sizes in all industries, mobile devices have transformed how people manage day-to-day activities and organizations. As a result, ERP vendors are rapidly evolving their systems to better support managers with a variety of mobile ERP applications so that managers will be able to take advantage of the functionality, data, and benefits of their ERP application not only in the office but also on the road, enabling real-time management. Mobile ERP applications can provide many benefits to an organization, including:

- 1. Improving Service Quality.** Mobile ERP will allow remote workers access to relevant customer information, improving service quality and responsiveness.
- 2. Improving Productivity.** Mobile ERP will allow remote workers to access key resources when commuting or waiting in airports, improving productivity and reducing downtime.
- 3. Strengthening Customer Relationships.** Mobile ERP will allow remote workers to have key customer information when needed to strengthen customer relationships.
- 4. Improving Competitive Advantage.** Mobile ERP can speed responsiveness to customer needs, improving competitive advantage.
- 5. Improving Data Timeliness and Accuracy.** Mobile ERP allows for easier, less redundant, and more timely data capture, allowing workers in the field to capture critical data as they emerge without having to rekey the data into multiple systems where errors and inconsistencies can occur.

Historically, ERP systems have not had a reputation of being user friendly. Given the mainframe roots of most systems, high usability was not a priority. Vendors are working hard to improve usability, especially for mobile ERP. Early mobile ERP apps tried to do too much and, much like their desktop-based interfaces, were slow and cumbersome to use. To reduce complexity and improve usability, vendors are now creating apps designed to perform a narrow set of tasks related to a specific business problem. Each app can be streamlined to focus on one problem and is therefore fast and easy to use. ERP giant SAP, for example, has hundreds of different apps to perform specific tasks. While apps are helping with mobile access, such innovation and usability improvements are also being integrated into desktop systems, and overall, ERP systems are becoming much easier to use. As mobility is a megatrend that will only become more and more prevalent in the workplace, organizations should choose ERP systems that have the capability and flexibility to integrate with an expanding array of mobile devices and platforms.

Based on:

Borek, R. (2011, July 22). 5 benefits to mobile ERP. *ERP Software-Blog*. Retrieved May 18, 2016, from <http://www.erpsoftwareblog.com/2011/07/5-benefits-to-mobile-erp>

SAP Mobile Technology (2016). Mobile technology. *SAP*. Retrieved May 18, 2016, from <http://go.sap.com/solution/mobile-technology.html>

SAP Store. (2016). SAP store. *SAP*. Retrieved May 18, 2016, from <https://store.sap.com/sap/cpa/ui/resources/store/html/Solutions.html?pcntry=US&sap-language=EN&catID=MOB>

Given these numbers, should businesses even attempt to tackle large IS projects? The answer is, in most cases, yes. Typically, organizations do not (or should not) start such projects for the sake of starting the projects; rather, organizations are trying to fix certain problems, such as inefficient or ineffective distribution, pricing, or logistics, or lack of compliance with government regulations. Further, businesses have realized that it is all but impossible to improve business processes without the support of information systems. Companies that have successfully installed enterprise systems are found to follow a basic set of recommendations related to enterprise system implementations. As with all large projects, governance and risk mitigation are critical to success, and companies should attempt to share both risks and rewards with the vendors. Although the following list is not meant to be comprehensive, these recommendations will provide an understanding of some of the challenges involved in implementing enterprise systems:

- Recommendation 1.** Secure executive sponsorship.
- Recommendation 2.** Get help from outside experts.
- Recommendation 3.** Thoroughly train users.
- Recommendation 4.** Take a multidisciplinary approach to implementations.
- Recommendation 5.** Evolve the implementation.

Secure Executive Sponsorship

The primary reason why enterprise system implementations fail is believed to be a lack of top-level management support. Although executives do not necessarily need to make decisions concerning the enterprise system, it is critical that they buy into the decisions made by project

managers. Many problems can arise if projects fail to grab the attention of top-level management. In most companies, executives have the ultimate authority regarding the availability and distribution of resources within the organization. If executives do not support the project, the probability of failure increases dramatically.

A second problem that may arise deals with top-level management's ability to authorize changes in the way the company does business. When business processes need to be changed to incorporate best practices, these modifications need to be completed. Otherwise, the company will have a piece of software that does not fit the way people accomplish their business tasks. Also, as people, in general, are reluctant to change the way they are working, there is bound to be resistance to the implementation of an ERP system. If users and midlevel management perceive the enterprise system to be unimportant, they are not likely to view it as a priority. Enterprise systems require a concentrated effort, and executive sponsorship can propel or stifle the implementation.

Get Help from Outside Experts

Enterprise systems are complex. Even the most talented IS departments can struggle in coming to grips with any enterprise-level system. Most vendors have trained project managers and experienced consultants to assist companies with installing these complex systems. Using consultants tends to move companies through the implementation more quickly and tends to help companies train their personnel on the applications more effectively. However, companies should not rely too heavily on support from the vendors. The salespeople's job is, after all, selling a system, and they are unlikely to thoroughly understand the company's exact business needs. Thus, organizations should also draw on external consultants to help define the functionality *before* selecting a vendor and to ensure that all requirements are incorporated in the contract with the vendor. Once the application goes live and the consultants are no longer there, users have to do the job themselves. A key focus should therefore be facilitating user learning.

Thoroughly Train Users

Training is often the most overlooked, underestimated, and poorly budgeted expense involved in planning enterprise system implementations. Enterprise systems are much more complicated to learn than standalone systems. Learning a single application requires users to become accustomed to a new software interface, but enterprise system users typically need to learn a new set of business processes as well. Once enterprise systems go live, many companies initially experience a dramatic drop-off in productivity. This issue can potentially lead to heightened levels of dissatisfaction among users, as they prefer to accomplish their business activities in a familiar manner rather than doing things the new way. By training users before the system goes live and giving them sufficient opportunities to learn the new system, a company can allay fears and mitigate potential productivity issues.

Take a Multidisciplinary Approach to Implementations

Enterprise systems affect the entire organization; thus, companies should include personnel from different levels and departments on the implementation team. In customer relationship management and supply chain management environments in which other organizations are participating in the implementation, it is critical to enlist the support of personnel in their organizations as well. During implementation, project managers need to include personnel from midlevel management, the IS department, external consultants, and, most important, end users.

Failing to include the appropriate people in the day-to-day activities of the project can prove problematic in many areas. From a needs-analysis standpoint, it is critical that all the business requirements be sufficiently captured before selecting an enterprise solution. Because end users are involved in every aspect of daily business activities, their insights can be invaluable. For instance, an end user might make salient a feature that no one on the project team had thought of. Having an application that does not meet all of the business's requirements can result in poorly fitting software or customizations. Another peril in leaving out key personnel is the threat of alienation. Departments and/or personnel who do not feel included may develop a sense of animosity toward the new system and view it in a negative light. In extreme cases, users will refuse to use the new application, resulting in conflicts and inefficiencies within the organization.

Evolve the Implementation

As you can see, implementing ERP systems is a highly complex undertaking; although a successful implementation can have huge payoffs for an organization, some organizations fear



WHEN THINGS GO WRONG

Software Error Frees Prisoners Early and Is Linked to Killings

The United States has the highest incarceration rate in the world, estimated to be 716 people per 100,000 residents in 2013. To put this into perspective, consider that the United States represents about 4.4 percent of the world's population, and it houses nearly 22 percent of the world's prisoners. The cost of the corrections industry in the United States is substantial, exceeding US\$74 billion, which is more than the GDP of 133 nations. The growth of the U.S. prison population is driven by several factors. First, many states have mandatory sentencing laws that require prison time for specific types of crimes (e.g., child molesting) or for repeat offenders. Such laws have acted to lower crime rates but have exploded prison populations. Second, many of the mandatory sentences can be as long as 25 years, which limits when and whether a prisoner can be released due to good behavior or other mitigating factors. With longer sentences in prison, populations continue to grow. Other factors such as the privatization of prisons, strict drug sentencing laws, and even 24-hour news programs have been cited as contributing reasons for increasing prison populations. Needless to say, there is a lot "wrong" with this picture.

In late 2015, a software glitch was discovered that was blamed for the early release of more than 3,200 prisoners since 2002 in the state of Washington. The software problem was discovered when a crime victim believed a convicted prisoner was going to be released too early. The glitch gave some prisoners

more good behavior credit than was possible to earn. While many may feel that having such an error in the software for 13 years is not a huge deal, there were at least two incidents where released prisoners were charged with murder during a period of time they should have still been in confinement. In early 2016, 31 of the early released prisoners were back in custody, with only a few being accused of committing new crimes while they were on the outside. For those who were making positive progress, such as holding a job or working on their education, this unexpected re-incarceration came as an unwelcome surprise.

Based on:

Berman, M. (2016, February 9). What happened after Washington State accidentally let thousands of inmates out early. *The Washington Post*. Retrieved May 18, 2016, from <https://www.washingtonpost.com/news/post-nation/wp/2016/02/09/heres-what-happened-after-the-state-of-washington-accidentally-let-thousands-of-inmates-out-early>

Godard, T. (2016, March 23). The economics of the American prison system. *Smart Asset*. Retrieved May 18, 2016, from <https://smartasset.com/insights/the-economics-of-the-american-prison-system>

Kaste, M. (2016, January 1). 2 prisoners mistakenly released early now charged in killings. *National Public Radio*. Retrieved May 18, 2016, from <http://www.npr.org/2016/01/01/461700642/computer-glitch-leads-to-mistaken-early-release-of-prisoners-in-washington>

United States incarceration rate. (2016, May 7). In *Wikipedia, The Free Encyclopedia*. Retrieved May 18, 2016, from https://en.wikipedia.org/w/index.php?title=United_States_incarceration_rate&oldid=719139142

losing the ability to quickly respond to changing business requirements, particularly because large ERP systems are difficult to install, maintain, and upgrade. In addition, the life cycle of a large ERP installation is typically 10 to 15 years. A recent trend, especially for small and mid-sized companies, is to move away from such large, comprehensive in-house systems toward cloud-based ERP solutions. As with other cloud-based solutions, companies implementing cloud-based ERP can benefit from scalability and agility. In addition, many companies extending into new markets are extending their existing ERP systems with cloud-based solutions. Such two-tier ERP strategy can support operations at the corporate level while providing the needed flexibility and agility at the subsidiary level. This can be especially beneficial when entering global markets, as the cloud-based solutions can be easily adapted to local needs and regulations without having to make extensive changes to the core ERP system.

Another key trend is the ability to manage a business in real time. With the costs of sensors decreasing at a tremendous pace (see Chapter 1), organizations are now able to acquire data about various operational processes in real time. Being able to use this data for business decisions is regarded as critical for successfully competing in the digital world. Traditionally, organizations separated the processing of transactions from the analysis (see Chapter 6, "Enhancing Business Intelligence Using Big Data and Analytics") so as to prevent the analytical applications from slowing down the transaction processing. Even then, batch transactions could take hours, and decision makers could not get quick answers to pressing business questions, as transactional data were loaded only periodically into the analytical systems and the data needed for real-time business intelligence were just not available. New technology, using in-memory computing (see Chapter 3), can help to tremendously increase processing speed by reducing disk latency while at the same time enabling the removal of the distinction between transactional and analytical systems. Paired with the continuing trend of mobile access to ERP systems, this enables managers to manage business in real time and quickly respond to changes as they occur.

Although expansive enterprise system implementations are often cumbersome and difficult, the potential payoff is huge. As a result, organizations are compelled to implement these systems. Further, given the popularity and necessity of integrating systems and processes on an organization-wide basis, you are likely to find yourself involved in the implementation and/or use of such a system. We are confident that after reading this chapter, you will be better able to understand and help with the development and use of such systems.



INDUSTRY ANALYSIS

The Automobile Industry

There are more than 1.2 billion cars and light trucks on the road throughout the world, a number that is estimated to reach 2 billion by 2035. With almost 90 million vehicles sold worldwide in 2015, experts predict this number to climb to 100 million by 2018, with China alone accounting for 25 million vehicles sold. In addition, countries such as Brazil, Russia, and India and other emerging economies (especially in Southeast Asia) will significantly contribute to this growth.

Currently, there is growing global demand for small, energy-efficient vehicles. Since 2006, the “World Car of the Year” has been selected by a large jury of international automotive journalists from 22 countries. Cars nominated for this award need to have been sold in at least five countries and on at least two continents. In addition to the overall winner, there are other categories including luxury, performance, and green automobiles. In recent years, the Audi A3 (2014), BMW 2 Series (2015), and Mazda MX-5 (2016), all small and relatively efficient vehicles, have been chosen as the overall winners.

In the meantime, the automobile industry continues to explore other ways of responding to global market demands. Many automobile manufacturers have dramatically evolved their global networks of suppliers (such as Bosch and Continental from Germany, Magna and Lear from the United States, and Yazaki from Japan), leveraging these broad supply chains to bring new innovations to market, ranging from USB ports to hard drives for storing music to mobile data connectivity. In addition, manufacturers and technology companies are finding interesting ways to make cars safer and more convenient. Electric cars are also gaining a growing market share. In 2013, just over 400,000 electrical vehicles were sold globally; in 2015, this number grew to 1.2 million. In Norway, more than 22 percent of all new car sales were electric in 2015.

Another coming trend in this market is driverless cars. For several years, Google has famously been working on technology to support a self-driving car. The system drives the car at the speed limit it has stored from Google’s mapping database and maintains distance from other vehicles using an array of sensors. In addition to Google, many other technology companies and automobile manufacturers are focusing a lot of their R&D budgets to driverless cars. Key players include not only Google but also Apple, Ford, General Motors, Tesla, Baidu, and numerous universities around the world.

Beyond optimizing supply chains and adding new innovative features, automakers are trying to attract new customers

by finding new ways to present their newest models. For example, automakers are using virtual reality (VR) technology to create virtual showrooms in upscale shopping centers or just about anywhere. In 2016, Audi is using VR headsets to allow potential customers to move around the exterior of the virtual vehicle, open the trunk and doors, check out the headlights and taillights, look underneath the hood, and even get inside and sit in the driver’s seat. In such immersive environments, customers can experience all aspects of the shopping experience except for the new car smell.

Questions

1. How has globalization changed the business processes of auto manufacturers?
2. What innovative technologies may be included in the cars of the future?

Based on:

Abkowitz, A. (2016, June 2). Baidu plans to mass produce autonomous cars in five years. *Wall Street Journal*. Retrieved July 21, 2016, from <http://www.wsj.com/articles/baidu-plans-to-mass-produce-autonomous-cars-in-five-years-1464924067>.

Anonymous. (2015, August 12). Do you know the car population in the world? *Tofucar*. Retrieved May 1, 2016, from <http://www.tofucar.com/do-you-know-the-car-population-in-the-world>

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Autonomous car. (2016, May 1). In *Wikipedia, The Free Encyclopedia*. Retrieved May 1, 2016, from https://en.wikipedia.org/w/index.php?title=Autonomous_car&oldid=718111778

Cavies, A. (2015, October 22). Obviously drivers are already abusing Tesla’s autopilot. *Wired*. Retrieved May 1, 2016, from <http://www.wired.com/2015/10/obviously-drivers-are-already-abusing-teslas-autopilot>

Electric car use by country. (2016, April 29). In *Wikipedia, The Free Encyclopedia*. Retrieved May 1, 2016, from https://en.wikipedia.org/w/index.php?title=Electric_car_use_by_country&oldid=717758461

Gaudiosi, J. (2016, January 8). Audi drives virtual reality showroom with HTC Vive. *Fortune*. Retrieved May 1, 2016, from <http://fortune.com/2016/01/08/audi-showroom-uses-vr>

Google self-driving car. (2016, April 28). In *Wikipedia, The Free Encyclopedia*. Retrieved May 1, 2016, from https://en.wikipedia.org/w/index.php?title=Google_self-driving_car&oldid=717557267

Key Points Review

1. **Explain core business processes that are common in organizations.** Most organizations are organized around distinct functional areas that work together to execute the core business processes order-to-cash, procure-to-pay, and make-to-stock/order. Together, these core business processes enable the creation of value chains that are involved in transforming raw materials into products sold to the end consumer. Value chains are composed of both core activities (inbound logistics, operations and manufacturing, outbound logistics, marketing and sales, and customer service) and support activities (administrative activities, infrastructure, human resources, technology development, and procurement). Companies connect their value chains with suppliers and customers, creating value systems such that information flows from one company's value chain to another company's value chain.
2. **Describe what enterprise systems are and how they have evolved.** Enterprise systems are information systems that span the entire organization and can be used to integrate business processes, activities, and information across all the functional areas of a firm. Enterprise systems evolved from legacy systems that supported distinct organizational activities by combining data and applications into a single comprehensive system and can be either prepackaged software or custom-made applications. The implementation of enterprise systems often involves business process management, a systematic, structured improvement approach by all or part of an organization that critically examines, rethinks, and redesigns processes in order to achieve dramatic improvements in one or more performance measures, such as quality, cycle time, or cost.
3. **Describe enterprise resource planning systems and how they help to improve internal business processes.** ERP systems allow information to be shared throughout the organization through the use of a large database, helping to streamline business processes and improve customer service. When selecting an ERP system, organizations must choose which modules to implement from a large menu of options—most organizations adopt only a subset of the available ERP components. ERP core components support the major internal activities of the organization for producing its products and services, while ERP extended components support the primary external activities of the organization for dealing with suppliers and customers.
4. **Understand and utilize the keys to successfully implementing enterprise systems.** Experience with enterprise system implementations suggests that there are some common problems that can be avoided and/or should be managed carefully. Organizations can avoid common implementation problems by (1) securing executive sponsorship, (2) getting necessary help from outside experts, (3) thoroughly training users, (4) taking a multidisciplinary approach to implementations, and (5) keeping track of evolving ERP trends.

