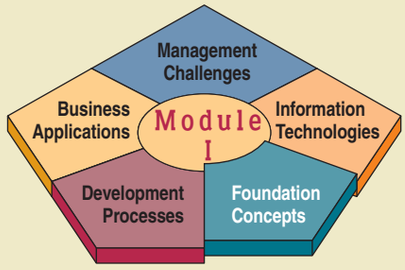
CHAPTER 2



COMPETING WITH INFORMATION TECHNOLOGY

Chapter Highlights

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Learning Objectives

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

1. Identify several basic competitive strategies and explain how they use information technologies to confront the competitive forces faced by a business.
2. Identify several strategic uses of Internet technologies and give examples of how they give competitive advantages to a business.
3. Give examples of how business process reengineering frequently involves the strategic use of Internet technologies.
4. Identify the business value of using Internet technologies to become an agile competitor or form a virtual company.
5. Explain how knowledge management systems can help a business gain strategic advantages.

SECTION I Fundamentals of Strategic Advantage

Strategic IT

Technology is no longer an afterthought in forming business strategy, but the actual cause and driver [17].

This chapter will show you that it is important to view information systems as more than a set of technologies that support efficient business operations, workgroup and enterprise collaboration, or effective business decision making. Information technology can change the way businesses compete. You should also view information systems strategically, that is, as vital competitive networks, as a means of organizational renewal, and as a necessary investment in technologies that help a company adopt strategies and business processes that enable it to reengineer or reinvent itself to survive and succeed in today's dynamic business environment.

Section I of this chapter introduces fundamental competitive strategy concepts that underlie the strategic use of information systems. Section II then discusses several major strategic applications of information technology used by many companies today.

Read the Real World Case regarding the competitive advantages of IT. We can learn a lot about the strategic business uses of information technologies from this case. See Figure 2.1.

Competitive Strategy Concepts

In Chapter 1, we emphasized that a major role of information systems applications in business is to provide effective support of a company's strategies for gaining competitive advantage. This strategic role of information systems involves using information technology to develop products, services, and capabilities that give a company major advantages over the competitive forces it faces in the global marketplace.

This role is accomplished through a strategic information architecture—the collection of **strategic information systems** that support or shape the competitive position and strategies of a business enterprise. So a strategic information system can be any kind of information system (TPS, MIS, DSS, etc.) that uses information technology to help an organization gain a competitive advantage, reduce a competitive disadvantage, or meet other strategic enterprise objectives.

Figure 2.2 illustrates the various competitive forces a business might encounter and the variety of competitive strategies that can be adopted to counteract such forces. Although not all strategies are used simultaneously by a single firm, each has value in certain circumstances. The key is to understand which strategy should be employed and why. For now, it's only important that you become familiar with the available strategic approaches. Let's look at several basic concepts that define the role of competitive strategy as it applies to information systems.

Competitive Forces and Strategies

How should a business professional think about competitive strategies? How can competitive strategies be applied to the use of information systems by a business? Figure 2.2 illustrates an important conceptual framework for understanding forces of competition and the various competitive strategies employed to balance them.

A company can survive and succeed in the long run only if it successfully develops strategies to confront five **competitive forces** that shape the structure of competition in its industry. In Michael Porter's classic model of competition, any business that wants to survive and succeed must develop and implement strategies to effectively counter (1) *the rivalry of competitors within its industry*, (2) *the threat of new entrants into an industry and its markets*, (3) *the threat posed by substitute products that might capture market share*, (4) *the bargaining power of customers*, and (5) *the bargaining power of suppliers* [21].

Competition is a positive characteristic in business, and competitors share a natural, and often healthy, rivalry. This rivalry encourages and sometimes requires a constant

REAL WORLD CASE 1

FedEx Corporation: Investing in Information Technology for Competitive Advantage in a Dynamic Global Environment

It's easy to feel a bit sorry for any company's chief information officer (CIO) these days. The pace of technology is accelerating, and costs seem to be going up just as fast. But for Rob Carter, the CIO of FedEx, the job may seem even more daunting. He's responsible for all the computer and communications systems that keep this staggeringly complex outfit running. He has to connect 39 hubs around the world with 677 airplanes, over 90,000 vehicles, and more than 200,000 employees delivering 6 million packages a day in 220 countries. Seconds count. The least glitch could cost millions of dollars and trigger a PR disaster. And if anything goes wrong, you know who takes the heat. Plus, FedEx's main competitor UPS and growing third-place provider DHL are continually trying to make the challenges harder for this on-the-spot CIO.

But don't feel all that sorry for him. Carter works for a boss, CEO and founder Fred Smith, who completely believes in the importance of infotech. He gives Carter a $1 billion annual budget. Most important, Carter is at the strategic heart of what makes FedEx successful. The company is America's second most admired and the world's fourth most admired, according to *Fortune*'s latest survey, and Carter knows he helped put it there and must keep it there. If you're in the field you love, a job doesn't get much better than that.

Rob Carter is a great example of a so-called C-suite member, one of those elite top execs whose titles start with "chief" and end with "officer." Increasingly, the C-suite is team managing companies in all kinds of industries. The 46-year-old Carter is widely regarded as America's preeminent CIO. (*Information Week* magazine recently named him CIO of the year, an honor he has shared twice before.) He joined FedEx 13 years ago and has been CIO since 2000.

FIGURE 2.1

FedEx and many other companies know that the skillful management and use of their investment in information technology can give them a competitive advantage.

Carter recently sat down with *Fortune* senior editor-at-large Geoffrey Colvin before an invited audience at the Time Warner Center in Manhattan. They discussed topics as varied as how FedEx encourages innovation, how it gains competitive advantage, competing with UPS, security measures, and the war on terror.

Colvin: Customers can track individual shipments on your Web site, which seems amazing, but they can do the same on UPS's site. You work hard, your competitors work hard. At the end of the day, is information technology a competitive advantage for you?

Carter: The answer is absolutely yes. UPS is a marvelous competitor. I'd say everybody needs a good competitor that keeps you on your toes, and I have tremendous respect for UPS and what they've accomplished with technology. There was a day when they didn't get this. It wasn't all that long ago, in the early '90s, when they really turned it around and said, "We're going to invest significantly."

From that point in time we've been in a battle on technology, no question about it, especially customer-based technology. We tend to focus slightly less on operational technology. We focus a little more on revenue-generating, customer-satisfaction–generating, strategic advantage technology. The key focus of my job is driving technology that increases the top line, and there are some terrific examples of that.

Colvin: Give me a good example.

Carter: A product we developed called Insight. The competition has now come close to doing this, but we took the whole tracking mechanism and turned it around so that as opposed to having to track a package, you say, "I want to know what's coming to me today." You can go out there now and see every inbound package, regardless of whether you knew someone was sending it to you.

In the Northeast there's a company that does bone marrow sample testing for bone marrow transplants. Getting those samples is a very painful process for the donors involved, and the viability of that sample is only about 24 hours. They'd send out kits to collection places, and they never knew exactly how many would be coming in on a given day. Using Insight, very early in the morning they can see every inbound kit that's heading to them and staff appropriately to get every one of those tests done, because the last thing you want to do is run out of hours in a day and have to recontact a potential donor and say, "Do the test again." Because it's not a fun test.

Colvin: So you figure you have an infotech competitive advantage over UPS. How long do you think it will last?

Carter: I think it's easier to copy than it is to innovate. There's no question about that. So when we launch something new, they're hot on our heels. That's why we simply have to keep moving. We have a philosophy—it came out of the Marine Corps—from the early days, that says, "Move, communicate, and shoot." That's one of our strategies. And in that order, by the way. It's not "Shoot, communicate, and stand still." So we move, communicate, and shoot, and it's a very important thing. We have an innovation team that does nothing but look for new opportunities to come out of the gate with something that'll be a whack on the side of the head to them.