Key Terms

best practices	285	enterprise system	281	module	284
business process management (BPM)	286	enterprise-wide information system	281	off-the-shelf software	284
business process reengineering (BPR)	286	ERP core components	290	order-to-cash process	273
core activities	275	ERP extended components	291	packaged software	284
custom software	284	externally focused system	283	procure-to-pay process	273
customization	284	internally focused system	281	standalone application	280
downstream information flow	279	interorganizational system	283	support activities	277
enterprise resource planning (ERP) system	288	legacy system	280	upstream information flow	279
		make-to-order process	274	value system	279
		make-to-stock process	274	vanilla version	284

Review Questions

- 7-1. What are core business processes?
- MyMISLab 7-2. Compare and contrast the core and support activities of a value chain.
- 7-3. Give an example of upstream and downstream information flows in a value system.
- MyMISLab 7-4. Describe what enterprise systems are and how they have evolved.
- MyMISLab 7-5. Compare and contrast customized and packaged software as well as vanilla versions versus best practices-based software.
- 7-6. What are the core components of an ERP system?
- 7-7. What are the keys to successfully implementing an ERP system?

Self-Study Questions

- 7-8. _____ are information systems that allow companies to integrate information and support operations on a company-wide basis.
- A. Customer relationship management systems
 - B. Enterprise systems
 - C. Wide area networks
 - D. Interorganizational systems
- 7-9. Which of the following is a core activity according to the value chain model?
- A. firm infrastructure
 - B. customer service
 - C. human resources
 - D. procurement
- 7-10. According to the value chain model, which of the following is a support activity?
- A. technology development
 - B. marketing and sales
 - C. inbound logistics
 - D. operations and manufacturing
- 7-11. All of the following are true about legacy systems except _____.
- A. they are standalone systems
 - B. they are older software systems
 - C. they are ERP systems
 - D. they may be difficult to integrate into other systems
- 7-12. The processes associated with obtaining goods from external vendors are referred to as _____.
- A. make-to-order processes
 - B. make-to-stock processes
 - C. procure-to-pay processes
 - D. order-to-cash processes
- 7-13. The processes associated with selling a product or service are referred to as _____.
- A. make-to-order processes
 - B. make-to-stock processes
 - C. procure-to-pay processes
 - D. order-to-cash processes
- 7-14. Which processes are most often associated with pull-based manufacturing of products?
- A. make-to-order processes
 - B. make-to-stock processes
 - C. procure-to-pay processes
 - D. order-to-cash processes
- 7-15. Information systems that focus on supporting functional areas, business processes, and decision making within an organization are referred to as _____.
- A. legacy systems
 - B. enterprise-wide information systems
 - C. interorganizational systems
 - D. internally focused systems
- 7-16. An enterprise system that has not been customized is commonly referred to as _____.
- A. a vanilla version
 - B. a root version
 - C. a core version
 - D. none of the above
- 7-17. _____ is a systematic, structured improvement approach by all or part of an organization that critically examines, rethinks, and redesigns processes in order to achieve dramatic improvements in one or more performance measures, such as quality, cycle time, or cost.
- A. Systems analysis
 - B. Business process management
 - C. Customer relationship management
 - D. Total quality management
- Answers are on page 302.

Problems and Exercises

- 7-18.** Match the following terms with the appropriate definitions:
- i. Enterprise system
 - ii. Legacy system
 - iii. Value system
 - iv. ERP extended components
 - v. Standalone application
 - vi. Vanilla version
 - vii. Make-to-stock process
 - viii. Business process management
 - ix. Procure-to-pay process
 - x. Internally focused system
- a. Components that support the primary *external* activities of the organization for dealing with suppliers and customers
 - b. System that focuses on the specific needs of an individual department
 - c. The processes associated with producing goods based on forecasted demand
 - d. Older system that is not designed to communicate with other applications beyond departmental boundaries
 - e. Information system that allows companies to integrate data on a company-wide basis
 - f. The features and modules that a packaged software system comes with out of the box
 - g. The processes associated with acquiring goods from suppliers
 - h. A systematic, structured improvement approach by all or part of an organization whereby people critically examine, rethink, and redesign business processes in order to achieve dramatic improvements in one or more performance measures, such as quality, cycle time, or cost
 - i. Information system that supports functional areas, business processes, and decision making within an organization
 - j. A collection of interlocking company value chains
- 7-19.** Find an organization that you are familiar with and determine how many software applications it is utilizing concurrently. Are the company's information systems cohesive, or do they need updating and streamlining?
- 7-20.** What part does training users in an ERP system play, and how important is it in job satisfaction? What productivity problems can result from an ERP implementation?
- 7-21.** What are the payoffs from taking a multidisciplinary approach to an ERP implementation? What departments are affected, and what is the typical time frame? Research an organization that has recently implemented an ERP system. What could the company have done better, and what did it do right?
- 7-22.** For a business or organization that you are familiar with, describe its order-to-cash process using the steps outlined in Figure 7.3; if the organization doesn't have a particular step, explain why this is so.
- 7-23.** For a business or organization that you are familiar with, describe its procure-to-pay process using the steps outlined in Figure 7.4; if the organization doesn't have a particular step, explain why this is so.
- 7-24.** For a business or organization that you are familiar with, describe either its make-to-stock or make-to-order process using the steps outlined in Figure 7.5; if the organization doesn't have a particular step, explain why this is so.
- 7-25.** Using Figure 7.6 as a guide, develop a supply chain diagram for some other product.
- 7-26.** Explain what is meant by upstream and downstream in the value chain and explain how Walmart influences both ends to control costs.
- 7-27.** Based on your own experiences with applications, have you used customized or off-the-shelf applications? What is the difference, and how good was the system documentation?
- 7-28.** Search the web for the phrase "best practices," and you will find numerous sites that summarize the best practices for a variety of industries and professions. Choose one and summarize these best practices in a one-page report.
- 7-29.** Examine and contrast the differences between packaged and custom software. When is one approach better or worse than the other?
- 7-30.** Search the web for recent articles on business process management and related approaches (e.g., business process reengineering) for improving organizations. What is the current state of the art for these approaches? To what extent are these "headlines" about IS implementations, especially regarding enterprise systems?
- 7-31.** Search the web for recent stories about the use of cloud-based ERP systems. To what extent does it appear that cloud-based ERP systems will be replacing traditional ERP systems?

Application Exercises

Note: The existing data files referenced in these exercises are available on the book's website: www.pearsonhighered.com/valacich.



Spreadsheet Application: Choosing an ERP System at Campus Travel

- 7-32. Campus Travel is interested in integrating its business processes to streamline processes such as purchasing, sales, human resource management, and customer relationship management. Because of your success in implementing the e-commerce infrastructure, the general manager asks you for advice on what to do to streamline operations at Campus Travel. Use the data provided in the file ERPSystems.csv to make a recommendation about which ERP system to purchase. The file includes ratings of the different modules of the systems and the weights assigned to these ratings. You are asked to do the following:
- Determine the product with the highest overall rating. (Hint: Use the SUMPRODUCT formula to multiply each vendor's scores with the respective weights and add the weighted scores.)

- Prepare the necessary graphs to compare the products on the different dimensions and the overall score.
- Be sure to professionally format the graphs before submitting them to your instructor.



Database Application: Creating Forms at Campus Travel

- 7-33. After helping Campus Travel off to a good start with its databases, you have decided that it should enter data using forms rather than doing it from tables. From your experience, you know that employees have an easier time being able to browse, modify, and add records from a form view. As this can be implemented using your existing database, you decide to set up a form. You can accomplish this by doing the following:
- Open the database employeeData.mdb.
 - Select the employee table in the database window.
 - Create a form using the table. (Hint: This can be done by selecting “More Forms >> Form Wizard” under “Forms” in the “Create” tab.)
 - Save the form as “employees.”

Team Work Exercise



Net Stats: Should They Expect to Fail?

For years, broad surveys have reported surprisingly high rates of ERP project failures. In a survey exploring the nature of these failures, Panorama Consulting Solutions, an ERP systems integrator, found that in 2015, 57 percent of ERP projects experienced cost overruns and schedule overruns. Even worse, 46 percent of the survey respondents reported receiving less than half of the expected benefits from their ERP implementation; 10 percent did not realize any measurable benefits. Clearly, ERP implementations are prone to difficulties and delays, but the reasons behind the problems are difficult to pinpoint.

Questions and Exercises

- 7-34. Search the web to identify a story about a recent ERP implementation failure.
- 7-35. As a team, interpret this article. What caused the project to fail? What could have been done differently?
- 7-36. As a team, discuss how the Panorama survey might look in 5 years and 10 years. Will success rates improve? Get worse? Why?
- 7-37. Using your presentation software of choice, create two or three slides that summarize the findings you consider most important.

Based on:

Anonymous. (2016). 2016 report on ERP systems and enterprise software. *Panorama Consulting Solutions*. Retrieved May 1, 2016, from <http://panorama-consulting.com/resource-center/2016-erp-report>

Answers to the Self-Study Questions

7-8. B, p. 279

7-13. D, p. 273

7-9. B, p. 278

7-14. A, p. 274

7-10. A, p. 278

7-15. D, p. 281

7-11. C, p. 280

7-16. A, p. 284

7-12. C, p. 273

7-17. B, p. 286

CASE 1 | Software as a Service: ERP by the Hour

As you know by now, an organization's IS infrastructure is not simple to construct or maintain but is a complex infrastructure of servers and databases useful for managing large amounts of information. With advances in cloud computing, software as a service (SaaS) has appeared as a model of IS infrastructure and software and is rapidly changing the way many organizations do business. SaaS is a way for organizations to use cloud-based Internet services to accomplish the goals that traditional IS infrastructure and software models have in the past. SaaS allows software application vendors to deploy their products over the Internet through web-based services. SaaS customers pay to use applications on demand, giving them the freedom to access a software service only when needed. Applications and software are developed, hosted, and operated by SaaS vendors, and customers are charged on a pay-per-use basis. Once the customer's "license" expires, the customer no longer has to carry the cost of the software. If a future need for the software arises, the customer simply orders it again to have access. SaaS products can be licensed for single or multiple users within the organization, making them flexible and scalable.

Using the SaaS model has several advantages. Through SaaS applications, organizations can move their data storage into the cloud, reducing the cost of buying storage and diminishing the risk of catastrophic data loss, as it is in the vendor's financial interest to keep the services it provides running at

peak performance or risk losing customers to another vendor. In addition, SaaS allows for less resource expenditure on long-term software licensing because an organization can get what it needs when it needs it. SaaS utilization also allows organizations to become more productive outside the physical confines of their buildings. Because SaaS services are in the cloud, employees can access services from remote offices or from their mobile devices.

One of the main disadvantages of SaaS is that customers must give up some autonomy over their applications and data. Some organizations require specialized software solutions and are used to customizing software in-house to meet their needs. Although some SaaS vendors are beginning to offer customizable solutions, the problem is still a roadblock for some. Computing off-site also means that security may be an issue, as organizational operations and data are effectively running on someone else's server. As it is virtually impossible for some types of organizations to keep their data—and their secrets—in the cloud, such concerns are another roadblock that organizations must overcome in order to use SaaS products.

These disadvantages aside, organizations are reaping the benefits of SaaS, utilizing them for human resources activities, e-mail services, collaboration efforts, storage solutions, and financial tasks such as billing, invoicing, and timekeeping. In addition to more general-purpose applications, many organizations are deploying ERP capabilities

via SaaS vendors. And the growth of the SaaS industry doesn't appear to be slowing. In fact, a recent study by Gartner found that the global SaaS market is projected to grow from US\$49 billion in 2015 to US\$67 billion in 2018.

Companies like Google, Amazon.com, and Microsoft have become well-known SaaS vendors offering a range of services to organizations, including shared-document management, communication services, cloud-based e-mail, calendaring, photo and video sharing, web and intranet page management, and data storage services, just to name a few. Given the challenges and issues associated with implementing in-house enterprise systems, ERP vendors are increasingly offering their software as a service as well. For example, SAP offers SAP Business ByDesign, an integrated on-demand ERP solution for small and medium-sized enterprises. Similarly, Microsoft offers its Dynamics customer relationship management system as a service, and Oracle offers the subscription-based Oracle On-Demand customer relationship management solution.

As more organizations continue to adopt SaaS services as a way of carrying out their day-to-day activities, vendors will continue to upgrade and expand the available technologies for use. The question of whether organizations will adopt SaaS services has, for the most part, been answered. The question has now become how much of their business they will put in the cloud.

Questions

- 7-38. Would you trust an external provider with your organization's data? Why or why not? What would be needed to raise your trust in the reliability, security, and privacy of the data?
- 7-39. What are the potential drawbacks of using a relatively simple in-house database with limited capabilities versus a more robust, SaaS database solution? Do the benefits outweigh these limitations? Why or why not?
- 7-40. Are there any types of applications that should only be purchased rather than obtained through a SaaS relationship? If so, why or why not?

Based on:

Columbus, L. (2015, September 27). Roundup of cloud computing forecasts and market estimates Q3 update, 2015. *Forbes*. Retrieved May 1, 2016, from <http://www.forbes.com/sites/louiscolumbus/2015/09/27/roundup-of-cloud-computing-forecasts-and-market-estimates-q3-update-2015>

Software as a service. (2016, March 5). In *Wikipedia, The Free Encyclopedia*. Retrieved May 1, 2016, from https://en.wikipedia.org/w/index.php?title=Software_as_a_service&oldid=708416639

CASE 2 | Amazon's Order Fulfillment, Automation, and Technological Unemployment

“Work Hard. Have Fun. Make History.” So reads a sign above the entrance to many of Amazon’s fulfillment centers throughout the world. Inside these massive fulfillment centers, millions of products are waiting to be shipped to the doorsteps of customers. Historically, human pickers walked the isles of these warehouses, pushing carts with baskets as they deposited items that were awaiting to be shipped to someone, from somewhere, who ordered the product online. More and more, robots are being used to support and many times replace these human workers.

While the data are constantly changing, in May 2016, Amazon operated nearly 300 centers across the world to handle order fulfillment, sorting, and delivery for Amazon and Amazon Prime customers. In addition to the United States, fulfillment centers are located in Canada, Mexico, the United Kingdom, Germany, France, Italy, Spain, Czech Republic, Poland, China, Japan, India, and Brazil. The United States alone has more than 160 facilities, with many larger than 1 million square feet. With such a network, Amazon provides same-day delivery to an increasing number of cities including New York City, Atlanta, Baltimore, Boston, Chicago, Indianapolis, Philadelphia, Washington, DC, Dallas, Los Angeles, Phoenix, San Francisco, and Seattle. Amazon has been very strategic about where it places centers. For example, in late 2015, it was estimated that its current centers bring it within 20 miles of 31 percent of the U.S. population. Clearly, Amazon is now competing with many local businesses that always had the advantage of same-day delivery.

As Amazon races for fast order fulfillment and reducing costs, it is very actively integrating robots into the order fulfillment process. An average human picker at a fulfillment center can pick around 1,000 items a day. While humans have fueled Amazon’s success in the order fulfillment process, humans are becoming the weak link as facilities get bigger and competition necessitates faster and less costly processes. Robots don’t get tired, don’t need to take lunch or toilet breaks, can work 24 hours per day, and will only make mistakes if the databases driving their operations contain an error. There are, however, many tasks that humans can perform better than robots, at least at this time. For example, robots are still incapable of tasks that require fine manipulation or improvisation. Because of this, Amazon and other large retailers are exploring ways for robots to collaborate with humans in more effective ways.

One approach for utilizing robots is to fundamentally change the picking process. Rather than have workers walk the aisles of these massive warehouses, why not have the shelves come to the pickers? These robotic shelves, sitting atop a small robot about the size of a footstool, know which products are on its shelves. Computer control guides these shelves to a particular picker, who can select the next product needed for an order, and can simultaneously optimize the movement and sequence of a countless numbers of shelves. The shelves can be kept very close to one another as they wait for inventory replenishments or to deliver a product to a picker. Shelves can also be packed tighter. The process is much more efficient than having humans walk around massive warehouses.

Historically, automation has often been viewed as a double-edged sword, providing both benefits and problems for society. Benefits could include the elimination of dangerous jobs, but at the same time, the technology also creates unemployment. Over the years, while technology eliminated some jobs, it often was the catalyst for the creation of new types of jobs, often with better pay. When automation was brought to family farms, for example, a single farmer could work much larger farms, producing enough food for many families. Such productivity gains resulted in the elimination of many farming jobs. These displaced farmers often then moved to the city to work in factories to produce even greater productivity gains in farming and other industries.