Colvin: How much does FedEx spend on IT in a year, and how do you decide how much you need to spend to stay ahead of the competition?

Carter: We spend more than $1 billion a year on technology. So the technology budget is significant. Part of the idea, though, has been to manage the expense-to-revenue number down to help the company grow faster than the IT expense. You can do a lot with $1 billion. So I've been focused on saying we don't need to rapidly grow the staff and rapidly grow the footprint of IT at FedEx. Let's hold the line against the backdrop of a growing business and make that billion dollars more and more efficacious. We may not be able to outspend the Brown guys [UPS]. They're a larger company than us today, although we are hot on their heels. But we're going to come at it from a lot of different angles in trying to make those dollars really work for us, and people have fun doing that. We do get great accolades in the trade press too, for being one of the great places to work on hot, innovative IT projects.

Colvin: Let's switch gears a bit and talk about FedEx and the war on terror. I don't want to be macabre, but the reality is that your company is famous for delivering stuff to the right place at the right time. Isn't that awfully attractive to a terrorist who would want to make a bomb or other device and FedEx it someplace? And what's to stop him from doing that?

Carter: One of the things about our system compared with other systems is the visibility of every transaction. If you wanted to be anonymous about having something delivered, we're kind of the wrong place to start—especially to get something across borders. If you're not what the U.S. Transportation Administration [TSA] calls a known shipper, you go through a perimeter of control and inspection and those kinds of things to clear customs. So the "known shipper" phenomenon and related declarations make us a less attractive target for that.

Having said that, this is a very dangerous world. We take our responsibility very seriously. We work with the regulatory bodies, the defense agencies around the globe, and I think we're the best at deploying a security team and an intelligence team that works with the DEA, the FBI, the CIA, the Department of Defense, and various foreign agencies. We've had many arrests and stings that have not received any publicity. If I gave you examples, I'd have to shoot you.

Colvin: Security, the war on terror—not how most people would define your business. As Peter Drucker might say, What business are you in?

Carter: I believe we engineer time. I believe that as the world shrinks and changes, we offer solutions that allow you to engineer time to make things happen along time schedules that weren't possible before.

Source: Adapted from Geoffrey Colvin, "The FedEx Edge," *Fortune*, April 3, 2006.

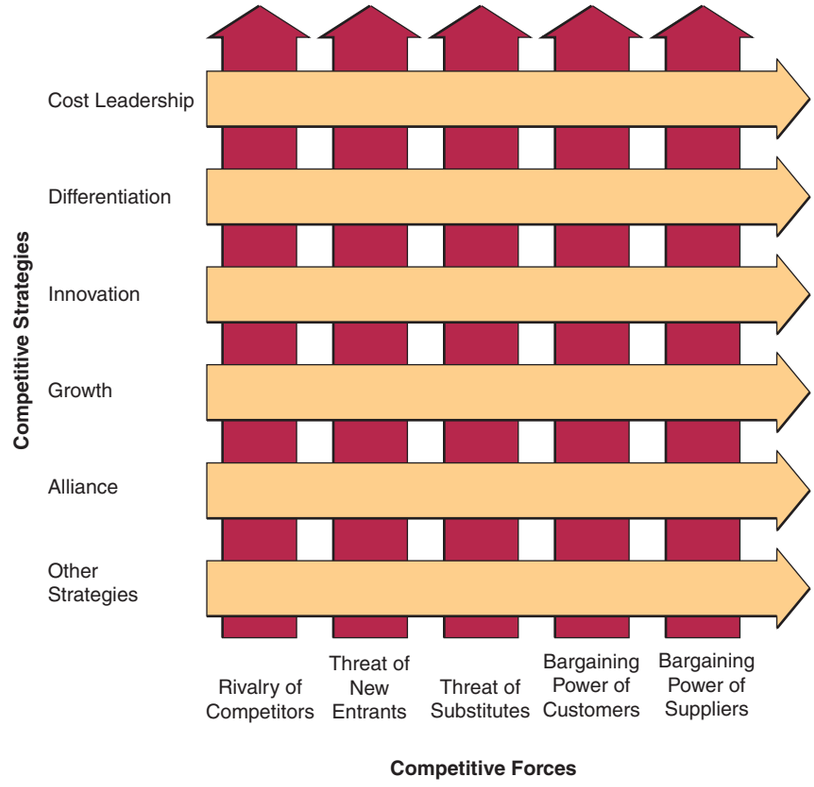
CASE STUDY QUESTIONS

1. How do the IT investment strategies and focus of FedEx and its main competitor UPS differ? Which company has the better strategy? Why?
2. Is FedEx's "move, communicate, and shoot" IT strategy a good one for its competitive battle with UPS? Why or why not? Is it a good model of competitive IT strategy for other types of companies? Defend your position.
3. FedEx CIO Carter says his company is in the business of engineering time. Is this a good business vision for FedEx? Why or why not? How vital is IT to this definition of FedEx's business? Use examples from the case to illustrate your answer.

REAL WORLD ACTIVITIES

1. Use the Internet to compare the current status of FedEx, UPS, and DHL in terms of revenue, profitability, parcels delivered, and other measures of business success. Who is winning the competitive battle? Why? Check out what business commentators and financial analysts are reporting on the Web to help you answer.
2. Use the Internet to discover more about how FedEx is involved in fighting the war on terror, beyond what is reported in this case. For example, FedEx has made some controversial disclosures of customer information to intelligence agencies. Break into small groups with your classmates to discuss FedEx's corporate responsibility to assist in the war on terror while protecting the privacy of its customers, as well as any other issues uncovered in your research.

FIGURE 2.2
Businesses can develop competitive strategies to counter the actions of the competitive forces they confront in the marketplace.



effort to gain competitive advantage in the marketplace. This ever-present competitive force requires significant resources on the part of a firm.

Guarding against the threat of new entrants also requires the expenditure of significant organizational resources. Not only do firms need to compete with other firms in the marketplace, but they also must work to create significant barriers to the entry of new competition. This competitive force has always been difficult to manage, but it is even more so today. The Internet has created many ways for a new entrant to enter the marketplace quickly and with relatively low cost. In the Internet world, a firm's biggest potential competitor may be one that is not yet in the marketplace but could emerge almost overnight.

The threat of substitutes is another competitive force confronting a business. The effect of this force is seen almost daily in a wide variety of industries, often at its strongest during periods of rising costs or inflation. When airline prices get too high, people substitute car travel for their vacations. When the cost of steak gets too high, people eat more hamburger and fish. Most products or services have some sort of substitute available to the consumer.

Finally, a business must guard against the often opposing forces of customer and supplier bargaining powers. If customers' bargaining power gets too strong, they can drive prices to unmanageably low levels or simply refuse to buy the product or service. If a key supplier's bargaining power gets too strong, it can force the price of goods and services to unmanageably high levels or simply starve a business by controlling the flow of parts or raw materials essential to the manufacture of a product.

Figure 2.2 also illustrates that businesses can counter the threats of competitive forces that they face by implementing five basic **competitive strategies**.

- **Cost Leadership Strategy.** Becoming a low-cost producer of products and services in the industry or finding ways to help suppliers or customers reduce their costs or increase the costs of competitors.

- **Differentiation Strategy.** Developing ways to differentiate a firm's products and services from its competitors' or reduce the differentiation advantages of competitors. This strategy may allow a firm to focus its products or services to give it an advantage in particular segments or niches of a market.
- **Innovation Strategy.** Finding new ways of doing business. This strategy may involve developing unique products and services or entering unique markets or market niches. It may also involve making radical changes to the business processes for producing or distributing products and services that are so different from the way a business has been conducted that they alter the fundamental structure of an industry.
- **Growth Strategies.** Significantly expanding a company's capacity to produce goods and services, expanding into global markets, diversifying into new products and services, or integrating into related products and services.
- **Alliance Strategies.** Establishing new business linkages and alliances with customers, suppliers, competitors, consultants, and other companies. These linkages may include mergers, acquisitions, joint ventures, forming of "virtual companies," or other marketing, manufacturing, or distribution agreements between a business and its trading partners.

One additional point regarding these strategies is that they are not mutually exclusive. An organization may make use of one, some, or all of the strategies in varying degrees to manage the forces of competition. Therefore, a given activity could fall into one or more of the categories of competitive strategy. For example, implementing a system that allows customers to track their order or shipment online could be considered a form of differentiation if the other competitors in the marketplace do not offer this service. If they do offer the service however, online order tracking would not serve to differentiate one organization from another.

If an organization offers its online package tracking system in a manner that allows its customers to access shipment information via not only a computer but a mobile phone as well, then such an action could fall into both the differentiation and innovation strategy categories. Think of it this way: Not everything innovative will serve to differentiate one organization from another. Likewise, not everything that serves to differentiate organizations is necessarily viewed as innovative. These types of observations are true for any combination of the competitive strategies, thus making them complementary to each other rather than mutually exclusive.

Strategic Uses of Information Technology

How can business managers use investments in information technology to directly support a firm's competitive strategies? Figure 2.3 answers this question with a summary of the many ways that information technology can help a business implement the five basic competitive strategies. Figure 2.4 provides examples of how specific companies have used strategic information systems to implement each of these five basic strategies for competitive advantage. Note the major use of Internet technologies for electronic business and commerce applications. In the rest of this chapter, we discuss and provide examples of many strategic uses of information technology.

Other Competitive Strategies

There are many competitive strategies in addition to the five basic strategies of cost leadership, differentiation, innovation, growth, and alliance. Let's look at several key strategies that also can be implemented with information technology. They include locking in customers or suppliers, building switching costs, raising barriers to entry, and leveraging investment in information technology.

Investments in information technology can allow a business to **lock in customers and suppliers** (and lock out competitors) by building valuable new relationships with them. These business relationships can become so valuable to customers or suppliers that they deter them from abandoning a company for its competitors or intimidate

FIGURE 2.3
A summary of how information technology can be used to implement the five basic competitive strategies. Many companies are using Internet technologies as the foundation for such strategies.

Basic Strategies in the Business Use of Information Technology
Lower Costs • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers.
Differentiate • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services on selected market niches.
Innovate • Create new products and services that include IT components. • Develop unique new markets or market niches with the help of IT. • Make radical changes to business processes with IT that dramatically cut costs; improve quality, efficiency, or customer service; or shorten time to market.
Promote Growth • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services.
Develop Alliances • Use IT to create virtual organizations of business partners. • Develop interenterprise information systems linked by the Internet and extranets that support strategic business relationships with customers, suppliers, subcontractors, and others.

them into accepting less profitable business arrangements. Early attempts to use information systems technology in these relationships focused on significantly improving the quality of service to customers and suppliers in a firm's distribution, marketing, sales, and service activities. More recent projects characterize a move toward more innovative uses of information technology.

A major emphasis in strategic information systems has been to find ways to **create switching costs** in the relationships between a firm and its customers or suppliers. That is, investments in information systems technology, such as those mentioned in the Wal-Mart example, can make customers or suppliers dependent on the continued use of innovative, mutually beneficial interenterprise information systems. Then they become reluctant to pay the costs in time, money, effort, and inconvenience that it would take to switch to a company's competitors.

By making investments in information technology to improve its operations or promote innovation, a firm could also **raise barriers to entry** that would discourage or delay other companies from entering a market. Typically, these barriers increase the amount of investment or the complexity of the technology required to compete in an industry or a market segment. Such actions tend to discourage firms already in the industry and deter external firms from entering the industry.

Investing in information technology enables a firm to build strategic IT capabilities that allow it to take advantage of strategic opportunities when they arise. In many cases, this ability results when a company invests in advanced computer-based information systems to improve the efficiency of its own business processes. Then, armed with this strategic technology platform, the firm can **leverage investment in IT** by developing new products and services that would not be possible without a strong IT capability. An important current example is the development of corporate intranets and extranets by many companies, which enables them to leverage their previous investments in Internet browsers, PCs, servers, and client/server networks. Figure 2.5 summarizes the additional strategic uses of IT we have just discussed.

FIGURE 2.4 Examples of how companies have used information technology to implement five competitive strategies for strategic advantage.

Strategy	Company	Strategic Use of Information Technology	Business Benefit
Cost Leadership	Dell Computer	Online build to order	Lowest cost producer
	Priceline.com	Online seller bidding	Buyer-set pricing
	eBay.com	Online auctions	Auction-set prices
Differentiation	AVNET Marshall	Customer/supplier e-commerce	Increase in market share
	Moen Inc.	Online customer design	Increase in market share
	Consolidated Freightways	Customer online shipment tracking	Increase in market share
Innovation	Charles Schwab & Co.	Online discount stock trading	Market leadership
	Federal Express	Online package tracking and flight management	Market leadership
	Amazon.com	Online full-service customer systems	Market leadership
Growth	Citicorp	Global intranet	Increase in global market
	Wal-Mart	Merchandise ordering by global satellite network	Market leadership
	Toys 'R' Us Inc.	POS inventory tracking	Market leadership
Alliance	Wal-Mart/Procter & Gamble	Automatic inventory replenishment by supplier	Reduced inventory cost/increased sales
	Cisco Systems	Virtual manufacturing alliances	Agile market leadership
	Staples Inc. and Partners	Online one-stop shopping with partners	Increase in market share

Wal-Mart and Others Get Innovative

Wal-Mart realized early on the benefits of using information technology to improve service. In 1983, it invested in an elaborate satellite network linking the point-of-sale terminals in all of its stores. In a few years, this system grew into a complex communication network that connected all Wal-Mart stores, its headquarters and distribution centers, and all its major suppliers. The most innovative aspect of the system was the facilitation of a modified just-in-time process of inventory control, a feat virtually unheard of in general merchandise retailing. When an item is sold by a store, a message is immediately sent to the supplier of that item. This message alerts the supplier to include a replacement in the next scheduled shipment (often the same day) to the nearest distribution hub. This tight connectivity allowed Wal-Mart's immediate response to inventory needs while significantly reducing the amount of inventory required. The innovation didn't stop there however. Wal-Mart realized the operational efficiency of its system and used it to offer lower-cost, better-quality products and services, as well as to differentiate itself from its competitors.

Companies have begun to follow Wal-Mart's example by extending their networks to customers and suppliers and adopting continuous inventory replenishment systems that serve to lock in business. These interenterprise information systems use the Internet and other networks to link the business processes of a company electronically with its customers and suppliers, resulting in new business alliances and partnerships. Extranets between a business and its suppliers are prime examples of such strategic linkages. One of the most innovative uses for these network linkages is the concept of *stockless* inventory replenishment systems. Such systems work for Wal-Mart and Procter & Gamble, a major supplier of personal care products. Using the network, Procter & Gamble automatically replenishes Wal-Mart's stock of all Procter & Gamble products [18, 29].

FIGURE 2.5 Additional ways that information technology can be used to implement competitive strategies.

Other Strategic Uses of Information Technology
• Develop interenterprise information systems whose convenience and efficiency create switching costs that lock in customers or suppliers.
• Make major investments in advanced IT applications that build barriers to entry against industry competitors or outsiders.
• Include IT components in products and services to make substitution of competing products or services more difficult.
• Leverage investments in IS people, hardware, software, databases, and networks from operational uses into strategic applications.

Competitive Advantage and Competitive Necessity

The constant struggle to achieve a measurable competitive advantage in an industry or marketplace occupies a significant portion of an organization's time and money. Creative and innovative marketing, research and development, and process reengineering, among many other activities, are used to gain that elusive and sometimes indescribable competitive advantage over rival firms. The real problem with a competitive advantage, however, is that it normally doesn't last very long and is generally not sustainable over the long term. Once a firm figures out how to gain an advantage over its competitors, the competitors figure out how it was done, and they do the same thing. What was once a competitive advantage is now a competitive necessity. Once a strategy or action becomes a competitive necessity, instead of it creating an advantage, the strategy or action becomes necessary simply to compete and do business in the industry. And when this happens, someone has to figure out a new way to gain a competitive edge, and the cycle starts over again.