As the digital world accelerates change, emerging technologies like industrial robots, artificial intelligence, 3D printing, and machine learning are forecasted to eliminate a variety of jobs at a pace faster than ever before. When automation kills more jobs than it produces in other industries, this is called *technological unemployment*. Historically, such widespread fears of technological unemployment have been viewed as a Luddite fallacy, but now, many fear that a tipping point has been reached where technology will rapidly eliminate not only blue-collar jobs needing manual labor but also many jobs where humans make decisions, so-called white-collar jobs. In fact, some 47 percent of present jobs in the United States could be computerized in the next 10 to 20 years, according to an Oxford University study. How far and how fast this change appears will have a tremendous impact on the digital world.

Questions

- 7-41. Search the web and find the latest statistics about Amazon’s order fulfillment facilities. Where is the largest facility located? What is its size? What large city (or cities) is it closest to?
- 7-42. The case made the point that automation is often a double-edged sword. Provide at least three examples where the invention of a technology provided both benefits and problems for a society.
- 7-43. Search the web for recent articles on “technological unemployment.” Which jobs are least likely to be replaced by automation?

Based on:

Anonymous. (2016, May). Amazon global fulfillment center network. *MWPVL International*. Retrieved May 18, 2016, from http://www.mwpvl.com/html/amazon_com.html

Frey, C. B., & Osborne, M. S. (2013, September 17). The future of employment: How susceptible are jobs to computerisation? *University of Oxford*. Retrieved May 19, 2016, from <http://www.oxfordmartin.ox.ac.uk/publications/view/1314>

Karsten, J., & West, D. M. (2015, October 26). How robots, artificial intelligence, and machine learning will affect employment and public policy. *Brookings*. Retrieved May 19, 2016, from <http://www.brookings.edu/blogs/techtank/posts/2015/10/26-emerging-tech-employment-public-policy-west>

Knight, W. (2015, July 7). Inside Amazon’s warehouse, human-robot symbiosis. *MIT Technology Review*. Retrieved May 19, 2016, from <https://www.technologyreview.com/s/538601/inside-amazons-warehouse-human-robot-symbiosis>

Thompson, C. (2015, June 3). We’ve reached a tipping point where technology is now destroying more jobs than it creates, research warns. *Business Insider*. Retrieved May 19, 2016, from <http://www.businessinsider.com/technology-is-destroying-jobs-and-it-could-spur-a-global-crisis-2015-6>

Technological unemployment. (2016, May 17). In *Wikipedia, The Free Encyclopedia*. Retrieved May 19, 2016, from https://en.wikipedia.org/w/index.php?title=Technological_unemployment&oldid=720773925



Go to mymislab.com for auto-graded writing questions as well as the following assisted-graded writing questions:

- 7-44. Describe and contrast order-to-cash, procure-to-pay, make-to-stock, and make-to-order business processes.
7-45. Contrast internally and externally focused systems.

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8

Strengthening Business-to-Business Relationships via Supply Chain and Customer Relationship Management

Preview

This chapter extends the prior discussion regarding how companies are deploying enterprise-wide information systems to build and strengthen organizational partnerships. Enterprise systems help integrate various business activities, streamline and better manage interactions with customers, and better coordinate with suppliers in order to meet changing customer demands more efficiently and effectively. In this chapter, two additional powerful systems are introduced: supply chain management (SCM) systems supporting business-to-business (B2B) transactions and customer relationship management (CRM) systems for promoting and selling products and building and nourishing long-term customer relationships. When added to enterprise resource planning (ERP) systems, both of these systems tie the customer to the supply chain that includes the manufacturer and suppliers all the way back to the raw materials that ultimately become the product no matter where in the world they originate.

More and more companies find that they need systems that span their entire organization to tie everything together. As a result, an understanding of supply chain management and customer relationship management is critical to succeed in today's competitive and ever-changing digital world.

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MANAGING IN THE DIGITAL WORLD:

Walmart

As the world's largest retailer, Walmart is known for its relentless pursuit of lowering costs and passing those savings on to shoppers to undercut competitors' prices. Much of the company's success has been widely attributed to its effective use of technology to support its supply chain. Through a combination of distribution practices, truck fleet management, and technological innovations, Walmart became a model of supply chain efficiency. Being the largest retailer and private-sector employer in the world, Walmart employs more than 2.2 million people worldwide (1.4 million in the United States) and, in 2016, had about 11,500 stores in 28 countries.

One of Walmart's famous supply chain innovations is vendor-managed inventory, where manufacturers are responsible for monitoring inventory levels of their products in Walmart's warehouses, helping Walmart achieve close to 100 percent order fulfillment on merchandise and essentially eliminating the loss of sales due to out-of-stock items. Walmart further streamlined its supply chain by creating communication networks with suppliers to improve product flow and reduce inventories. The network of global suppliers, warehouses, and retail stores has been described as behaving almost like a single firm. Walmart also developed the concept of "cross docking"—direct transfers from inbound to outbound truck trailers without extra storage

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

1. Describe supply chain management systems and how they help to improve business-to-business processes.
2. Describe customer relationship management systems and how they help to improve the activities involved in promoting and selling products to customers as well as providing customer service and nourishing long-term relationships.

(see Figure 8.1). The company's trucks continuously deliver goods to distribution, where they are stored, repackaged, and distributed without sitting in inventory.

Walmart's investments in technology to support its supply chain have also resulted in powerful customer relationship management capabilities. Walmart's information systems record every purchase in every store around the world, along with a host of other information (location, time of day, other items purchased in the same order, etc.). Its data warehouse containing all of these data is one of the largest in the world. As a result, Walmart can stock more of the most popular products and cluster items that people tend to buy at the same time. As Walmart's online business continues to grow, it is carefully refining its supply chain to optimize both traditional and online sales. These and other innovations have fueled and maintained Walmart's impressive growth and market share. In early 2016, Walmart was estimated to have 11.2 percent of U.S. retail sales, with e-commerce sales of nearly US\$14 billion, and global sales of nearly US\$500 billion in 2015.

Information systems are increasingly central to streamlining supply chains, coordinating with suppliers and distributors, and managing and leveraging relationships with customers. Those organizations that develop advanced systems capabilities in these crucial areas of business will, like Walmart, gain a significant edge over competitors in the market.

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

1. How has Walmart used its supply chain management systems to lower costs and outperform the competition?



FIGURE 8.1

Walmart uses cross docking to optimize its supply chain.
Source: Fertnig\E+\\Getty Images.

2. How can Walmart use the retail data it gathers to improve the activities involved in promoting and selling products to customers as well as providing customer service and nourishing long-term relationships?
3. How can companies like Walmart benefit from combining their SCM and CRM systems into one integrated information system?

Based on:

Chao, L. (2015, August 18). Wal-Mart reins back inventory in a revamped supply chain. *Wall Street Journal*. Retrieved May 4, 2016, from <http://www.wsj.com/articles/wal-mart-reins-back-inventory-in-a-revamped-supply-chain-1439933834>

Robinson, A. (2015, May 13). Walmart: 3 keys to successful supply chain management any business can follow. *Cerasis*. Retrieved May 4, 2016, from <http://cerasis.com/2015/05/13/supply-chain-management>

Walmart. (2016). Company facts. *Walmart.com*. Retrieved May 4, 2016, from <http://corporate.walmart.com/newsroom/company-facts>

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Supply Chain Management

In the previous chapter, we discussed the need to share internal data in order to streamline business processes, improving coordination within the organization to improve efficiency and effectiveness. Let's now turn our attention to collaborating with partners along the supply chain. Obtaining the raw materials and components that a company uses in its daily operations is an important key to business success. When deliveries from suppliers are accurate and timely, companies can convert them to finished products more efficiently. Coordinating this effort with suppliers has become a central part of many companies' overall business strategy, as it can help them reduce costs associated with inventory levels and get new products to market more quickly. Ultimately, this helps companies drive profitability and improve their customer service because they can react to changing market conditions swiftly. Collaborating or sharing information with suppliers has become a strategic necessity for business success. In other words, by developing and maintaining stronger, more integrated relationships with suppliers, companies can more effectively compete in their markets through cost reductions and responsiveness to market demands.

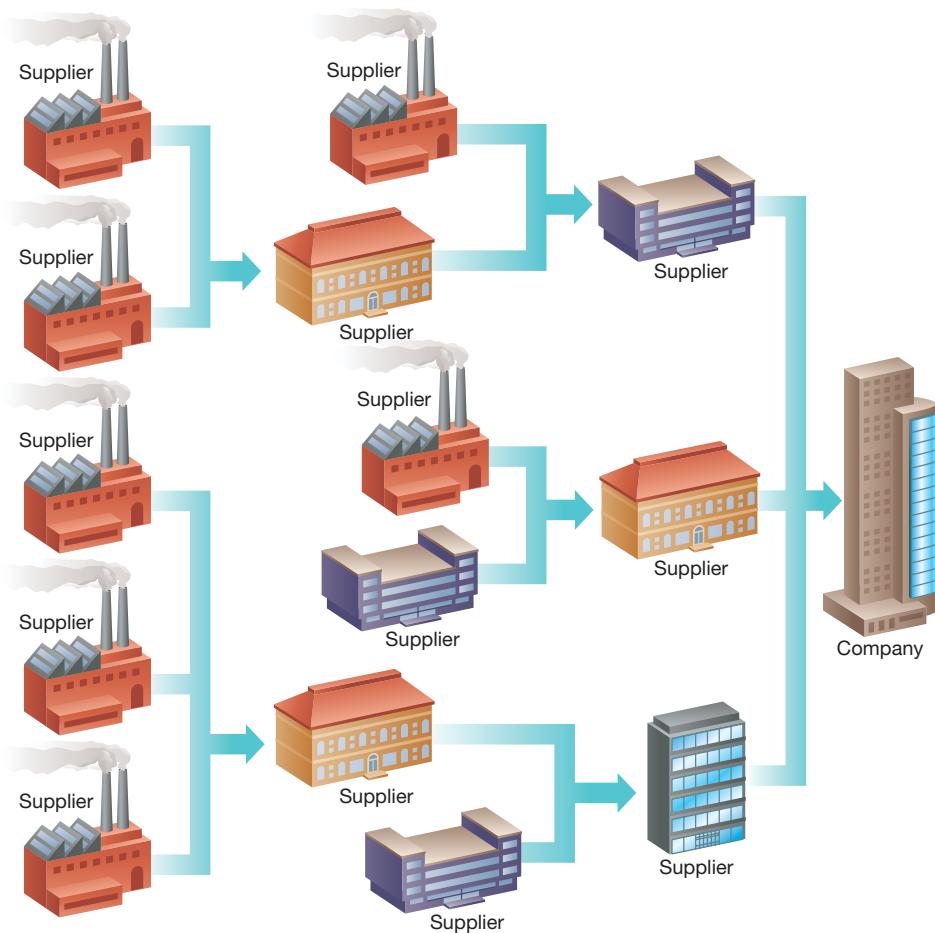
What Is a Supply Chain?

The term **supply chain** is commonly used to refer to a collection of companies and processes involved in everything from extracting raw materials to moving a product from the suppliers of raw materials to the suppliers of intermediate components, then to final production, and, ultimately, to the customer. Companies often procure specific raw materials and components from many different “upstream” suppliers. These suppliers, in turn, work with their own suppliers to obtain raw materials and components; their suppliers work with additional suppliers, and so forth. The further out in the supply chain one looks, the more suppliers are involved. As a result, the term “chain” becomes somewhat of a misnomer since it implies one-to-one relationships facilitating a chain of events flowing from the first supplier to the second to the third and so on. Similarly, on the “downstream” side, the products move to many different customers. The flow of materials from suppliers to customers can thus be more accurately described as a **supply network** because of the various interrelated parties involved in moving raw materials, intermediate components, and, finally, the end product within the production process (Figure 8.2).

Most companies are depending on a steady source of key supplies to produce their goods or services. For example, luxury restaurants require their produce to be consistently of high quality; similarly, car manufacturers need steel, paint, or electronic components in the right quantities, at the right quality and price, and at the right time. Thus, most companies are seeking long-term B2B relationships with a limited number of carefully selected suppliers—rather than one-time deals—and invest considerable efforts in selecting their suppliers or business partners; often, suppliers are assessed not only on product features such as price or quality but also on suppliers’ characteristics, such as trustworthiness, commitment, or viability.

Business-to-Business Electronic Commerce: Exchanging Data in Supply Networks

Transactions conducted between different businesses in a supply network, not involving the end consumer, are referred to as business-to-business electronic commerce (EC). This type of commerce accounts for more than 90 percent of all EC (excluding services such as healthcare, accommodation, real estate, or finance) in the United States (U.S. Census Bureau, 2016). B2B transactions require proprietary information (such as orders for parts) to be communicated to an organization’s business partners. For many organizations, keeping such information private can be of strategic value; for example, Apple tries to keep news about potential new product launches to a minimum, and any information about orders for key components (such as touch screens) could give away hints of what a new product may be. Prior to the introduction of the Internet and web, the secure communication of proprietary information in B2B EC was facilitated using **Electronic Data Interchange (EDI)**. EDI refers to computer-to-computer communication (without human intervention) following certain standards as set by the UN Economic Commission (for Europe) or the American National Standards Institute. Traditionally, using EDI, the exchange of business documents and other information took place via dedicated telecommunication networks between suppliers and customers, and thus the use of EDI was

**FIGURE 8.2**

A typical supply network.

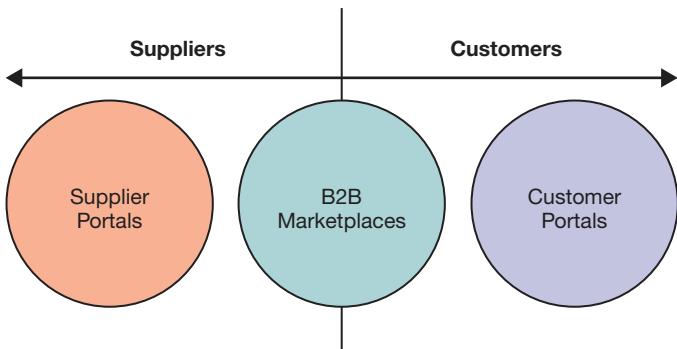
generally limited to large corporations that could afford the associated expenses. Today, the Internet has become an economical medium over which this business-related information can be transmitted, enabling even small to mid-sized enterprises to use EDI; many large companies (such as the retail giant Walmart) require their suppliers to transmit information such as advance shipping notices using web-based EDI protocols. Further, companies have devised a number of innovative ways to facilitate B2B transactions using web-based technologies. Specifically, organizations increasingly use extranets (see Chapter 3, “Managing the Information Systems Infrastructure and Services”) for exchanging data and handling transactions with their suppliers or organizational customers. Commonly, portals are used to interact with the business partners; these are discussed next.

PORTALS. Portals, in the context of B2B supply chain management, can be defined as access points (or front doors) through which a business partner accesses secured, proprietary information that may be dispersed throughout an organization (typically using extranets). By allowing direct access to critical information needed to conduct business, portals can thus provide substantial productivity gains and cost savings for B2B transactions.

In contrast to business-to-consumer (B2C) EC, where anyone can set up a customer account with a retailer, the suppliers or customers in B2B transactions are typically prescreened by the business, and access to the company’s extranet will be given depending on the business relationship (typically, after a review of the supplier’s or buyer’s application). To support different types of business relationships, portals come in two basic forms: supplier portals and customer portals. Supplier portals are owned or managed by a “downstream” company and automate the business processes involved in purchasing or procuring products from multiple suppliers; they connect a single buyer and multiple suppliers. On the other end of the spectrum, customer portals are owned or managed by an “upstream” company and automate the business processes involved in selling or distributing products to multiple buyers; they connect a single supplier and multiple

FIGURE 8.3

Supplier portals, B2B marketplaces, and customer portals.

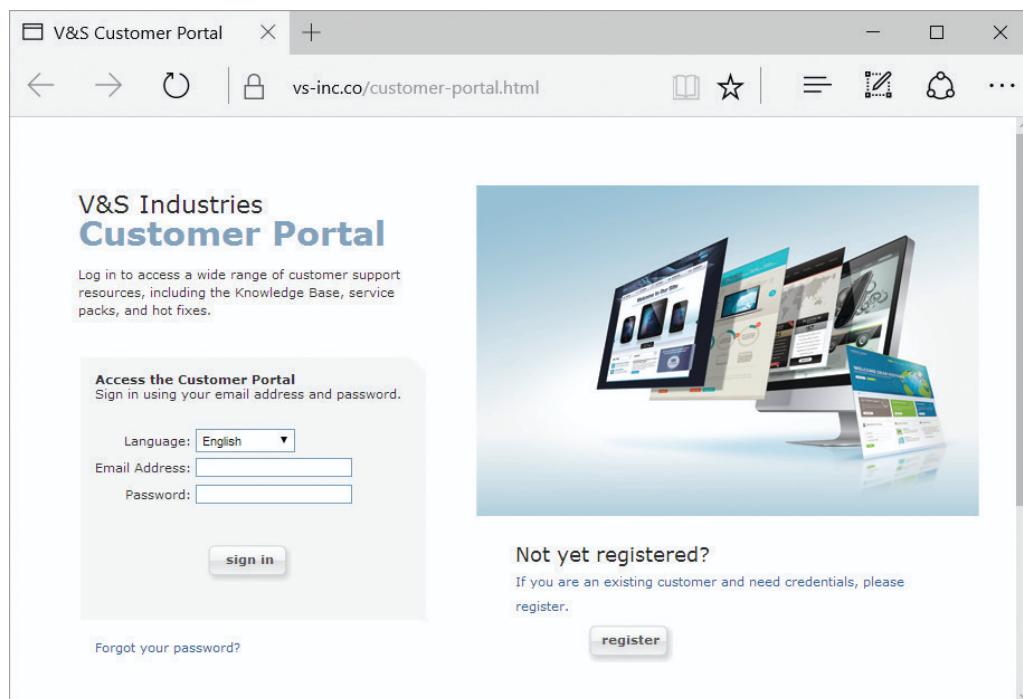


buyers. B2B marketplaces are typically run by separate entities and connect multiple buyers and multiple suppliers (Figure 8.3).