Every organization is looking for a way to gain competitive advantage, and many have been successful in using strategic information systems to assist them in achieving it. The important point to remember is that competitive advantage doesn't last forever. Arie de Geus, head of strategic planning for Royal Dutch Shell, thinks there may be one way to sustain it, however: "The ability to learn faster than your competitors may be the only sustainable competitive advantage in the future."

Building a Customer-Focused Business

> *The driving force behind world economic growth has changed from manufacturing volume to improving customer value. As a result, the key success factor for many firms is maximizing customer value* [6].

For many companies, the chief business value of becoming a customer-focused business lies in its ability to help them keep customers loyal, anticipate their future needs, respond to customer concerns, and provide top-quality customer service. This strategic focus on **customer value** recognizes that quality, rather than price, has become the primary determinant in a customer's perception of value. Companies that consistently offer the best value from the customer's perspective are those that keep track of their customers' individual preferences; keep up with market trends; supply products, services, and information anytime, anywhere; and provide customer services tailored to individual needs [6]. So Internet technologies have created a strategic opportunity for companies, large and small, to offer fast, responsive, high-quality products and services tailored to individual customer preferences.

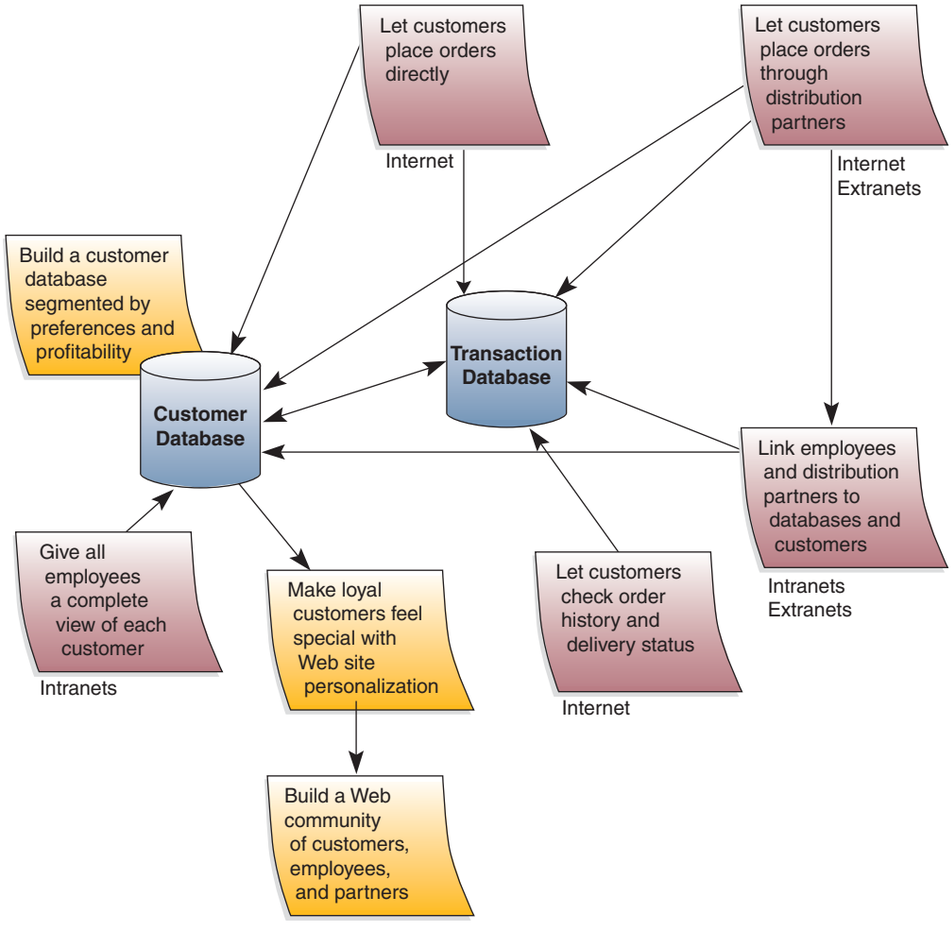
Internet technologies can make customers the focal point of customer relationship management (CRM) and other e-business applications. In combination, CRM systems and Internet, intranet, and extranet Web sites create new channels for interactive communications within a company, with customers, and with suppliers, business partners, and

others in the external environment. Such communications enable continual interaction with customers by most business functions and encourages cross-functional collaboration with customers in product development, marketing, delivery, service, and technical support [6]. We will discuss CRM systems in Chapter 7.

Typically, customers use the Internet to ask questions, lodge complaints, evaluate products, request support, and make and track their purchases. Using the Internet and corporate intranets, specialists in business functions throughout the enterprise can contribute to an effective response. This ability encourages the creation of cross-functional discussion groups and problem-solving teams dedicated to customer involvement, service, and support. Even the Internet and extranet links to suppliers and business partners can be used to enlist them in a way of doing business that ensures the prompt delivery of quality components and services to meet a company's commitments to its customers [13]. This process is how a business demonstrates its focus on customer value.

Figure 2.6 illustrates the interrelationships in a customer-focused business. Intranets, extranets, e-commerce Web sites, and Web-enabled internal business processes form the invisible IT platform that supports this e-business model. The platform enables the business to focus on targeting the kinds of customers it really wants and "owning" the customer's total business experience with the company. A successful

FIGURE 2.6 How a customer-focused business builds customer value and loyalty using Internet technologies.



business streamlines all business processes that affect its customers and develops CRM systems that provide its employees with a complete view of each customer, so they have the information they need to offer their customers top-quality personalized service. A customer-focused business helps its e-commerce customers help themselves while also helping them do their jobs. Finally, a successful business nurtures an online community of customers, employees, and business partners that builds great customer loyalty while fostering cooperation to provide an outstanding customer experience [24]. Let's review a real-world example.

Hilton Hotels: e-Business with the Customer in Mind

Hilton Hotels, via Carrolton, Texas-based Hilton Reservations Worldwide (HRW), prides itself in having one of the fastest reservation services in the world. For the more than 2,400 hotels located in 65 countries worldwide, HRW handles more than 31 million calls and generates more than 9 million reservations annually. Despite this incredible volume, the average time to complete a reservation is less than two minutes. This high level of efficiency and customer service is the direct result of Hilton's innovative application of information technology.

Here's how the system works: When a call comes in to HRW, the Dialed Number Identification Services (DNIS) immediately identifies the Hilton brand that the customer is calling. The call is then passed to a reservation specialist for that brand, who uses Hilton's reservation front-end client to assist in locating the hotel brand reservation and room availability information. This information is immediately displayed on the reservation specialist's desktop as the call is being transferred. If accommodations are not available for the caller's choice of hotel, the specialist can click an onscreen button to start a search of other reservation databases. Within seconds, the reservation specialist can cross-sell an alternate Hilton property.

Innovative applications of IT have also been used to automate specific portions of the reservation system, further enabling agents to handle additional transactions and reducing the time and agent expense associated with each call. This point is where the interactive voice response (IVR) system enters the picture. Once an agent books the reservation, the customer is transferred to the IVR system. The IVR reads back and confirms the customer's reservation information, freeing the reservation specialist for the next customer. Callers can select their next option from the IVR—including being transferred back to an agent if required—or hang up to complete the transaction.

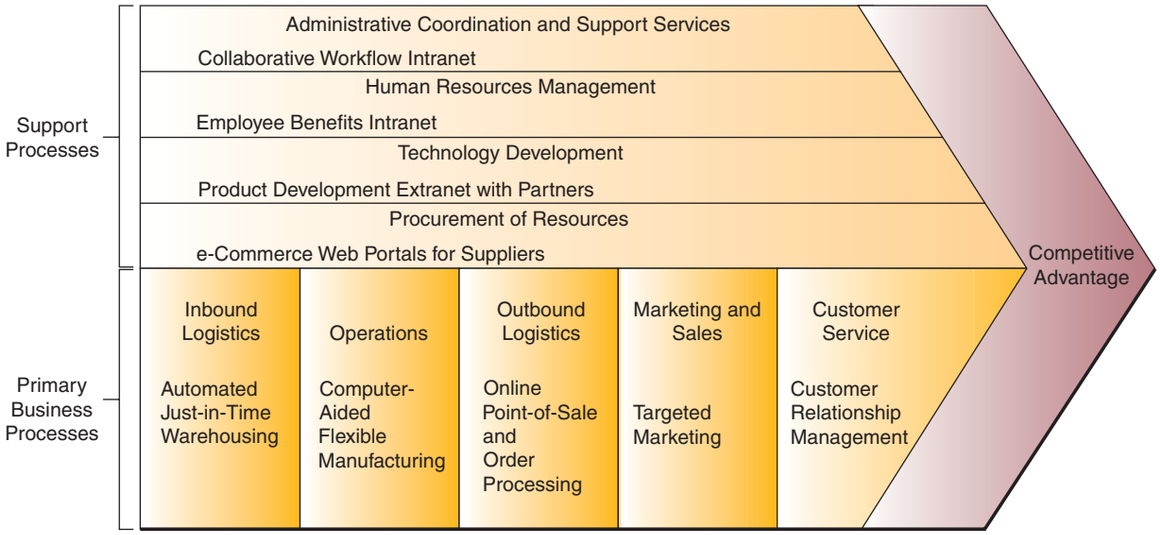
Hilton has also streamlined the reservation process for those who wish to use the Hilton.com Web site. Frequent guests have services automatically tailored to their last visit, and meeting planners access the Web site for group reservations and floor plans of venues. The Hilton Web site is designed for multiple customer segments as part of Hilton's direct-to-customer business model. Every customer segment—the business traveler, the tourist, the meeting planner, and the travel agent—has been accommodated.

To implement this e-business initiative, Hilton integrates workflows, a reservation system, call centers, and business processes with the common goal of obtaining more finely segmented customer data [16, 30].

The Value Chain and Strategic IS

Let's look at another important concept that can help you identify opportunities for strategic information systems. The **value chain** concept was developed by Michael Porter [21] and is illustrated in Figure 2.7. It views a firm as a series, chain, or network of basic activities that add value to its products and services and thus add a margin of value to both the firm and its customers. In the value chain conceptual framework, some business activities are primary processes; others are support processes. *Primary processes* are those business activities that are directly related to

FIGURE 2.7 The value chain of a firm. Note the examples of the variety of strategic information systems that can be applied to a firm's basic business processes for competitive advantage.



the manufacturing of products or the delivery of services to the customer. In contrast, *support processes* are those business activities that help support the day-to-day running of the business and that indirectly contribute to the products or services of the organization. This framework can highlight where competitive strategies can best be applied in a business. That is, managers and business professionals should try to develop a variety of strategic uses of the Internet and other technologies for those basic processes that add the most value to a company's products or services and thus to the overall business value of the company.

Value Chain Examples

Figure 2.7 provides examples of how and where information technologies can be applied to basic business processes using the value chain framework. For example, the figure illustrates that collaborative workflow intranets can increase the communications and collaboration required to improve administrative coordination and support services dramatically. An employee benefits intranet can help the human resources management function provide employees with easy, self-service access to their benefits information. Extranets enable a company and its global business partners to use the Web to jointly design products and processes. Finally, e-commerce Web portals can dramatically improve procurement of resources by providing online marketplaces for a firm's suppliers.

Examples of strategic applications of information systems technology to primary business processes are also identified by the value chain model in Figure 2.7. These include automated just-in-time warehousing systems to support inbound logistic processes involving the storage of inventory, computer-aided flexible manufacturing systems for manufacturing operations, and online point-of-sale and order processing systems to improve the outbound logistics processes that process customer orders. Information systems can also support marketing and sales processes by developing an interactive targeted marketing capability on the Internet and the Web. Finally, customer service can be dramatically improved by a coordinated and integrated customer relationship management system.

Thus, the value chain concept can help you identify where and how to apply the strategic capabilities of information technology. It shows how various types of information technologies might be applied to specific business processes to help a firm gain competitive advantages in the marketplace.

SECTION II Using Information Technology for Strategic Advantage

Strategic Uses of IT

Organizations may view and use information technology in many ways. For example, companies may choose to use information systems strategically, or they may be content to use IT to support efficient everyday operations. But if a company emphasized strategic business uses of information technology, its management would view IT as a major competitive differentiator. They would then devise business strategies that use IT to develop products, services, and capabilities that give the company major advantages in the markets in which it competes. In this section, we provide many examples of such strategic business applications of information technology. See Figure 2.8.

Read the Real World Case about using information technology to build strategic customer relationships. We can learn a lot about the competitive advantage gained through knowledge management systems.

Reengineering Business Processes

One of the most important implementations of competitive strategies is **business process reengineering** (BPR), often simply called *reengineering*. Reengineering is a fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in cost, quality, speed, and service. So BPR combines a strategy of promoting business innovation with a strategy of making major improvements to business processes so that a company can become a much stronger and more successful competitor in the marketplace.

However, Figure 2.9 points out that though the potential payback of reengineering is high, so is its risk of failure and level of disruption to the organizational environment [10]. Making radical changes to business processes to dramatically improve efficiency and effectiveness is not an easy task. For example, many companies have used cross-functional enterprise resource planning (ERP) software to reengineer, automate, and integrate their manufacturing, distribution, finance, and human resource business processes. Although many companies have reported impressive gains with such ERP reengineering projects, many others have experienced dramatic failures or failed to achieve the improvements they sought (as we saw in the Real World Cases in Chapter 1).

Many companies have found that *organizational redesign* approaches are an important enabler of reengineering, along with the use of information technology. For example, one common approach is the use of self-directed cross-functional or multidisciplinary *process teams*. Employees from several departments or specialties, including engineering, marketing, customer service, and manufacturing, may work as a team on the product development process. Another example is the use of *case managers*, who handle almost all tasks in a business process instead of splitting tasks among many different specialists.

Evolve Business Processes, Don't Reengineer Them

For many people, discussing business-process-management is an academic exercise that doesn't lead to business results.

But Rosemary Baczewski, director of process and performance improvement at Horizon Blue Cross Blue Shield of N. J., sums up what it's all about when she tells the story of when her team identified a health care claims process that usually took 7.6 days to complete. In an experiment, two managers hand-carrying the same claim managed to push it past the right parties in only 45 minutes.

"This was a wakeup call to the company. The employees can't necessarily work harder. The process has to work harder," she says.

REAL WORLD CASE 2

GE Energy and GE Healthcare: Using Information Technology to Create Strategic Customer Relationships

When the global network that is the Internet arrived on the scene alongside rapidly advancing capabilities for large-scale storage and data analysis, most companies in the world were not aware of the strategic impact of the confluence of these information technologies. But a few proactive IT-savvy companies spotted the shift in the economics that these new IT developments provided. Now their products could be networked and accessed at their customers' sites, and this connectivity was cheap enough to permit continual monitoring of them anywhere in the world. Even a company like General Electric, already the premier model for downstream service expansion, saw unprecedented opportunities for strategic relationships and returns.