Supplier Portals Many companies that are dealing with large numbers of suppliers (e.g., The Boeing Company, Lilly, P&G, and Hewlett-Packard [HP]) set up **supplier portals** (sometimes referred to as sourcing portals or procurement portals). A supplier portal is a subset of an organization's extranet designed to automate the business processes that occur before, during, and after sales transactions between the organization (i.e., a single buyer) and its multiple suppliers. For example, on the HP Supplier Portal, companies can register their interest in becoming a supplier for HP; access terms and conditions or guidelines (such as guidelines related to labeling, shipment, or packaging); and, once a business relationship is established with HP, manage interorganizational business processes associated with ordering and payment.

Customer Portals **Customer portals** are designed to automate the business processes that occur before, during, and after sales transactions between a supplier and multiple customers. In other words, customer portals provide efficient tools for business customers to manage all phases of the purchasing cycle, including reviewing product information, order entry, and customer service (Figure 8.4). For example, MyBoeingFleet, the customer portal of The Boeing Company, is part of Boeing's extranet and allows airplane owners, operators, and other parties to access information about their airplanes' configurations, maintenance documents, or spare parts. In other cases, customer portals are set up as B2B websites that provide custom-tailored offers or specific deals based on sales volume, as is the case with large office retailers such as OfficeMax (www.officemaxsolutions.com) or computer manufacturer Dell, which services business customers through its customer portal Dell Premier.

B2B MARKETPLACES. The purpose of supplier portals and customer portals is to enable interaction between a single company and its many suppliers or customers. Being owned/operated by a single organization, these portals can be considered a subset of the organization's extranet. However, setting up such portals tends to be beyond the reach of small to midsized businesses because of the costs involved in designing, developing, and maintaining this type of system. Many of these firms do not have the necessary monetary resources or skilled personnel to implement such portals on their own, and the transaction volume does not justify the expenses. To service this market, a number of **business-to-business marketplaces** have sprung up. B2B marketplaces are operated by third-party vendors, meaning they are built and maintained by a separate entity rather than being associated with a particular buyer or supplier. These marketplaces generate revenue by taking a small commission for each transaction that occurs, by charging usage fees, by charging association fees, and/or by generating advertising revenues. Unlike customer and supplier portals, B2B marketplaces allow many buyers and many sellers to come together, offering firms access to real-time trading with other companies in their **vertical markets** (i.e., markets composed of firms operating within a certain industry sector). Such B2B marketplaces can create tremendous efficiencies for companies because they bring together numerous participants along the supply network. Some popular B2B marketplaces include <http://www.b2bmetal.eu> (metals), www.paperindex.com (paper), and www.fibre2fashion.com (textile and fashion supplies).

**FIGURE 8.4**

Customer portals automate business processes that occur before, during, and after sales transactions.

Source: PureSolution/Shutterstock.

In contrast to B2B marketplaces serving vertical markets, other B2B marketplaces are not focused on any particular industry. One of the most successful examples is the Chinese marketplace Alibaba.com. Alibaba.com brings together buyers and suppliers from around the globe, from almost every industry, selling almost any product, ranging from fresh ginger to manufacturing machinery. Alibaba.com offers various services, such as posting item leads, displaying products, and contacting buyers or sellers but also features such as trading tips or price watch for raw materials. Offering various trading tools including online storefronts, virtual factory tours, and real-time chat, such B2B marketplaces have enabled many small or little-known suppliers to engage in trade on a global basis.

Managing Complex Supply Networks

A prime example of a company having to manage extremely complex supply networks is Apple and its extremely successful mobile devices, such as the iPhone and iPad. Typically, Apple sells millions of these devices within the first few days following the product launch. How does Apple manage to produce such an incredible number of these products? If you take a close look at the devices, you will find a statement saying “Designed by Apple in California Assembled in China.” Every time a new Apple device is launched, industry observers disassemble these devices to get a sneak peek into Apple’s supply chain. The iPhone, like other Apple devices, is by no means *manufactured* by Apple. The components of the iPhone are sourced from dozens of companies located in various different countries. For example, according to market research firm IHS iSuppli, a recent iPhone’s flash memory and central processing unit were produced by Korean Samsung; the display was sourced from Korean LG; the phone chips were made by German Infineon (manufactured in Germany or Southeast Asia); the Wi-Fi and global positioning system (GPS) chips were produced by U.S.-based Broadcom (but possibly assembled in China, Korea, Singapore, or Taiwan); the touchscreen controller was made by Texas Instruments; many other parts, such as the camera, were possibly made in Taiwan; and so on (depending on the requirements, companies such as Apple use various suppliers for different product models). The final products are assembled in a factory owned by Taiwanese electronics giant Foxconn, located in Shenzhen, China (a city of more than 10 million people located just north of Hong Kong), from where the finished iPhones are shipped by air to the different countries where the iPhone is for sale (Figure 8.5). Although many have never heard of Foxconn, it is the largest electronics manufacturer in the world, producing components, cell phones, gaming consoles, and so on, for various other companies, including Dell, HP, and Sony.

**FIGURE 8.5**

The iPhone is assembled in China from globally sourced components.

Coordinating such an extensive supply network requires considerable expertise, especially when facing unexpected events such as shortages in touchscreen panels or other issues at suppliers' factories; likewise, natural disasters, such as the series of back-to-back earthquakes that hit Japan in April 2016, can cause disruptions in supply chains, resulting in work stoppages and delayed orders. For example, Toyota, which uses a "just in time" inventory philosophy (discussed below) faced shutdowns and delays; in addition, the earthquakes disrupted production at many other Japanese manufacturing companies including Honda and Sony, which also utilize Toyota's "just in time" inventory philosophy. It is important to note that the impacts of such events are often not limited to the products manufactured locally but ripple through supply networks throughout the world. Disrupted supply chains in Japan also shut down plants around the world, as many key components for downstream products are produced in Japan; due to the earthquakes, these components could not be produced in Japan and be delivered to assembly lines in other countries, creating a domino effect on global supply networks. A limited pool of suppliers for critical components can further exacerbate such problems, as companies have fewer options to switch suppliers if necessary. It is thus important not only to monitor one's own direct suppliers but also to constantly monitor the company's extended supply chain so as to anticipate any issues that may have an impact on one's direct suppliers.

Benefits of Effectively Managing Supply Chains

Whereas effectively managing the supply chain can create various opportunities, many problems can arise when firms within the network do not collaborate effectively. For example, collaboration within supply networks has enabled process innovations such as just-in-time manufacturing and vendor-managed inventory (discussed in the following sections). On the other hand, if firms do not collaborate effectively, information can easily become distorted as it moves through the supply network. Problems such as excessive inventories, inaccurate manufacturing capacity plans, and missed production schedules can run rampant, causing huge ripple effects that lead to degradations in profitability and poor customer service by everyone within the supply network. Further, effectively managing the supply chain is becoming increasingly important in terms of corporate social responsibility.

JUST-IN-TIME PRODUCTION. One of the most significant advances in manufacturing has been the use of **just-in-time (JIT)** approaches. Based on the notion that keeping inventory is costly (in terms of both storage costs and the capital that is tied up) and does not add value, companies using a JIT method are trying to optimize their ordering quantities such that parts or raw materials arrive just when they are needed for production. As the orders arrive in smaller quantities (but at higher frequency), the investment in storage space and inventory is minimized. Pioneered by Japanese automaker Toyota, a JIT approach has now been adopted by many other businesses. For example, computer maker Dell realized the problems with keeping large inventories, especially because of the fast rate of obsolescence of electronics components. To illustrate, recall our discussion of Moore's Law, which suggests that processor technology is doubling in performance approximately every 24 months. Because of this, successful computer manufacturers have learned that holding inventory that can quickly become obsolete or devalued is a poor strategy for success. In fact, Dell now only keeps about 2 hours of inventory in its factories. Obviously, using a JIT method is heavily dependent on tight cooperation between all partners in the supply network, not only suppliers but also other partners, such as shipping and logistics companies.

VENDOR-MANAGED INVENTORY. Under a traditional inventory model, the manufacturer or retailer would manage its own inventories, sending out requests for additional items as needed. In contrast, **vendor-managed inventory (VMI)** is an approach to inventory management in which the suppliers to a manufacturer (or retailer) manage the manufacturer's (or retailer's) inventory based on negotiated service levels. To make VMI possible, the manufacturer (or retailer) allows the supplier to monitor stock levels and ongoing sales data. Such arrangements can help to optimize the manufacturer's (or retailer's) inventory, both saving costs and minimizing stockout situations (thus enhancing customer satisfaction); the supplier, in turn, benefits from the intense data sharing, which helps produce more accurate forecasts, reduces ordering errors, and helps prioritize the shipment of goods.

REDUCING THE BULLWHIP EFFECT. One major problem affecting supply chains are ripple effects referred to as the **bullwhip effect**. Each business forecasting demand typically includes a safety buffer in order to prevent possible stockouts. However, forecast errors and safety stocks multiply when moving up the supply chain, such that a small fluctuation in demand for an end product can lead to tremendous fluctuation in demand for parts or raw materials farther up the supply chain. Like someone cracking a bullwhip, a tiny "flick of the wrist" will create a big movement at the other end of the whip. Likewise, a small forecasting error at the end of the supply chain can cause massive forecasting errors farther up the supply chain. Implementing integrated business processes allows a company to better coordinate the entire supply network and reduce the impact of the bullwhip.

CORPORATE SOCIAL RESPONSIBILITY. Effectively managing the supply chain has also become tremendously important for aspects related to corporate social responsibility. Specifically, transparency and accountability within the supply chain can help organizations save costs and/or create a good image. Two related issues are product recalls and sustainable business practices; both are discussed next.

Product Recalls Given that a typical supply network comprises tens, hundreds, or sometimes thousands of players, many of which are dispersed across the globe, there are myriad possibilities where shortcuts are being taken or quality standards are not being met. Often, such issues are caught somewhere along the supply chain, but sometimes such incidents go unnoticed until the product reaches the end consumer. These problems can be exacerbated if companies are sourcing their products or raw materials globally, as more potential points of failure are added due to differences in quality or product safety regulations in the originating countries.

Hence, it is extremely important to have the necessary information to trace back the movement of products through the supply chain so as to be able to quickly identify the problematic link. Being able to single out the source of a problem can help a company to perform an appropriate response, helping to save goodwill and limiting the costs of a recall. Further, in many cases, only some batches of a product may be problematic (such as when certain raw materials or components are sourced from different suppliers). If a company is not able to clearly identify

the affected batches, the recall will have to be much broader, costing the company much more (in both goodwill and money) than just having to recall the affected batches. Hence, companies need to have a clear picture of their supply chain and also need to store these data in case of problems at a later point in time.

Sustainable Business Practices Another aspect related to corporate social responsibility is a growing emphasis on sustainable business practices. Particularly, organizations have come under increasing scrutiny for issues such as ethical treatment of workers (especially overseas) or environmental practices. For instance, because of Apple's vast success in marketing its products around the world, the tech giant has also received an abundance of negative press related to the poor conditions for many workers who assemble the world's favorite phone. A typical worker in such plants endures a 12-hour work shift six days a week. These workers typically live next to the assembly plant in crowded dorms that are often infested with bedbugs, and many have no working toilets. Over the past several years, there were also reports of numerous workers committing suicide due to the stress and poor conditions. While Apple is certainly aware of the negative effects that a supplier's action can have on a company's reputation, it also faces a conundrum, as few (if any) companies have sufficient production capacity, especially when offering such low wages, to meet the demand for hugely popular products such as the iPhone.

Other companies are trying to portray a "green" image and attempt to minimize their carbon footprint. For example, HP takes a proactive approach, being the first major information technology company to publish its aggregate supply chain greenhouse gas emissions, restrict the use of hazardous materials, implement environmentally friendly packaging policies, and so on. In order to do that and to provide sound, convincing numbers to back a "green" image, a company such as HP needs to have a clear view of its entire supply chain. Similarly, U.S. regulations require 95 percent of computers purchased by the U.S. federal government to carry the EPEAT eco-label. To achieve this certification, a manufacturer has to possess and produce extensive evidence that the products meet EPEAT's strict requirements.

Optimizing the Supply Chain Through Supply Chain Management

Information systems focusing on improving supply chains have two main objectives: to accelerate product development and innovation and to reduce costs. These systems, called **supply chain management (SCM) systems**, improve the coordination of suppliers, product or service production, and distribution. When implemented successfully, SCM systems help in not only reducing inventory costs but also enhancing revenue through improved customer service. SCM systems are often integrated with ERP systems to leverage internal and external information in order to better collaborate with suppliers. Like ERP and customer relationship management systems, SCM systems are delivered in the form of modules (Table 8.1) that companies select and implement according to their differing business requirements.

As discussed previously, ERP systems are primarily used to optimize business processes *within* the organization, whereas SCM systems are used to improve business processes that *span* organizational boundaries. Whereas some standalone SCM systems only automate the logistics aspects of the supply chain, organizations can reap the greatest benefits when the SCM system is tightly integrated with ERP and customer relationship management systems modules; this way, SCM systems can use data about customer orders or sales forecasts (from the customer relationship management system), data about payments (from the ERP system), and so on. Given its scope, SCM is adopted primarily by large organizations with a large and/or complex supplier network. At the same time, many smaller suppliers are interacting with the systems of large companies. To obtain the greatest benefits from the SCM processes and systems, organizations need to extend the system to include all trading partners regardless of size, providing a central location for information integration and common processes so that all partners benefit.

For an effective SCM strategy, several challenges have to be overcome. First and foremost, as with any information system, an SCM system is only as good as the data entered into it. This means that to benefit most from an SCM system, the organization's employees have to actually use the system and move away from traditional ways of managing the supply chain, as an order placed by fax or telephone will most likely not find its way into the system. Another challenge to overcome is distrust among partners in the supply chain; for many companies, sales and



WHEN THINGS GO WRONG

SpaceX Rocket Failure due to Supply Chain Failure

The Space Exploration Technologies Corporation, or SpaceX, is an American aerospace manufacturer and space transport services company. Founded in 2002 by former PayPal entrepreneur and current CEO of Tesla Motors Elon Musk, SpaceX has the goal of making space exploration less expensive and ultimately enabling the colonization of the planet Mars. In 2008, SpaceX was the first privately funded company to develop a liquid-propellant rocket (called Falcon 1) to reach orbit. Since then, many other firsts have occurred, including having the first stage of a rocket return and vertically land back at the launch site or onto a platform floating in the ocean. SpaceX has also been contracted by NASA to resupply cargo to the International Space Station (ISS). Overall, SpaceX has had tremendous success and provides evidence that space exploration can be accomplished by a commercial company.

In June 2015, however, SpaceX had a major setback when a rocket destined to bring supplies to the ISS failed soon after launch. The problem that caused the disaster was a failed strut—a commonly used piece of support hardware—that is used to secure a liquid oxygen tank. The strut that failed was designed and certified to handle 10,000 pounds of force but failed at 2,000 pounds, a fifth of what was independently certified. The strut was provided by a long-term contractor to SpaceX. Given that NASA no longer sends rockets to the ISS, the failure was a major setback for the United States. Both

Japan and Russia also bring supplies to the ISS, but this failure delayed the delivery of needed equipment and supplies to the station, including those to repair the station's water purification system.

After the failure, SpaceX pledged to more closely scrutinize its supply chain. Specifically, SpaceX outlined that it would implement additional hardware quality audits throughout the vehicle prior to launch and further ensure that all parts received from suppliers perform as expected per their certification requirements. By late 2015, SpaceX resumed flying rockets and plans to launch astronauts for the first time in 2017. When SpaceX's supply chain failed, it created a domino effect, also affecting the supply chain of the ISS.