Look at GE's power turbine business, for instance. Its customers are major utilities, and they have good reason to hate equipment failures. At the least, any downtime creates huge opportunity costs for these customers; often it means they have to pay hefty regulatory compliance fines. To reduce that risk, GE (and its competition) invests heavily in information technologies for remote monitoring and diagnostics so it can deploy a technician or engineer ahead of a failure as opposed to on a planned schedule, based on assumptions about the maintenance needed by each type of turbine, or, even worse, after a turbine fails and the power has gone off.

This strategic investment in IT has a dramatic effect on the profitability of GE's maintenance services. Most manufacturers cannot charge more than $90 to $110 per hour for their technical support because of price and benefit pressures from local competitors. But GE Energy, because of its efficient network-enabled remote servicing, can charge $500 to $600 per hour for the same technician. Even more important, the information generated by its continual monitoring allows GE to take on additional tasks, such as managing a customer's spare parts inventory or providing the customer's and GE's service and support personnel with complete access to unified data and knowledge about the status of the equipment.

FIGURE 2.8

Networking and data storage and analysis technologies enable companies like GE Healthcare to gain a competitive advantage by becoming the sole provider of MRI scanners and all support services to their medical radiology customers.

Customers now look to GE not just for high-quality energy equipment but also for help in optimizing their ability to supply consistent and high-quality power to their customers. So GE has created a significant amount of customer dependency for its services, which has allowed GE to tie its pricing to the business benefits it provides ("power by the hour"), for instance, rather than the products themselves.

The same kinds of economics are at work at GE Healthcare. Its typical customer is a medical radiology clinic in the market for a new MRI (magnetic resonance imaging) machine. But these customers have not purchased such machines in years. Given the rapidly obsolescent technology involved and the quirks of hospital finances, they've tended to lease the machines. Now even conventional leasing has gone by the wayside as companies like GE offer to install the equipment at no upfront cost and instead charge for its ongoing upkeep and use. Think, for example, of all the activities associated with the life cycle of an MRI scanner:

1. Determining requirements and whether having a scanner is justified.
2. Financing the scanner.
3. Installing the scanner.
4. Testing, calibrating, and validating the scanner.
5. Maintaining and replacing parts.
6. Replenishing materials (gases and imaging media).
7. Training personnel to use the scanner.
8. Determining a patient's need for a scan (preliminary diagnosis).
9. Preparing the patient for a scan.
10. Scanning the patient.
11. Interpreting the scan.
12. Updating the software.
13. Upgrading the hardware.

Because of the high value, complexity, and cost of MRI scanning, most of these activities represent a business opportunity for a scanner manufacturer. (Only activities 8–11 are

primarily medical matters and not the province of a manufacturer.) But that still leaves nine activities that are economic opportunities for scanner makers. This scenario is precisely the situation GE Healthcare has stepped into, positioning itself as a complete solution provider for its customers.

The strategic business result is a longer-term relationship than a traditional product sale would have yielded. Under the old model, a customer bought or leased a product and got some kind of warranty and support package with it. Then a salesperson would come back within a predictable amount of time to try to sell an upgrade or extension to the product or support services. Under the new model, the customer simply signs up, typically for a five-year-plus relationship with a major asset. All the support and replenishables related to that machine are handled, through individual transactions, as part of the managed service. By analogy, imagine not buying or leasing the car of your choice but instead paying for its use by the mile.

GE's ability to price those "miles" right is critical to its ongoing competitiveness. For an MRI machine, GE must estimate the number of images that will be required over the life of the contract based on the demographics of the customer's service area. Again, the company can make such estimates because of its investment in information technology for network monitoring, diagnostics, and data analysis of the use of its products at customer sites throughout the world.

Not long ago, we met with managers in GE's industrial capital equipment leasing division. These are the people responsible for those leased trailers you find at practically every construction site on earth. We were incredulous when we heard how much self-awareness the trailers have, even down to the number of times a particular door or window is opened in a given period. Why collect data on such seemingly minor events in the life of each trailer? "Because," we were told, "the business is actuarial science now."

Source: Adapted from Glen Allmendinger and Ralph Lombreglia, "Four Strategies for the Age of Smart Services," *Harvard Business Review*, October 2005; Peter Weill and Sinan Aral, "Generating Premium Returns on Your IT Investments," *MIT Sloan Management Review*, Winter 2006.

CASE STUDY QUESTIONS

1. What are the business benefits of using information technology to build strategic customer relationships for GE Energy and GE Healthcare? What are the business benefits for their customers?
2. What strategic uses of information technology discussed in this chapter and summarized in Figures 2.3 and 2.5 do you see implemented in this case? Explain the reasons for your choices.
3. How could other companies benefit from the use of IT to build strategic customer relationships? Provide or propose several examples of such uses. Explain how each benefits the business and its customers.

REAL WORLD ACTIVITIES

1. Use the Internet to discover if GE Energy and GE Healthcare are expanding or strengthening their uses of IT to build strategic customer relationships. What benefits are they gaining for themselves and claiming for their customers?
2. Use the Internet to discover other companies whose products are networked, monitored, diagnosed, and managed at customers' sites like the GE companies in this case. Alternatively, choose other companies you can research on the Internet and propose several ways they could implement and benefit from similar uses of information technology.
3. What business control and security concerns might a business customer have with the extent of its dependency on GE for the use and maintenance of assets that are vital to the operation of the business? Break into small groups to discuss the rationale for these concerns and what measures both the business and GE could take to reduce any security threats and improve a customer's secure control of the business assets it obtains from GE.

FIGURE 2.9
Some of the key ways that business process reengineering differs from business improvement.

	Business Improvement	Business Process Reengineering
Level of Change	Incremental	Radical
Process Change	Improved new version of process	Brand-new process
Starting Point	Existing processes	Clean slate
Frequency of Change	One-time or continuous	Periodic one-time change
Time Required	Short	Long
Typical Scope	Narrow, within functions	Broad, cross functional
Horizon	Past and present	Future
Participation	Bottom-up	Top-down
Path to Execution	Cultural	Cultural, structural
Primary Enabler	Statistical control	Information technology
Risk	Moderate	High

Source: Adapted from Howard Smith and Peter Fingar, *Business Process Management: The Third Wave* (Tampa, FL: Meghan-Kiffer Press, 2003), p. 118.

Baczewski said her business-process improvement team at Horizon tries to teach business-process managers to avoid excessive studying and defining of a business-process problem. "When you have 60% of the data you need, evaluate it and go with your gut" on how best to improve it, she said.

Many acknowledge that the field of business-process management, despite keen interest among managers inside companies, got something of a bad name during the 1990s when it was presented as business-process reengineering. Trying to reengineer many company processes at the same time proved disruptive and, in many cases, counterproductive. Now the goal is to improve business processes and capitalize on potential new efficiencies as a business evolves.

"CIOs are in their third year of relentless cost pressure to deliver more results, while meeting new requirements like those of the Sarbanes-Oxley Act. Improving business processes has to include collecting feedback on changes and using that feedback to further improve the overall business," says Robert Farrell, president of Metastorm Inc., a business-process-management software supplier. "We need round-trip business-process management."

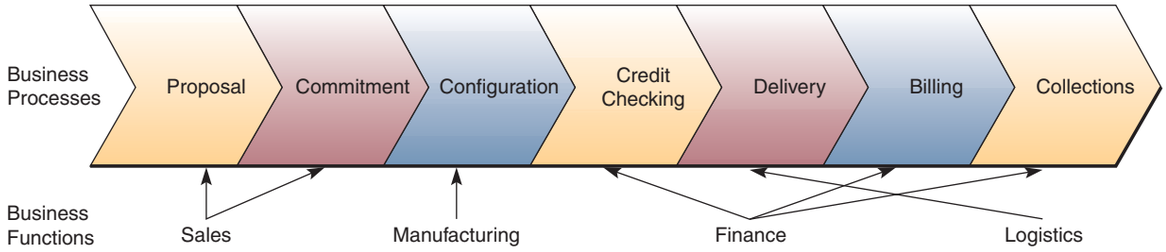
Just as with Horizon, new systems at Agilent Technologies, Inc. (www.agilent.com) have enabled simplification and standardization of processes across the entire company. Real-time information about inventory and order status, easier-to-understand invoicing and pricing, and improved visibility in product delivery lead times are just some of the benefits being realized by Agilent customers, suppliers, and vendors.

Such approaches monitor and measure the results of business-process change, evaluate them, and try to further improve the process with that information. In other words, the job isn't over just because the process was changed. [1, 29]

The Role of Information Technology

Information technology plays a major role in reengineering most business processes. The speed, information processing capabilities, and connectivity of computers and Internet technologies can substantially increase the efficiency of business processes, as well as communications and collaboration among the people responsible for their

FIGURE 2.10 The order management process consists of several business processes and crosses the boundaries of traditional business functions.



operation and management. For example, the order management process illustrated in Figure 2.10 is vital to the success of most companies [6]. Many of them are reengineering this process with ERP software and Web-enabled electronic business and commerce systems, as outlined in Figure 2.11. Let's take a look at an example.

Becoming an Agile Company

> *We are changing from a competitive environment in which mass-market products and services were standardized, long-lived, information-poor, and exchanged in one-time transactions, to an environment in which companies compete globally with niche market products and services that are individualized, short-lived, information-rich, and exchanged on an ongoing basis with customers* [12].

Agility in business performance means the ability of a company to prosper in rapidly changing, continually fragmenting global markets for high-quality, high-performance, customer-configured products and services. An **agile company** can make a profit in markets with broad product ranges and short model lifetimes and can produce orders individually and in arbitrary lot sizes. It supports *mass customization* by offering individualized products while maintaining high volumes of production. Agile companies depend heavily on Internet technologies to integrate and manage their business processes while providing the information processing power to treat masses of customers as individuals.

To be an agile company, a business must implement four basic strategies. First, customers must perceive the products or services of an agile company as solutions to their individual problems. Thus, products can be priced on the basis of their value as solutions, not their cost to produce. Second, an agile company cooperates with customers, suppliers, and other companies—even with its competitors. This cooperation allows a business to bring products to market as rapidly and cost effectively as possible, no matter where resources are located or who owns them. Third, an agile company organizes so that it thrives on change and uncertainty. It uses flexible organizational structures keyed to the requirements of different and constantly changing customer opportunities.

FIGURE 2.11
Examples of information technologies that support reengineering the order management processes.

Reengineering Order Management
• Customer relationship management systems using corporate intranets and the Internet.
• Supplier-managed inventory systems using the Internet and extranets.
• Cross-functional ERP software for integrating manufacturing, distribution, finance, and human resource processes.
• Customer-accessible e-commerce Web sites for order entry, status checking, payment, and service.
• Customer, product, and order status databases accessed via intranets and extranets by employees and suppliers.

FIGURE 2.12 How information technology can help a company be an agile competitor, with the help of customers and business partners.

Type of Agility	Description	Role of IT	Example
Customer	Ability to co-opt customers in the exploitation of innovation opportunities • As sources of innovation ideas • As cocreators of innovation • As users in testing ideas or helping other users learn about the idea	Technologies for building and enhancing virtual customer communities for product design, feedback, and testing	eBay customers are its de facto product development team because they post an average of 10,000 messages each week to share tips, point out glitches, and lobby for changes.
Partnering	Ability to leverage assets, knowledge, and competencies of suppliers, distributors, contract manufacturers, and logistics providers in the exploration and exploitation of innovation opportunities	Technologies facilitating interfirm collaboration, such as collaborative platforms and portals, supply-chain systems, etc.	Yahoo! has accomplished a significant transformation of its service from a search engine into a portal by initiating numerous partnerships to provide content and other media-related services from its Web site.
Operational	Ability to accomplish speed, accuracy, and cost economy in the exploitation of innovation opportunities	Technologies for modularization and integration of business processes	Ingram Micro, a global wholesaler, has deployed an integrated trading system, allowing its customers and suppliers to connect directly to its procurement and ERP systems.

Source: Adapted from V. Sambamurthy, Anandhi Bhaharadwaj, and Varun Grover. "Shaping Agility Through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," *MIS Quarterly* (June 2003), p. 246.

Fourth, an agile company leverages the impact of its people and the knowledge they possess. By nurturing an entrepreneurial spirit, an agile company provides powerful incentives for employee responsibility, adaptability, and innovation [12].

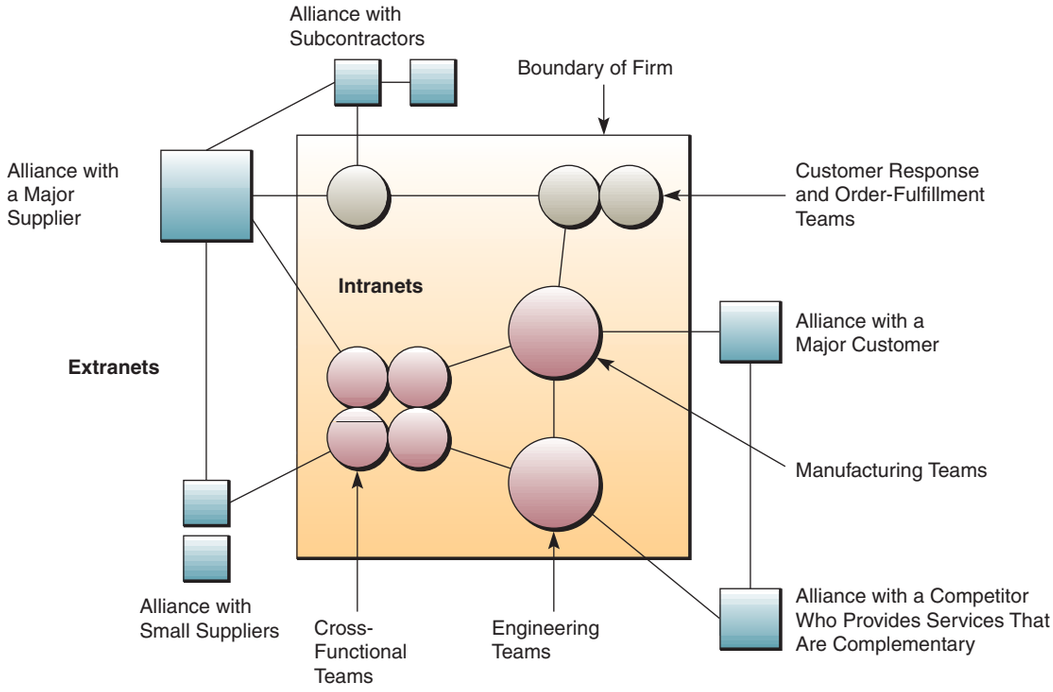
Figure 2.12 summarizes another useful way to think about agility in business. This framework emphasizes the roles customers, business partners, and information technology can play in developing and maintaining the strategic agility of a company. Notice how information technology can enable a company to develop relationships with its customers in virtual communities that help it be an agile innovator. And as we will see repeatedly throughout this text, information technologies enable a company to partner with its suppliers, distributors, contract manufacturers, and others via collaborative portals and other Web-based supply chain systems that significantly improve its agility in exploiting innovative business opportunities [23].

Creating a Virtual Company

In today's dynamic global business environment, forming a **virtual company** can be one of the most important strategic uses of information technology. A virtual company (also called a *virtual corporation* or *virtual organization*) is an organization that uses information technology to link people, organizations, assets, and ideas.

Figure 2.13 illustrates that virtual companies typically form virtual workgroups and alliances with business partners that are interlinked by the Internet, intranets, and extranets. Notice that this company has organized internally into clusters of process and cross-functional teams linked by intranets. It has also developed alliances and extranet links that form **interenterprise information systems** with suppliers,

FIGURE 2.13 A virtual company uses the Internet, intranets, and extranets to form virtual workgroups and support alliances with business partners.



customers, subcontractors, and competitors. Thus, virtual companies create flexible and adaptable virtual workgroups and alliances keyed to exploit fast-changing business opportunities [2].