Based on:

Clark, S. (2015, June 29). SpaceX failure adds another kink in station supply chain. *SpaceflightNow.com*. Retrieved May 4, 2016, from <https://spaceflightnow.com/2015/06/29/spacex-failure-adds-another-kink-in-station-supply-chain>

McGarry, B. (2015, July 21). SpaceX to scrutinize supply chain after rocket failure. *Defensetech.org*. Retrieved on May 4, 2016, from <http://www.defensetech.org/2015/07/21/spacex-to-scrutinize-supply-chain-after-rocket-failure>

SpaceX. (2016, May 4). In *Wikipedia, The Free Encyclopedia*. Retrieved May 4, 2016, from <https://en.wikipedia.org/w/index.php?title=SpaceX&oldid=718620407>

TABLE 8.1 Functions That Optimize the Supply Network

Module	Key Uses
Demand planning and forecasting	Forecast and plan anticipated demand for products
Safety stock planning	Assign optimal safety stock and target stock levels in all inventories in the supply network
Distribution planning	Optimize the allocation of available supplies to meet demand
Supply network collaboration	Work with partners across the supply network to improve accuracy of demand forecasts, reduce inventory buffers, increase the velocity of materials flow, and improve customer service
Materials management	Ensure that the materials required for production are available where needed when needed
Manufacturing execution	Support production processes taking into account capacity and material constraints
Order promising	Provide answers to customer relationship management queries regarding product availability, costs, and delivery times
Transportation execution	Manage logistics between company locations or from company to customers, taking into account transportation modes and constraints
Warehouse management	Support receiving, storing, and picking of goods in a warehouse
Supply chain analytics	Monitor key performance indicators to assess performance across the supply chain

supply chain data are strategic assets, and no one wants to show his or her cards to other members in the supply chain. Further, many organizations (such as Apple) tend to be very clandestine about their suppliers, as such information could reveal their pricing strategies or give clues about new product development. In addition, more and more organizations are reluctant to share data along the supply chain because of an increase in intellectual property theft, especially in China, a major source of supplies for many companies. A final challenge is to get all partners within the supply chain to adopt an SCM system. Several years ago, the retail giant Walmart began mandating its suppliers to use its RetailLink supply chain system and refused to engage in a business relationship with any supplier that was not willing to use the system. Whereas large companies can force their suppliers or partners to use a system, smaller companies typically do not have this power.

Developing an SCM Strategy

When developing an SCM strategy, an organization must consider a variety of factors that will affect the effectiveness and efficiency of the supply chain. **Supply chain effectiveness** is the extent to which a company's supply activities meet the requirements of the external partners involved. In contrast, **supply chain efficiency** is the extent to which a company optimizes the use of resources in its supply chain activities. Focusing on one or the other can result in excessive costs or in not meeting stakeholders' needs, so companies have to evaluate the trade-offs in different areas, such as procurement, production, and transportation (Figure 8.6). In other words, the design of the supply chain must consider natural trade-offs between a variety of factors and should match the organization's competitive strategy to offer the greatest benefits. For example, an organization utilizing a low-cost-provider competitive strategy would likely focus on supply chain efficiency. In contrast, an organization pursuing a superior customer service differentiation strategy would focus on supply chain effectiveness.

SCM systems typically allow for making trade-offs between efficiency and effectiveness for individual components or raw materials. For example, if a hurricane is likely to delay the arrival of a key component by sea, the company can perform simulations to evaluate the effect of the delay on production and can assess the feasibility of temporarily switching suppliers, switching modes of transportation (e.g., expediting the shipment via air freight), or substituting the component altogether. In such cases, making changes to the original plans may be costlier but can help the organization meet promised delivery deadlines, thus maintaining goodwill and avoiding possible contract penalties. On the other hand, companies can dynamically adjust schedules for noncritical components or raw materials so as to minimize costs while still meeting the targets set in the production schedule.

An SCM system includes more than simply hardware and software; it also integrates business processes and supply chain partners. As shown in Table 8.1, an SCM system consists of many modules or applications. Each of these modules supports supply chain planning, supply chain execution, or supply chain visibility and analytics. All are described next.

FIGURE 8.6

In developing a supply chain strategy, companies have to evaluate the trade-offs between effectiveness and efficiency in different areas, such as procurement, production, and transportation.

Supply Chain Strategy	Procurement	Production	Transportation
Effectiveness Efficiency	More Inventory Multiple Inventory Sources ... Single Inventory Source Less Inventory	General-Purpose Facilities More Facilities Higher Excess Capacity ... Less Excess Capacity Fewer Facilities Special-Purpose Facilities	Fast Delivery Times More Warehouses ... Fewer Warehouses Longer Delivery Times



GREEN IT

Nike's Green Supply Chain

Consumerism, globalization, and mass production are creating large costs for economies, societies, and the environment, with negative effects arising everywhere from resource extraction to manufacturing to the disposal of products. Having realized this, more and more companies are striving to reduce these impacts, aiming to improve their economic, environmental, and social performance through reducing the use of resources, eliminating or reusing waste, or renewing resources by recovering materials from used products. Green supply chain management includes green supply chain planning, green procurement, green distribution, and green logistics. For example, already during the planning stage, products can be engineered so as to reduce their environmental impact, such as by using recycled materials or designing products to be easily recyclable at the end of their lifetime. Better demand and supply planning can also help reduce excess production. When procuring components or raw materials, companies can strive to use sustainable sources, or collaborate with and provide incentives to their suppliers. When packing and shipping goods, companies can use green packaging (e.g., using cardboard rather than Styrofoam), recycle or reuse packaging materials, utilize alternative fuel vehicles, or group shipments to reduce the number of trips needed. At all stages in the supply chain of a product, responsible companies increasingly strive to minimize their carbon footprint.

As with almost all business processes, information systems play a key role in enabling green supply chain management, evaluating performance, and helping to continuously improve the performance of the green supply chain. The sportswear

company Nike is but one of many organizations that have realized the many benefits of a green supply chain. Nike is continuously innovating with the aim of "doubling [its] business while halving [its] impact," focusing not only on what they produce, but also on how they produce it and what they produce it from. Nike starts with trying to source regenerative or reclaimed materials, which can be reused after a product's life. In manufacturing, Nike uses information-systems enabled innovations such as 3D printing or digital knitting, which not only reduce waste and improve working conditions, but also help to increase efficiency and enable mass customization. Having realized that sustainability is a common goal, Nike even open-sourced many of its sustainable innovations, promoting sustainability throughout the industry. Fueled by its innovative products, Nike's success shows that focusing on a green supply chain can not only minimize a company's environmental footprint, but can have large positive impacts on a company's bottom line.

Based on:

Blanco, E., Bateman, A., & Craig, A. (2014). ESD.S43 Green Supply Chain Management, Spring 2014. *Massachusetts Institute of Technology: MIT OpenCourseWare*. Retrieved July 25, 2016, from <http://ocw.mit.edu>

Nike (2016). FY14/15 Nike, Inc. sustainable business report. *Nike.com*. Retrieved July 25, 2016, from <http://about.nike.com/pages/sustainable-innovation>

Srivasta, S.K. (2007). Green supply-chain management: A state-of-the-art literature review. *International Journal of Management Reviews* 9(1), 53-80.

Supply Chain Planning

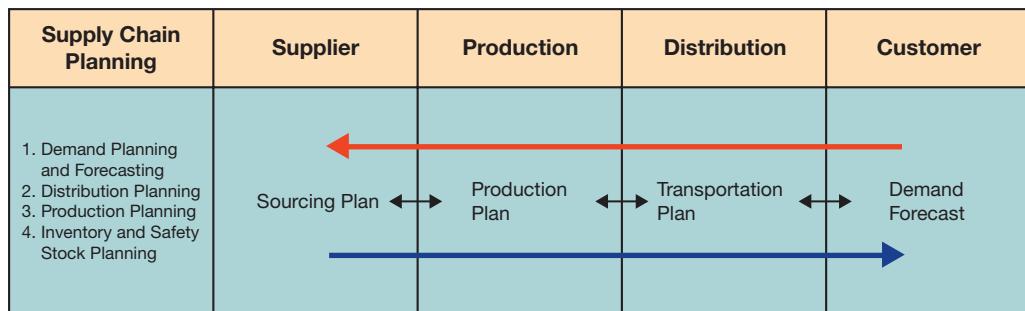
Supply chain planning involves the development of various resource plans to support the efficient and effective production of goods and services (Figure 8.7). Four key processes are generally supported by supply chain planning modules:

1. Demand Planning and Forecasting. Supply chain planning begins with product demand planning and forecasting. To develop demand forecasts, SCM modules examine historical data to develop the most accurate forecasts possible. The accuracy of these forecasts will be influenced greatly by the stability of the data. When historic data are stable, plans can be longer in duration, whereas if historic data show unpredictable fluctuations in demand, the forecasting time frame must be narrowed. SCM systems also support collaborative demand and supply planning such that a sales representative can work together with the demand planner, taking into account data provided by the organization's point-of-sale system, promotions entered in the customer relationship management system, and other factors influencing demand. Demand planning and forecasting leads to the development of the overall *demand forecast*.

2. Distribution Planning. Once demand forecasts are finalized, plans for moving products to distributors can be developed. Specifically, distribution planning focuses on delivering products or services to consumers as well as warehousing, delivering, invoicing, and payment collection. Distribution planning leads to the development of the overall *transportation plan*.

FIGURE 8.7

Supply chain planning includes (customer) demand planning and forecasting, distribution planning, production planning, and (supplier) inventory and safety stock planning.



3. Production Scheduling. Production scheduling focuses on the coordination of all activities needed to create the product or service. When developing this plan, analytical tools are used to optimally utilize materials, equipment, and labor. Production also involves product testing, packaging, and delivery preparation. Production scheduling leads to the development of the *production plan*.

4. Inventory and Safety Stock Planning. Inventory and safety stock planning focuses on the development of inventory estimates. Using inventory simulations and other analytical techniques, organizations can balance inventory costs and desired customer service levels to determine optimal inventory levels. Once inventory levels are estimated, suppliers are chosen who contractually agree to preestablished delivery and pricing terms. Inventory and safety stock planning leads to the development of a *sourcing plan*.

As suggested, various types of analytical tools—such as statistical analysis, simulation, and optimization—are used to forecast and visualize demand levels, distribution and warehouse locations, resource sequencing, and so on. Once these plans are developed, they are used to guide supply chain execution. Additionally, it is important to note that SCM planning is an ongoing process—as new data are obtained, plans are updated. For example, if shortages in the capacity for manufacturing touchscreen displays suddenly become evident, Apple has to dynamically adjust its plans so as to obtain the needed quantities to meet customer demand.

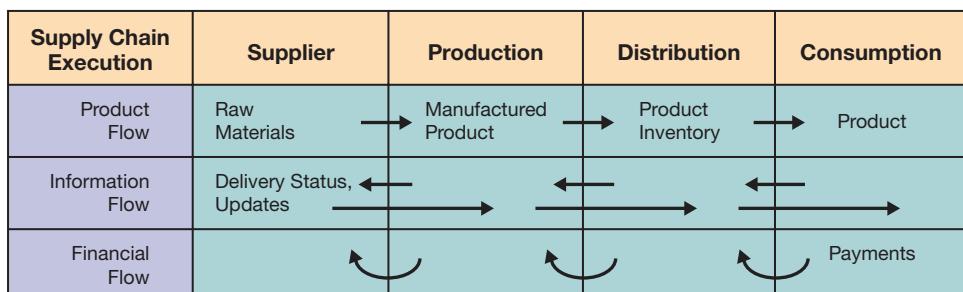
Supply Chain Execution

Supply chain execution is the execution of supply chain planning. Essentially, supply chain execution puts the planning into motion and reflects the processes involved in improving the collaboration of all members of the supply chain—suppliers, producers, distributors, and customers. Supply chain execution involves the management of three key elements of the supply chain: product flow, information flow, and financial flow (Figure 8.8). Each of these flows is discussed next.

PRODUCT FLOW. Product flow refers to the movement of goods from the supplier to production, from production to distribution, and from distribution to the consumer. Although products primarily “flow” in one direction, an effective SCM system will also support the activities associated with product returns. Effectively processing returns and customer refunds and recycling or properly disposing of products after the end of their life span are critical parts of supply chain execution. Thus, an SCM system should support not only the “downstream” forward logistics processes but also **reverse logistics**. Reverse logistics refers to the processes

FIGURE 8.8

Supply chain execution focuses on the efficient and effective flow of products, information, and finances along the supply chain.



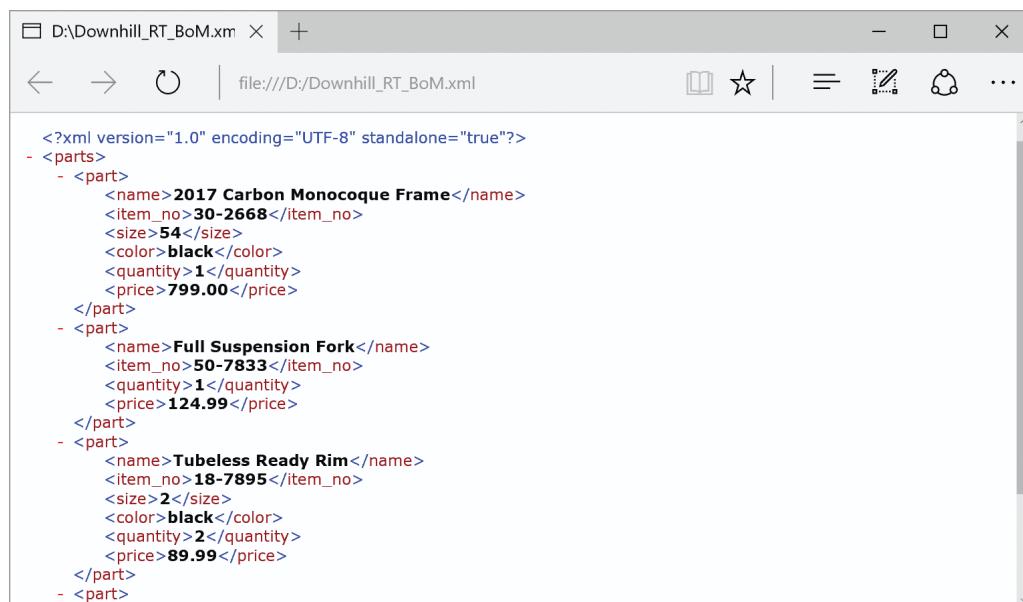
in place to efficiently receive products from the point of consumption. With an increasing need to recapture value by reusing or recycling materials, recovering these after use is an important aspect of managing product flows, and companies need to plan reverse logistics, where materials flow back from the consumer to the producer, so that valuable materials can be recycled, or hazardous materials can be properly disposed of. In case of receiving excessive or defective products, these processes also include shipping replacements or crediting customer accounts.

As introduced in Chapter 3, RFID (radio frequency identification) systems offer great opportunities for managing supply chains, and virtually all major retailers are adopting RFID to better manage product flows, as are governments for tracking military supplies and weapons, drug shipments and ingredients (i.e., for eliminating counterfeit drugs), and citizens with RFID chips on passports.

INFORMATION FLOW. **Information flow** refers to the movement of information along the supply chain, such as order processing and delivery status updates. Like the product flow, information can also flow up or down the supply chain as needed. The key element to the information flow is the complete removal of paper documents. Specifically, as all information about orders, fulfillment, billing, and consolidation is shared electronically, these paperless information flows save not only paperwork but also time and money. Additionally, because SCM systems use a central database to store data, all supply chain partners have at all times access to the most current data necessary for scheduling production, shipping orders, and so on.

Extensible Markup Language A key enabler for optimizing information flows is XML. **Extensible Markup Language (XML)** is a standard for exchanging structured data over the web. XML allows creating documents consisting of customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

As described in Chapter 3, Hypertext Markup Language (HTML) uses tags to specify the structure and content of a document—such as a web page—that will be presented by a user’s browser. Much like HTML, XML also uses tags but focuses on sharing data between applications. An **XML tag** is a label that is inserted into an XML document in order to specify how the data contained in the document or a portion of the document should be interpreted and/or used. For example, the tags <item_no> . . . </item_no> would instruct the application reading the XML file that the numbers enclosed in the tags should be interpreted as a product’s item number (Figure 8.9). The application could use this information when displaying a product on a web page or when updating inventory records. As a result, XML is a powerful tagging system that can be tailored to share similar data across applications over the web. With these advanced data



```

<?xml version="1.0" encoding="UTF-8" standalone="true"?>
- <parts>
  - <part>
    <name>2017 Carbon Monocoque Frame</name>
    <item_no>30-2668</item_no>
    <size>54</size>
    <color>black</color>
    <quantity>1</quantity>
    <price>799.00</price>
  </part>
  - <part>
    <name>Full Suspension Fork</name>
    <item_no>50-7833</item_no>
    <quantity>1</quantity>
    <price>124.99</price>
  </part>
  - <part>
    <name>Tubeless Ready Rim</name>
    <item_no>18-7895</item_no>
    <size>2</size>
    <color>black</color>
    <quantity>2</quantity>
    <price>89.99</price>
  </part>
- <part>

```

FIGURE 8.9

An XML file for transmitting a bill of materials for a bicycle.
Source: Windows 10, Microsoft Corporation.

definition capabilities built into web applications, organizations can use the web as the worldwide network for electronic commerce and SCM.

XML has become the standard for automating data exchange between business information systems and may well replace all other formats for electronic data interchange. Companies can, for example, use XML to create applications for web-based ordering, for checking on and managing inventory, for signaling to a supplier that more parts are needed, for alerting a third-party logistics company that a delivery is needed, and so on. All these various applications can work together using the common language of XML.

XML is customizable, and variations of XML have been developed. For example, **Extensible Business Reporting Language (XBRL)** is an XML-based specification for publishing financial information. XBRL makes it easier for public and private companies to share information with each other, with industry analysts, and with shareholders. XBRL includes tags for data such as annual and quarterly reports, Securities and Exchange Commission filings, general ledger information, and net revenue and accounting schedules (Figure 8.10). Similarly, many applications, such as Microsoft Office or OpenOffice, use XML-based file formats, such as Microsoft's Open XML or the Open Document Format (ODF).

FINANCIAL FLOW. Financial flow refers primarily to the movement of financial assets throughout the supply chain. Financial flows also include information related to payment schedules, consignment and ownership of products and materials, and other relevant information. Linkages to electronic banking and financial institutions allow payments to automatically flow into the accounts of all members within the supply chain.

Managing B2B Financial Transactions In B2C electronic commerce, most transactions are settled using credit cards or electronic payment services such as PayPal; in contrast, B2B payments are lagging far behind. In fact, according to some estimates, about 75 percent of all noncash B2B payments in the United States are made by check. While this may sound archaic, the time needed to process a check serves as a form of trade credit, which can amount to a significant part of an organization's working capital. For smaller purchases, organizations also often use purchasing cards. However, although productivity gains can be realized from using purchasing cards instead of checks, such cards are typically not used for large B2B transactions because of preset spending limits. In global B2B transactions, organizations often use letters of credit issued by a bank to make payments. While letters of credit help to reduce credit risk, these are often used only for relatively large amounts. Alternatively, businesses can make international transfers using providers such as Western Union. In any case, making a B2B payment is far from being as simple as making a purchase at Amazon.com using your credit card, and making B2B payments easier can greatly enhance efficiency as well as reduce costs for organizations. Thus, it is no wonder that businesses have started asking for payment methods as simple as PayPal for B2B transactions. When dealing with new, unknown suppliers, there is considerable fraud risk involved; this is especially of concern in global EC, so businesses often use third-party escrow

FIGURE 8.10

An XBRL file for sharing
Securities and Exchange
Commission filings.

Source: Windows 10, Microsoft
Corporation.

```

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<us-gaap:BusinessCombinationRecognizedIdentifiableAssetsAcquiredAndLiabilitiesAccumulatedInventory id="1d_6568047_D35CE36
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services, which release payment only when the buyer has confirmed satisfactory delivery of the goods, reducing the risks for the buyer.

Supply Chain Visibility and Analytics

Supply chain visibility refers to the ability not only to track products as they move through the supply chain but also to foresee external events. Being able to see where a shipment is at any given time can be of tremendous help, especially when using JIT methods or when maintaining low inventory levels. For example, knowing where a shipment is and being able to expedite it can help in not losing a sale or help in taking away a sale from a competitor. Further, knowing where a supplier's facilities are located can help to anticipate and react to issues arising from adverse weather conditions, natural disasters, or political issues; if I don't know where in Taiwan my suppliers' factories are located, how will I know whether they might be affected by a fast-approaching typhoon? Similarly, some companies even want to know when labor contracts of key suppliers' workers expire in order to plan for potential labor disputes. Needless to say, such levels of information sharing throughout the supply chain require tremendous trust among the partners. The Internet of Things (IoT) has opened up various ways of enhancing supply chain visibility. For example, sensors or on-board telematics units can transmit data about the location of trucks, enabling real-time location monitoring as well as making accurate predictions about when shipments will arrive. Further, various sensors can provide valuable information about the condition of shipments throughout all phases of the journey: Temperature or humidity sensors can provide information about whether sensitive goods have been kept within the correct temperature or humidity range, or sensors or cameras can be used to send alerts if a shipment has been tampered with.

Supply chain analytics refers to the use of key performance indicators to monitor performance of the entire supply chain, including sourcing, planning, production, and distribution. For example, a purchasing manager can identify the suppliers that are frequently unable to meet promised delivery dates. Being able to access key performance metrics can help to identify and remove bottlenecks, such as by switching suppliers, spreading orders over multiple suppliers, expediting shipping for critical goods, and so on. With the increase in available data from a variety of sources, ranging from IoT sensors used in logistics, to Industrial Internet of Things (IIoT) sensors used in manufacturing, to news reports about global events, Big Data analytics plays an increasingly important role in optimizing supply chains.

Customer Relationship Management

With the changes introduced by the web, in most industries a company's competition is simply a mouse click away. It is increasingly important for companies not only to generate new business but also to attract repeat business from existing customers. This means that to remain competitive, companies must keep their customers satisfied. In today's highly competitive markets, customers hold the balance of power; if customers become dissatisfied with the levels of customer service they are receiving, they have many alternatives readily available.

It is important to note that customers are not just the end consumer but also other businesses in B2B transactions. As mentioned earlier, B2B e-commerce is many times larger than business-to-consumer (B2C) e-commerce. So, any rules or best practices for keeping customers happy apply to not only retailers but also any company within a supply chain. In the past, companies would try to establish long-term relationships with business customers, and establishing relationships with end customers was virtually impossible, especially for large companies. Today, the emphasis has shifted from conducting business transactions to managing relationships even when dealing with individual customers. If a company successfully manages its relationships with customers—satisfying them and solving their problems—then customers are less price sensitive. Hence, leveraging and managing customer relationships is equally as important as product development. Indeed, customer relationship management systems often collect data that can be mined to discover the next product line extension that customers covet.

The megatrends mobile, social media, Big Data, cloud computing, and IoT have tremendously changed the way organizations need to interact with their customers. Some researchers



COMING ATTRACTIONS

Augmenting Supply Chain Success

In the 2002 film *Minority Report*, Tom Cruise used gestures and natural language to interact with a futuristic computer that displayed information on massive screens that surrounded him. Today, such interaction is no longer science fiction but science fact. Augmented reality (AR) refers to interactions in a live direct or indirect view of a physical, real-world environment that is *augmented* (or supplemented) by computer-generated sensory input such as sound, video, graphics, or GPS data. Visual information, for example, can be presented on optical projection systems, monitors, handheld devices, and so on. Such information can be provided on a heads-up display using a headset or eyeglasses or be projected onto large screens or even a vehicle's windshield.

Many believe that AR is going to transform various aspects of supply chain management. For example, an important part of assembling or packing orders is the picking process, where a human "picks" components or completed items for assembly or delivery. AR can allow each picker to see a "digital packing list" on a heads-up display. When an item is selected in a warehouse, the heads-up display can then show the most efficient path to the next item to pick, guiding the person perfectly to the next step in the process. Virtually no mistakes or missteps are made. Once products are collected to be shipped, AR can also aid in

loading containers and trucks by providing step-by-step instructions on a heads-up display on how to most efficiently arrange cargo given the size, dimension, and weight of the items. When delivering items, AR can provide more than widely used GPS navigation by providing a heads-up windshield display with real-time traffic analysis so rerouting can occur on the fly without any interactions that might distract the driver. Additional information about the cargo can also be provided if needed (e.g., temperature sensitive items). And the best part of this is that workers using AR support will feel like Tom Cruise in *Minority Report*.

Based on:

Augmented reality. (2016, May 3). In Wikipedia, *The Free Encyclopedia*. Retrieved May 10, 2016, from https://en.wikipedia.org/w/index.php?title=Augmented_reality&oldid=718470443

Glocker, H., Jannek, K., Mahn, J., & Theis, B. (2014). Augmented reality in logistics. *DHL*. Retrieved May 11, 2016, from http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/csi_augmented_reality_report_290414.pdf

Robinson, A. (2016, January 4). 2016 Supply chain trends: 7 of 12 trends that will drive supply chain management in 2016. *Cerasis*. Retrieved on May 10, 2016, from <http://cerasis.com/2016/01/04/2016-supply-chain-trends>

argue that we have moved from the Internet age to the age of the customer. The age of the customer is characterized by customers being part of social circles and being increasingly empowered by social media (Figure 8.11). For example, customers have much more access to information from various sources; at the same time, customers' word of mouth can be spread anywhere, anytime using mobile devices and has a much wider reach through social media such as blogs, Twitter, or Facebook. This can pose tremendous challenges for organizations trying to present and maintain a positive public image, as unmonitored conversations can have huge negative impacts, and monitoring and participating in ongoing conversations can be an important part of shaping public opinion. In addition, companies face significant changes in the competitive landscape. For example, the Internet has freed customers from having to purchase goods locally and has thus

FIGURE 8.11

Today's empowered customers have many ways to obtain and spread information and opinions about companies.



lowered the barriers to entry for potential rivals. Similarly, many products have been replaced or marginalized by digital substitutes. The power of buyers has increased, as people can quickly and easily find information, reviews, or prices at a competitor's store. At the same time, employees, an important source of supply, have more mobility and thus have higher power. Last but not least, not only one's customers but also one's competitors have tremendous amounts of information about one's products (and their strengths and weaknesses) available at their fingertips and can more easily predict one's next strategic move. Thus, businesses have to rethink their interactions with customers; rather than seeing customers as a passive audience, organizations need to engage in conversations with their customers. In their attempts to engage with customers and build long-lasting relationships, organizations are increasingly utilizing cloud-based systems and Big Data to better understand their customers and predict their needs and desires. Likewise, the IoT serves as a source for additional data not only about customers but also about their usage of products and can offer various opportunities to offer customers better value.

Many of the world's most successful corporations have realized the importance of developing and nurturing relationships with their customers. For example, Starbucks Coffee uses a variety of means to engage with its customers: Like many other businesses, Starbucks uses a loyalty card to entice people to return to its stores; further, Starbucks actively solicits feedback and new product ideas from its customers, not only within the stores but also via its open innovation platform mystarbucksidea.com, and it has one of the most successful fan pages on Facebook. Computer manufacturer Dell, in contrast, has different needs when interacting with its customers. For instance, when Dell sales representatives are dealing with large corporate clients that routinely make large computer purchases, issues of quantity pricing and delivery are likely to be paramount, whereas when dealing with less-computer-savvy individuals ordering a new notebook for personal use, questions about compatibility with an older printer or the ability to run a specific program may be asked. No matter the customer, Dell attempts to provide all customers with a positive experience during both the presale and the ongoing support phases. Large banks and insurance companies are trying to widen and deepen relationships with customers so as to be able to sell more financial services and products, maximizing the lifetime value of each individual customer. Chase Card Services, for example, has more than 4,000 agents handling 200 million customer calls a year. Being able to increase **first-call resolution** (sometimes referred to as first-contact resolution), that is, addressing the customers' issues during the first contact, can help to save costs tremendously while increasing customer satisfaction.

Marketing researchers have found that the cost of trying to win back customers who have gone elsewhere can be up to 50 to 100 times as much as keeping a current one satisfied. Thus, companies are finding it imperative to develop and maintain customer satisfaction and widen (by attracting new customers), lengthen (by keeping existing profitable customers satisfied), and deepen (by transforming minor customers into profitable customers) the relationships with their customers in order to compete effectively in their markets (Figure 8.12). To achieve



FIGURE 8.12

Companies search for ways to widen, lengthen, and deepen customer relationships.

this, companies need to not only understand who their customers are but also determine the lifetime value of each customer. With the increasing popularity of social media such as social networks, blogs, and microblogs, companies have more ways than ever to learn about their customers.

To assist in deploying an organization-wide strategy for managing these increasingly complex customer relationships, organizations are deploying **customer relationship management (CRM) systems**. CRM is not simply a technology but also a corporate-level strategy to create and maintain, through the introduction of reliable systems, processes, and procedures, lasting relationships with customers by concentrating on downstream information flows. Applications focusing on downstream information flows have three main objectives: to attract potential customers, to create customer loyalty, and to portray a positive corporate image. The appropriate CRM technology combined with the management of sales-related business processes can have tremendous benefits for an organization (Table 8.2). To pursue customer satisfaction as a basis for achieving competitive advantage, organizations must be able to access data and track customer interactions throughout the organization regardless of where, when, or how the interaction occurs. This means that companies need to have an integrated system that captures data from retail stores, websites, social networks, microblogs, call centers, and various other channels that organizations use to communicate downstream within their value chain. More important, managers need the capability to monitor and analyze factors that drive customer satisfaction (as well as dissatisfaction) as changes occur according to prevailing market conditions.

CRM systems come in the form of packaged software that is purchased from software vendors. CRM systems are commonly integrated with a comprehensive ERP implementation to leverage internal and external information to better serve customers. Thus, most large vendors of ERP systems, such as Oracle, SAP, and Microsoft, also offer CRM systems; further, specialized vendors, such as Salesforce.com or SugarCRM, offer CRM solutions on a software-as-a-service basis. Like ERP, CRM systems come with various features and modules. Managers must carefully select a CRM system that will meet the unique requirements of their business processes.

TABLE 8.2 Benefits of a CRM System

Benefit	Examples
24/7/365 operation	Web-based interfaces provide product information, sales status, support information, issue tracking, and so on.
Individualized service	Learn how each customer defines product and service quality so that customized product, pricing, and services can be designed or developed collaboratively.
Improved information	Integrate all information for all points of contact with the customers—marketing, sales, and service—so that all who interact with customers have the same view and understand current issues.
Improved problem identification/resolution	Improved record keeping and efficient methods of capturing customer complaints help to identify and solve problems faster.
Optimized processes	Integrated information removes information handoffs, speeding both sales and support processes.
Improved integration	Information from the CRM can be integrated with other systems to streamline business processes and gain business intelligence as well as make other cross-functional systems more efficient and effective.
Improved product development	Tracking customer behavior over time helps to identify future opportunities for product and service offerings.
Improved planning	This provides mechanisms for managing and scheduling sales follow-ups to assess satisfaction, repurchase probabilities, time frames, and frequencies.



SECURITY MATTERS

Disclosing the Customer Data of the Most Vulnerable

VTech is a Hong Kong-based global supplier of cordless phones as well as electronic learning products designed for infants to preschool children. In November 2015, VTech's learning products app store "Learning Lodge" was compromised by hackers who obtained customers' names, addresses, passwords, and other personal data, including 190 GB of photos and chat logs. The data breach exposed personal data about millions of individuals, including children, who had accounts that allowed them to register or utilize services related to specific products.

While companies are increasingly focusing on ways to better connect with customers, the VTech hack highlights the dark side of CRM in the digital world. VTech did contact all affected customers immediately after the breach. And, fortunately, the hacker didn't appear to be malicious; after completing the breach, the hacker contacted the website Motherboard and provided files containing the sensitive data to prove that VTech's sites had been compromised. According to the hacker, the breach demonstrated how insecure the VTech sites were and suggested that others, with malicious intent, might have compromised the servers prior to November 2015. Security experts gave VTech failing grades for its security policies. In response to the breach, VTech changed its end user license agreement to state:

You acknowledge and agree that any information you send or receive during your use of the site may not be secure and may be intercepted or later acquired by unauthorized parties. You acknowledge and agree that your

use of the site and any software or firmware downloaded therefrom is at your own risk. (Windows 10, Microsoft Corporation)

While some countries are questioning the legality of VTech's policy change, it is clear that VTech is trying to avoid any liability if future hacks occur. Security experts cite that such incidents are increasing and companies would be better off getting their security right before such failure occurs rather than changing policies to limit their responsibility to their "valued" customers.

Based on:

Ellison, M. (2016, April 21). These toys have eyes (and ears too): VTech security breach raises "Internet of Things" privacy fears. *Lexology*. Retrieved May 8, 2016, from <http://www.lexology.com/library/detail.aspx?g=e9fc4a57-4bbb-43d7-a414-24c72b383ac4>

Franceschi-Bicchieri, L. (2015, November 27). One of the largest hacks yet exposes data on hundreds of thousands of kids. *Motherboard*. Retrieved May 8, 2016, from <http://motherboard.vice.com/read/one-of-the-largest-hacks-yet-exposes-data-on-hundreds-of-thousands-of-kids>

Gibbs, S. (2015, November 30). Toy firm VTech hack exposes private data of parents and children. *The Guardian*. Retrieved May 8, 2016, from <https://www.theguardian.com/technology/2015/nov/30/vtech-toys-hack-private-data-parents-children>

VTech. (2016, March 21). In *Wikipedia, The Free Encyclopedia*. Retrieved May 9, 2016, from <https://en.wikipedia.org/w/index.php?title=VTech&oldid=711267165>

Companies that have successfully implemented CRM systems can experience greater customer satisfaction and increased productivity of their sales and service personnel, which can translate into dramatic enhancements to the company's profitability. CRM allows organizations to focus on driving revenue as well as on reducing costs as opposed to emphasizing only cost cutting. Cost cutting tends to have a lower limit because there are only so many costs that companies can reduce, whereas revenue generation strategies are bound only by the size of the market itself. The importance of focusing on customer satisfaction is emphasized by findings that institutional investors increase a company's valuation when customer satisfaction is higher and reduce valuations when customer satisfaction is lower (Aalto University, 2013).

Developing a CRM Strategy

To develop a successful CRM strategy, organizations must do more than simply purchase and install CRM software. The first consideration is whether a comprehensive CRM system is even needed for a company; for example, the closer an organization is to the end customer, the more important CRM becomes. Further, companies have to realize that a successful CRM strategy must include enterprise-wide changes, including changes to:

- **Policies and Business Processes.** Organizational policies and procedures need to reflect a customer-focused culture.
- **Customer Service.** Key metrics for managing the business need to reflect customer-focused measures for quality and satisfaction as well as process changes to enhance the customer experience.

FIGURE 8.13

A successful CRM strategy requires enterprise-wide changes.



- **Employee Training.** Employees from all areas—marketing, sales, and support—must have a consistent focus that values customer service and satisfaction.
- **Data Collection, Analysis, and Sharing.** All aspects of the customer experience—prospecting, sales, support, and so on—must be tracked, analyzed, and shared to optimize the benefits of the CRM.

In sum, the organization must focus and organize its activities to provide the best customer service possible (Figure 8.13). Additionally, a successful CRM strategy must carefully consider the ethical and privacy concerns of customers' data (discussed later in this chapter).

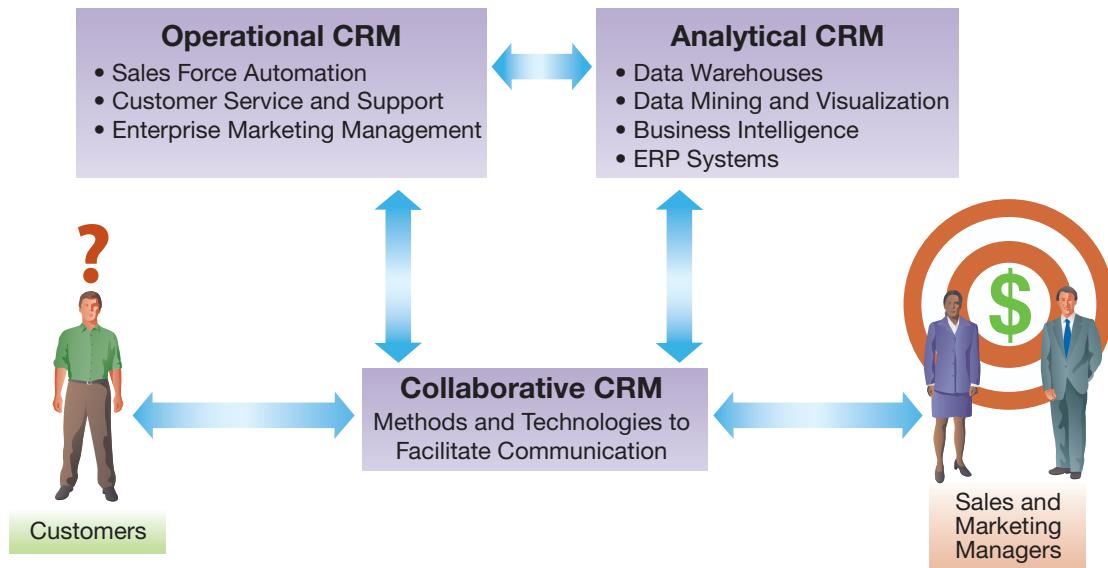
Architecture of a CRM System

A comprehensive CRM system comprises three primary components:

1. **Operational CRM.** Systems for automating the fundamental business processes—marketing, sales, and support—for interacting with the customer
2. **Analytical CRM.** Systems for analyzing customer behavior and perceptions (e.g., quality, price, and overall satisfaction) in order to provide business intelligence
3. **Collaborative CRM.** Systems for providing effective and efficient communication with the customer from the entire organization

Operational CRM enables direct interaction with customers; in contrast, analytical CRM provides the analyses necessary to more effectively manage the sales, service, and marketing activities. Whereas analytical CRM aids in the development of a company's CRM strategy, operational CRM aids in the execution of CRM strategy; thus, either component alone provides no real benefit for a business. Finally, collaborative CRM provides the communication capabilities of the CRM environment (Figure 8.14). Next, we examine each of these components.

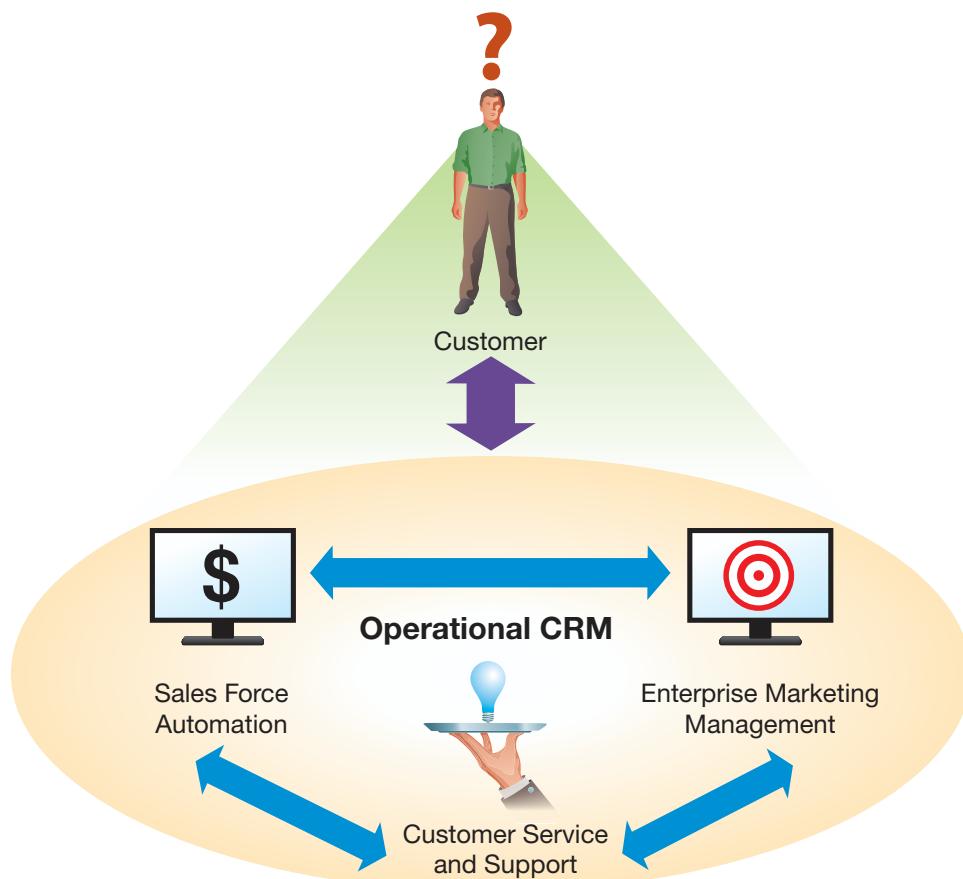
OPERATIONAL CRM. Operational CRM includes the systems used to enable customer interaction and service. For example, operational CRM systems help create mass e-mail marketing campaigns wherein each consumer receives an individualized e-mail based on prior purchase history. With an effective operational CRM environment, organizations are able to provide personalized and highly efficient customer service. Customer-focused personnel are provided complete customer information—history, pending sales, and service requests—in order to optimize interaction and service. It is important to stress that the operational CRM environment provides *all* customer information regardless of the touch point (i.e., technical support, customer service, and in-store

**FIGURE 8.14**

A comprehensive CRM environment includes operational, analytical, and collaborative components.

sales as well as website interactions such as downloading content and e-commerce clickstream data). This means that marketing, sales, and support personnel see *all* prior and current interactions with the customer regardless of where it occurred within the organization. To facilitate the sharing of information and customer interaction, three separate modules are utilized (Figure 8.15).

Sales Force Automation The first component of an operational CRM is **sales force automation** (SFA). SFA refers to modules that support the day-to-day sales activities of an

**FIGURE 8.15**

An operational CRM environment is used to enable customer interaction and service.

organization. For example, companies such as Dell have thousands of sales staff in various different countries working with many different clients. Unless sales personnel and sales managers have an integrated view of Dell's entire sales pipeline, Dell sales staff may be competing with each other for the same contracts unbeknownst to each other. SFA supports a broad range of sales-related business processes, such as order processing and tracking; managing accounts, contacts, opportunities, and sales; and tracking and managing customer history and preferences (both in terms of product and communication). Together, this can help in creating more accurate sales forecasts and analyzing sales performance.

SFA systems provide advantages for sales personnel, sales managers, and marketing managers. For sales personnel, SFA reduces the potentially error-prone paperwork associated with the selling process. Because all the information is within the system, personnel can more easily hand off work and collaborate; it is also easier to train new personnel. Sales personnel can then use their time more efficiently and ultimately focus more on selling than on paperwork and other non-selling tasks. Likewise, for sales managers, the SFA system provides tremendous benefits, such as accurate, up-to-the-minute information on all customers, markets, and sales personnel. This improved information allows for better planning, scheduling, and coordination. Ultimately, SFA provides better day-to-day management of the sales function. For example, SFA allows sales managers to track a plethora of sales performance measures, such as the sales pipeline for each salesperson, including rating and probability (Figure 8.16), revenue per salesperson, per territory, or as a percentage of sales quota, or number of calls per day, time spent per contact, revenue per call, cost per call, or ratio of orders to calls. Further, sales managers can obtain other useful information such as number of lost customers per period or cost of customer acquisition; product-related information such as margins by product category, customer segment, or customer; or percentage of goods returned, number of customer complaints, or number of overdue accounts. All of these measures aid in assessing sales performance and detecting potential problems in certain regions or issues with product or service quality.

Finally, SFA improves the effectiveness of the marketing function by providing an improved understanding of market conditions, competitors, and products. This enhanced information will provide numerous advantages for the management and execution of the marketing function. Specifically, SFA aids in gaining a better understanding of markets, segments, and customers as well as competitors and the overall economic structure of the industry. Such broad and deep understanding of the competitive landscape can help organizations assess their unique strengths and weaknesses, thereby facilitating new product development and improving strategic planning.

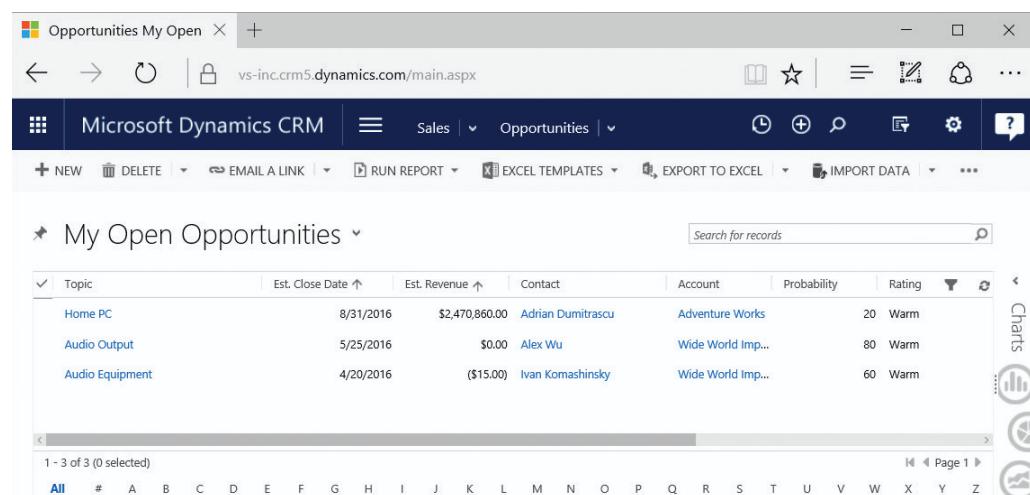
In sum, the primary goals of SFA are to better identify potential customers, streamline selling processes, and improve managerial information. Next, we examine systems for improving customer service and support.

Customer Service and Support The second component of an operational CRM system is **customer service and support**. Customer service and support refers to modules that

FIGURE 8.16

SFA allows sales managers to track sales performance.

Source: Dynamics CRM 2016, Windows 10, Microsoft Corporation.



The screenshot shows a Microsoft Dynamics CRM interface titled 'Opportunities My Open'. The main area displays a list of 'My Open Opportunities' with the following data:

Topic	Est. Close Date	Est. Revenue	Contact	Account	Probability	Rating
Home PC	8/31/2016	\$2,470,860.00	Adrian Dumitrescu	Adventure Works	20	Warm
Audio Output	5/25/2016	\$0.00	Alex Wu	Wide World Imp...	80	Warm
Audio Equipment	4/20/2016	(\$15.00)	Ivan Komashinsky	Wide World Imp...	60	Warm

Below the list, a footer indicates '1 - 3 of 3 (0 selected)' and includes navigation links for 'All', '#', and letters A through Z. On the right side, there are icons for 'Charts', 'Gantt', and 'Map'.

automate service requests, complaints, product returns, and information requests. In the past, organizations had *help desks* and *call centers* to provide customer service and support. Today, organizations are deploying **customer engagement centers** that use multiple communication channels to support the communication preferences of customers, such as the web, the company's Facebook page, industry blogs, face-to-face contact, telephone, and so on (see the section "Collaborative CRM" later in this chapter). A customer engagement center utilizes a variety of communication technologies for optimizing customers' communications with the organization. For example, automatic call distribution systems forward calls to the next available person; while waiting to connect, customers can be given the option to use the keypad or voice response technologies to check account status information. Southwest Airlines improves customer service by using "virtual hold technology," where customers can choose to stay on the line or be called back when the next agent is available; this helped to save almost 25 million toll minutes in just one year and reduced the number of abandoned calls, which provided additional opportunities for ticket sales and signals increased customer satisfaction. In essence, the goal of customer service and support is to provide great customer service—anytime, anywhere, and through any channel—while keeping service and support costs low. For example, many customer engagement centers use powerful self-service diagnostic tools that guide consumers to their needed information. Customers can log service requests or gain updates to pending support requests using a variety of self-service or assisted technologies (Figure 8.17). On their websites, companies increasingly use automated chatbots

**FIGURE 8.17**

A customer engagement center allows customers to use a variety of self-service and assisted technologies to interact with the organization.



WHO'S GOING MOBILE

Developing a Mobile CRM App for Customers

In the past, mobile CRM was focused primarily on allowing employees on the go to use mobile devices to access, update, and interact with customer data wherever they are. These mobile CRM solutions let mobile workers do everything they could do with CRM at their desktop. CRM mobility, in organizations where the sales staff is frequently in the field, is a critical component to the CRM solution and has a significant impact on sales performance for staff and the company.

Mobile CRM is not just for a company's employees anymore, but it is also for customers. Today, mobile apps have become a powerful way for customers to connect with a brand. Mobile apps allow customers to access useful content and information while on the go. Smart companies will carefully design a mobile CRM app to leverage the mobile platform, not just repurpose a set of desktop features. Effective strategies for mobile, for example, will leverage push notifications, and provide personalized and relevant messages based on specific events, segmentation criteria, and in-app behavior.

According to comScore, we now spend more time engaging with mobile sites than with desktop websites, with most of that time being spent on apps. Unfortunately, only 3 percent of

apps are still actively used after 30 days past initial download. So, it is critical to build the right app for customers. The real measure of mobile CRM success is not initial downloads but how many people remain engaged 30 to 60 days after initial engagement. To be successful, companies need specific metrics to measure progress and success. How many customers opt in and download the app, how long customers remain engaged, what events motivate interaction, when push notifications convert to sales, and various other factors must be tracked to learn and sharpen the organization's strategy. Mobile CRM is much more than a replication of a traditional CRM strategy. The company must put the customer first and design an app that helps to increase customer engagement and loyalty.

Based on:

Anonymous. (2015, December 7). How many apps do smartphone owners use? eMarketer. Retrieved May 8, 2016, from <http://www.emarketer.com/Article/How-Many-Apps-Do-Smartphone-Owners-Use/1013309>

Turner, N. (2016, April 16). Mobile CRM—the six metrics that matter. PerformanceIN. Retrieved on May 8, 2016, from <http://performancein.com/news/2016/04/11/mobile-crm-six-metrics-matter>

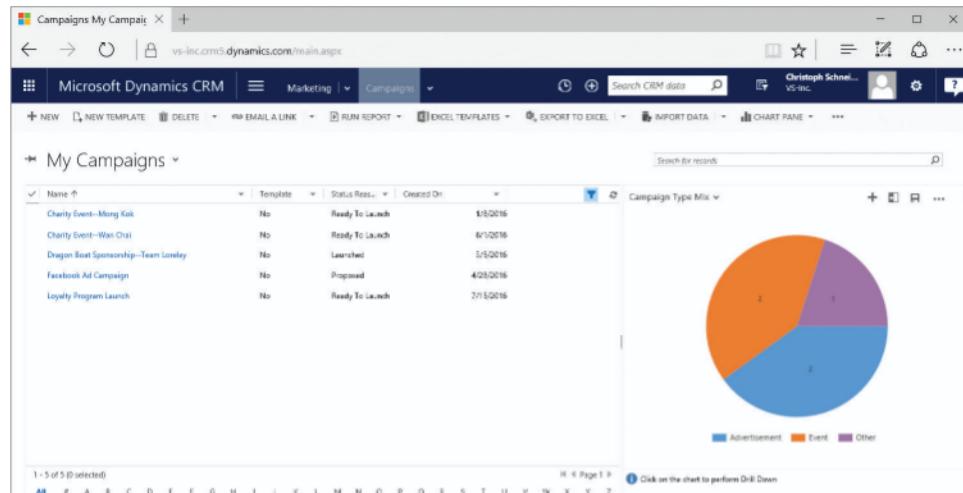
(see Chapter 6, “Enhancing Business Intelligence Using Big Data and Analytics”) to initiate conversations and gain preliminary information from the user in order to route the user to the relevant human customer service representative. Successful customer service and support systems enable faster response times, increased first-contact resolution rates, and improved productivity of service and support personnel. Managers can utilize digital dashboards to monitor key metrics such as first-contact resolution and service personnel utilization, which allows for improved management of the service and support functions.

Enterprise Marketing Management The third component of an operational CRM system is **enterprise marketing management**. Enterprise marketing management tools help a company in the execution of the CRM strategy by improving the management of promotional campaigns (Figure 8.18). Today, many companies use a variety of channels (such as e-mail,

FIGURE 8.18

CRM systems allow for managing various types of promotional campaigns.

Source: Dynamics CRM 2016, Windows 10, Microsoft Corporation.



telephone, direct mail, Facebook pages and YouTube channels, Twitter status updates, and so on; see Chapter 4, “Enabling Business-to-Consumer Electronic Commerce,” and Chapter 5, “Enhancing Organizational Communication and Collaboration Using Social Media”) to reach potential customers and drive them to web pages customized for their target market (based on demographics and lifestyle). Using enterprise marketing management tools can help integrate those campaigns such that the right messages are sent to the right people through the right channels. This necessitates that customer lists are managed carefully to be able to personalize messages that can deliver individualized attention to each potential or existing customer (or to avoid targeting people who have opted out of receiving marketing communication). At the same time, enterprise marketing management tools provide extensive analytical capabilities that can help to analyze the effectiveness of marketing campaigns and can help to efficiently route sales leads to the right salespeople, leading to higher conversion rates.

ANALYTICAL CRM. Analytical CRM focuses on analyzing customer behavior and perceptions in order to provide the business intelligence necessary to identify new opportunities and to provide superior customer service. Organizations that effectively utilize analytical CRM can more easily customize marketing campaigns from the segment level to even the individual customer. Such customized campaigns help to increase cross- or up-selling (i.e., selling more profitable products or identifying popular bundles of products and services tailored to different market segments) as well as retain customers by having accurate, timely, and personalized information. Analytical CRM systems are also used to spot sales trends by ZIP code, state, and region as well as specific target markets within those areas.

Key technologies within analytical CRM systems include Big Data analytics and other business intelligence technologies that attempt to create predictive models of various customer attributes (see Chapter 6). These analyses can focus on enhancing a broad range of customer-focused business processes; for example, marketing campaign analysis can help organizations to optimize campaigns by improving customer segmentation and sales coverage as well as by optimizing the use of each customer’s preferred communication channels. Similarly, analytical CRM tools can help in analyzing customer acquisition and retention. In addition, analytical CRM tools help in pricing optimization by building models of customer demand, taking into consideration not only factors such as product usage and customer satisfaction but also price, quality, and satisfaction of competitors’ products or services.

Once these predictive models are created, they can be delivered to marketing and sales managers using a variety of visualization methods, including digital dashboards and other reporting methods (Figure 8.19). To gain the greatest value from analytical CRM applications, data

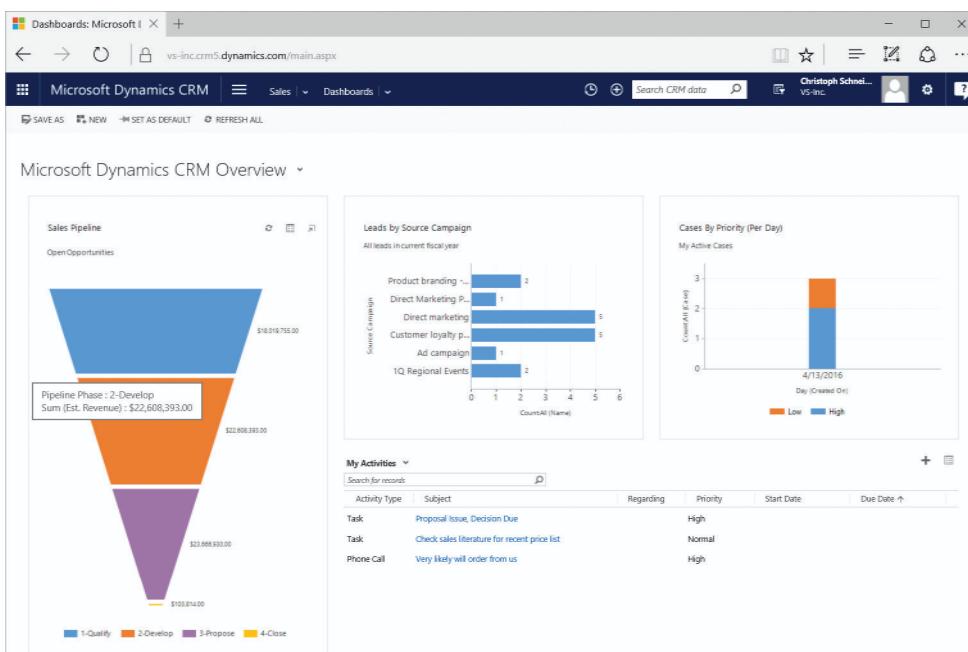


FIGURE 8.19

Digital dashboards help to visualize key CRM performance metrics.

Source: Dynamics CRM 2016, Windows 10, Microsoft Corporation.

FIGURE 8.20

Many people interact with a company in many different ways using various online identities.

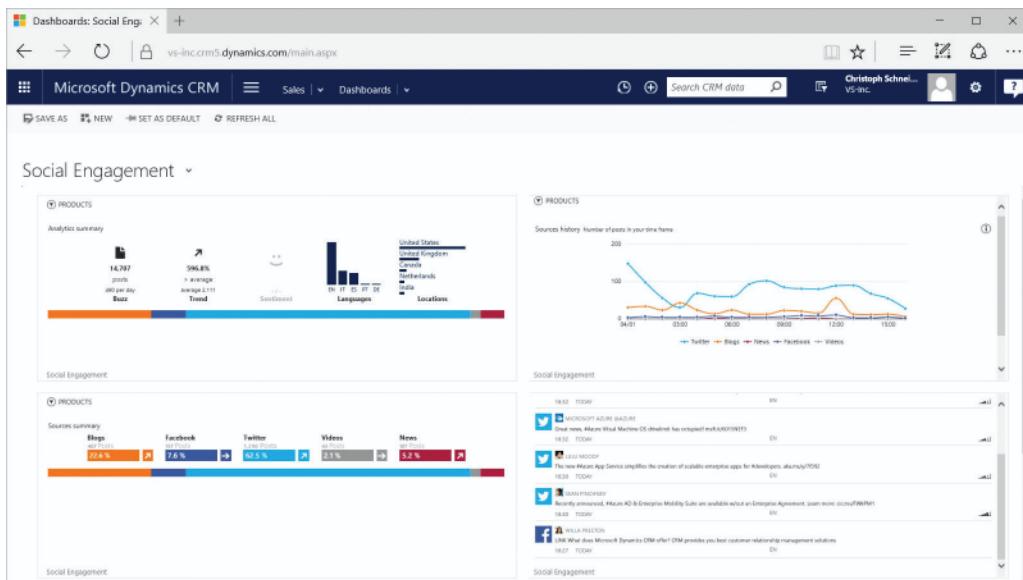


collection and analysis must be continuous so that all decision making reflects the most accurate, comprehensive, and up-to-date information.

One goal that customer-focused organizations are constantly striving for is to get a 360-degree view of the customer so as to be able to maximize the outcomes of sales and marketing campaigns and to identify the most profitable customers. In order to get the most complete picture of a sales prospect or a customer, marketers have to tie together data from various sources, such as demographic data provided when signing up for a loyalty card program, the customer's address, purchase and contact history, clickstream data on the company's website, and so on. In addition to the data captured when interacting with a person, marketers can complete the picture with publicly available information posted on the person's Facebook or LinkedIn profile or the person's Twitter updates. Unfortunately, many people have various different online identities (e.g., for different social networks), use multiple e-mail addresses, and access websites from different computers (Figure 8.20). Analytical CRM systems can help merge different identities by using fuzzy logic-based algorithms (see Chapter 6) to identify multiple records belonging to the same person.

Social CRM Social media applications enable companies to engage with their customers using a variety of social media channels. For example, many companies directly react to customer enquiries on their Facebook pages or on Twitter. This allows companies to quickly react to customers' concerns and provide a level of customer service that was typically not possible in offline environments. This use of social media for customer relationship management is often referred to as **social CRM**. As companies are using various social media channels, customers use various social media channels to quickly share both positive and negative experiences with a product or service. Monitoring such conversations can help organizations to better measure public perceptions, and by participating in such conversations, organizations can more effectively manage customer satisfaction and maintain a positive brand image.

Social Media Monitoring **Social media monitoring** is the process of identifying and assessing the volume and sentiment of what is being said about a company, individual, product, or brand. For example, monitoring online conversations can help to assess customer sentiments, find out what people really think about a product, and discover ways for improving a product: Whereas most customers do not bother to fill out a survey about a product, they are likely to voice their thoughts on Facebook or Twitter if they are very satisfied or very dissatisfied with a product. Similarly, many people participate in online discussion forums related to a product or company, and the company should monitor the conversation and step in when needed (e.g., when customers have questions about a product but no other customer answers within a certain time frame). To collect this information, organizations utilize a variety of tools to track

**FIGURE 8.21**

Many CRM applications include various tools to help in monitoring and analyzing ongoing conversations on social media sites.

Source: Dynamics CRM 2016, Windows 10, Microsoft Corporation.

and aggregate social media content from blogs, wikis, news sites, microblogs such as Twitter, social networking sites like Facebook, video- and photo-sharing websites like YouTube and Flickr, forums, message boards, blogs, and user-generated content in general. Depending on the goal of the social media monitoring program, a simple tool like Google Alerts might be adequate; alternatively, specialized applications that provide sophisticated analyses and full integration with existing CRM systems help to gain timely understanding of evolving customer sentiment. For example, Hootsuite, a popular tool for social media monitoring (and there are many), allows a company to keep track of chatter in real time on social media platforms such as Facebook, Twitter, LinkedIn, and many others. Using such tools, companies are not only able to listen to what people are saying about their brand or products, they can also consolidate and analyze trends and other summary information to improve strategy and decision making. Many CRM systems such as Microsoft Dynamics CRM now include various tools to help in monitoring and analyzing ongoing conversations on social media sites, helping to spot potential perception issues or to discover trends in customer sentiment (see Figure 8.21). Needless to say, an organization should have an appropriate social CRM strategy in place and should have clear policies, such as when to step into an online discussion, which (or how many) tweets to reply to, or how to strike a balance between grassroots marketing and deceiving people by posing as casual conversation partners.

Given the rise in importance of social media for reaching out to and communicating with customers, many organizations are creating a formal organizational group to engage in social media monitoring.

With the increasing use of social media, social media monitoring has become a central part of analyzing and understanding evolving market trends and customer sentiments. In addition, social media monitoring helps in identifying the “influencers” who are most likely to share their views through social media. Even though social media allow anybody to voice opinions, not everyone does so. For example, while many people regularly read blogs, only a few people write their own blogs; yet these blogs can be influential in swaying others’ opinions. The importance of social media monitoring is exemplified by large companies such as Dell, which established a Social Media Listening Command Center, where a number of full-time staff monitor more than 22,000 daily posts made about the company on various social media. Having a dedicated team helps Dell to quickly react to customer complaints or changes in public sentiment about the company, enabling near-real-time communication with the customers through social media.

COLLABORATIVE CRM. Collaborative CRM refers to systems for providing effective and efficient communication with the customer from the entire organization. Collaborative CRM systems facilitate the sharing of information across the various departments of an organization in order to increase customer satisfaction and loyalty. Sharing useful customer information



ETHICAL DILEMMA

When Algorithms Discriminate

Promising companies the ability to get to know their customers and maximize the benefit gained from each one, CRM systems could be called a marketer's dream. CRM software allows companies to look closely at customer behavior, drilling down to smaller and smaller market segments. Once so segmented, customers can be targeted with specific promotions. For the company, this process reaps the greatest returns from marketing efforts because only those customers are targeted who are likely to respond to the marketing campaign.

From a customer's perspective, CRM systems seem like a great idea. You finally stop receiving advertisements for things that don't interest you. But what if a company uses its CRM software in a more discriminating way? Where do companies draw the line between using CRM data to offer certain clients customized deals and unethically discriminating against other customers? For example, lenders, which often segment their customers according to their creditworthiness, might use this credit risk data to target customers having a low credit rating with underhanded payday or subprime loans. Although these customers are riskier for the lender, the higher fees and interest charged for credit make these customers especially lucrative.

CRM and all software contain countless algorithms for manipulating, aggregating, and summarizing data. Algorithms reflect a set of rules to be followed in calculations and other problem-solving operations. While there is a widespread belief that such algorithms must be objective and fair, CRM software, and the underlying algorithms, is not free of human bias. Instances of bias reported in the popular press include a report that Google's online advertising system displayed an advertisement for high-income jobs for men more often than for

women. Similarly, ads for accessing arrest records were significantly more likely to show up on searches for distinctively black names. In a similar way, CRM systems based on biased or discriminatory algorithms can potentially do more harm than good, destroying rather than building customer relationships.

Questions

1. Whose responsibility is it to ensure that algorithms are not discriminatory? Explain.
2. Google, Facebook, and many other widely used software platforms have been accused of using algorithms that present biased search results or news feeds. Should such platforms be bias free (at least as much as possible), or is it acceptable for platforms to reflect the biases of the developers? Explain.

Based on:

Jourdier, A. (2002, May 1). Privacy & ethics: Is CRM too close for comfort? *CIO.com*. Retrieved May 8, 2016, from http://www.cio.com/article/31062/Privacy_Ethics_Is_CRM_Too_Close_for_Comfort_

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on a company-wide basis helps improve information quality and can be used to identify products or services a customer may be interested in. A collaborative CRM system supports customer communication and collaboration with the entire organization, thus providing more streamlined customer service with fewer handoffs. The customer engagement center (as described previously) enables customers to utilize the communication method they prefer when interacting with the organization. In other words, collaborative CRM integrates the communication related to all aspects of the marketing, sales, and support processes in order to better serve and retain customers. Collaborative CRM enhances communication in the following ways:

- **Greater Customer Focus.** Understanding customer history and current needs helps to focus the communication on issues important to the customer.
- **Lower Communication Barriers.** Customers are more likely to communicate with the organization when personnel have complete information and when they utilize the communication methods and preferences of the customer.
- **Increased Information Integration.** All information about the customer as well as all prior and ongoing communication is given to all organizational personnel interacting with the customer; customers can get status updates from any organizational touch point.

In addition to these benefits, collaborative CRM environments are flexible such that they can support both routine and nonroutine events.

Ethical Concerns with CRM

Although CRM has become a strategic enabler for developing and maintaining customer relationships, it is not viewed positively by those who feel that it invades customer privacy and facilitates coercive sales practices. Proponents of CRM warn that relying too much on the “systems” profiles of customers, based on statistical analysis of past behavior, may categorize customers in a way that they will take exception to. Additionally, given that a goal of CRM is to better meet the needs of customers by providing highly *personalized* communication and service (such as Amazon.com’s recommendations), at what point does the communication get *too* personal? It is intuitive to conclude that when customers feel that the system knows too much about them, personalization could backfire on a company. Clearly, CRM raises several ethical concerns in the digital world (see Chapter 1, “Managing in the Digital World,” for a comprehensive discussion of information privacy). Nevertheless, as competition continues to increase in the digital world, CRM will remain a key technology for attracting and retaining customers.



INDUSTRY ANALYSIS

Manufacturing

Regardless of whether you’re thinking about a new computer, TV, automobile, or toy for your baby brother, most of today’s consumer products have undergone an elaborate design and manufacturing process, and few companies do not make heavy use of information systems in the process. Traditionally, designers and engineers used large drawing boards to sketch detailed drawings of each component of a product. Today, designers use computer-aided design (CAD) software for this task, allowing them to create drawings faster and more accurately, thus cutting down cycle time (i.e., the time from inception to the shipment of the first product) tremendously. Further, CAD allows easier sharing of designs and can be used to produce 3D drawings of a new product. However, while you can create realistic 3D drawings of a new product, people often still prefer holding a physical model in their hands to evaluate it. 3D printing, sometimes known as “fabbing,” can greatly speed up the creation of prototypes as well as an increasing range of finished products. In essence, 3D printers add successive layers of material onto a surface, thus building a 3D model out of myriad individual slices. In fact, some 3D printers even use materials such as titanium, allowing battleships to produce spare parts on an as-needed basis rather than carrying warehouses full of parts. 3D printing is rapidly evolving. Another implication of 3D printing relates to where products are manufactured. In the past decades, product manufacturing was often moved to parts of the world where labor was ample and wages were low. Countries such as China, Mexico, and Taiwan have become global heavyweights, manufacturing products for Apple, Nike, and countless other leading brands. 3D printing is potentially a global disrupter for manufacturing products. Many believe that the “workers” with the lowest wages and unlimited capacity will ultimately be 3D printers, which would

result in moving the manufacturing of many products close to the location of final sale. While 3D printing is not a suitable manufacturing method for all products, and it may take many years before it emerges as the dominant manufacturing method, it clearly will have global implications for employment and trade balances.

The use of technology doesn’t stop there. Inventory planning, job scheduling, or warehouse management are all supported by information systems, often in the form of ERP and SCM systems. Using RFID and other IoT sensors, new data can be integrated into various systems. With such highly granular data, companies will have enhanced information throughout the entire manufacturing value chain. From inventory management to production to logistics, all steps will be more transparent and efficient; complete information on the status of raw materials, production, and delivery will allow for improved inventory management, production scheduling, and delivery. Once a product leaves the manufacturer, IoT will be used throughout the distribution of the product to the final customer. Clearly, information systems will continue to transform the process of designing, manufacturing, and shipping products to you.

Based on:

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