Virtual Company Strategies

Why are people forming virtual companies? Several major reasons stand out and are summarized in Figure 2.14. People and corporations are forming virtual companies as the best way to implement key business strategies and alliances that promise to ensure success in today's turbulent business climate.

For example, to quickly exploit a new market opportunity, a business may not have the time or resources to develop the manufacturing and distribution infrastructure, personnel competencies, and information technologies needed. Only by quickly forming a virtual company through a strategic alliance of all-star partners can it assemble the components it needs to provide a world-class solution for customers and capture the market opportunity. Of course, today, the Internet, intranets, extranets, and a variety of other Internet technologies are vital components in creating such successful solutions.

FIGURE 2.14
The basic business strategies of virtual companies.

Strategies of Virtual Companies
● Share infrastructure and risk with alliance partners.
● Link complementary core competencies.
● Reduce concept-to-cash time through sharing.
● Increase facilities and market coverage.
● Gain access to new markets and share market or customer loyalty.
● Migrate from selling products to selling solutions.

Cisco Systems: Virtual Manufacturing

Most people who have heard of Cisco Systems (www.cisco.com) would not be surprised to learn that Cisco is the world's largest supplier of telecommunications products. What they may be surprised to discover, however, is the answer to the question, "What does Cisco manufacture?" Answer: Absolutely nothing! Cisco sells solutions to their customers, but their products come from an innovative virtual manufacturing company arrangement with Jabil Circuit and Hamilton Standard, two large electronics suppliers and manufacturers. Let's look at an example of how these three companies collaborate to bring a Cisco solution to market.

An order placed for a Cisco product arrives simultaneously at Cisco in San Jose, California, and Jabil in St. Petersburg, Florida, via Cisco's online ordering system. Jabil immediately starts to build the product by drawing parts from any or all of three onsite inventories: one owned by Jabil, one belonging to Cisco, and one owned and controlled by Hamilton Standard. When the manufacturing process is complete, the product is tested and checked against the order in St. Petersburg by computers in San Jose, then shipped directly to the customer by Jabil. The shipment triggers the generation of a Cisco invoice sent to the customer and electronic bills from both Jabil and Hamilton Standard sent to Cisco in San Jose. Cisco's virtual manufacturing company alliance with Jabil Circuit and Hamilton Standard gives them an agile, build-to-order capability in the fiercely competitive telecommunications equipment industry [26].

Building a Knowledge-Creating Company

> *In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge. When markets shift, technologies proliferate, competitors multiply, and products become obsolete almost overnight, successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products. These activities define the "knowledge-creating" company, whose sole business is continuous innovation* [20].

To many companies today, lasting competitive advantage can only be realized if they become **knowledge-creating companies** or *learning organizations*. That means consistently creating new business knowledge, disseminating it widely throughout the company, and quickly building the new knowledge into their products and services.

Knowledge-creating companies exploit two kinds of knowledge. One is *explicit knowledge*—data, documents, and things written down or stored on computers. The other kind is *tacit knowledge*—the "how-tos" of knowledge—which resides in workers. Tacit knowledge can often represent some of the most important information within an organization. Often, longtime employees of a company "know" many things about how to manufacture a product, deliver the service, deal with a particular vendor, or operate an essential piece of equipment. This tacit knowledge is not recorded or codified anywhere because it has evolved in the employee's mind through years of experience. Furthermore, much of this tacit knowledge is never shared with anyone who might be in a position to record it in a more formal way because there is often little incentive to do so or simply, "Nobody ever asked."

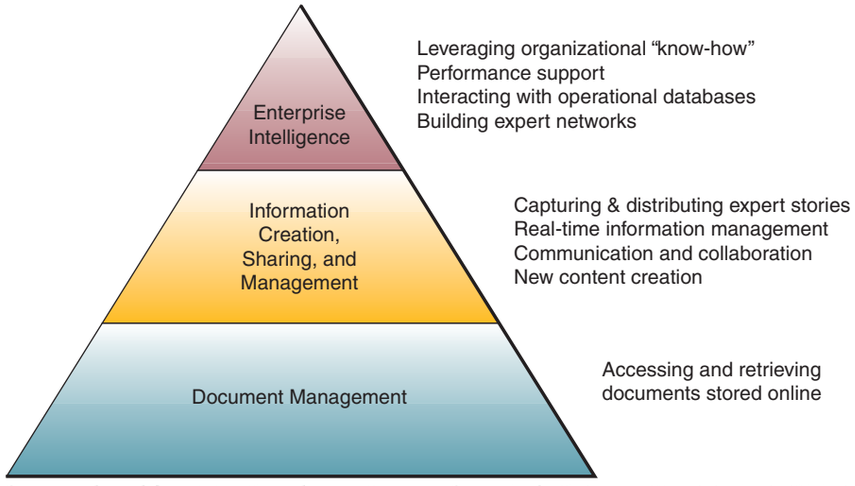
As illustrated in Figure 2.15, successful **knowledge management** creates techniques, technologies, systems, and rewards for getting employees to share what they know and make better use of accumulated workplace and enterprise knowledge. In that way, employees of a company are leveraging knowledge as they do their jobs [20].

Knowledge Management Systems

> *Making personal knowledge available to others is the central activity of the knowledge-creating company. It takes place continuously and at all levels of the organization* [20].

Knowledge management has thus become one of the major strategic uses of information technology. Many companies are building **knowledge management systems** (KMS)

FIGURE 2.15
Knowledge management can be viewed as three levels of techniques, technologies, and systems that promote the collection, organization, access, sharing, and use of workplace and enterprise knowledge.



Source: Adapted from Marc Rosenberg, *e-Learning: Strategies for Delivering Knowledge in the Digital Age* (New York: McGraw-Hill, 2001), p. 70.

to manage organizational learning and business know-how. The goal of such systems is to help knowledge workers create, organize, and make available important business knowledge, wherever and whenever it's needed in an organization. This information includes processes, procedures, patents, reference works, formulas, "best practices," forecasts, and fixes. As you will see in Chapter 9, Internet and intranet Web sites, groupware, data mining, knowledge bases, and online discussion groups are some of the key technologies that may be used by a KMS.

Knowledge management systems also facilitate organizational learning and knowledge creation. They are designed to provide rapid feedback to knowledge workers, encourage behavior changes by employees, and significantly improve business performance. As the organizational learning process continues and its knowledge base expands, the knowledge-creating company works to integrate its knowledge into its business processes, products, and services. This integration helps the company become a more innovative and agile provider of high-quality products and customer services, as well as a formidable competitor in the marketplace [22]. Now let's close this chapter with an example of knowledge management strategies from the real world.

BAE Systems PLC: Managing Its Intellectual Capital

It's elusive, complex, and strategically essential to every modern organization: the capture of the seemingly infinite amount of intellectual capital carried by tens of thousands of employees around the world and then using it to achieve competitive advantage. London-based BAE Systems PLC, formerly British Aerospace, found its holy grail in its highly successful knowledge management (KM) intranet. The system is used by thousands of BAE engineers located in 110 offices across five continents to both search for vital information related to ongoing strategic initiatives and identify and eliminate redundant project work.

In early 1999, BAE Systems invested roughly $150,000 to study its global operations to determine whether it had the right information to support decision-making processes and if BAE employees had the right learning systems to help them support their daily activities. The results were remarkably revealing. The study showed that nearly two-thirds of BAE's top 120 decision makers didn't have the right information at key phases of the decision process. Furthermore, 80% of BAE employees were "wasting" an average of 30 minutes each day simply trying to locate the information they needed to do their jobs. Yet another 60% were spending

an hour or more duplicating the work of others. Finally, one of the biggest problems revealed by the study was the large-scale information overload on the company intranets. The information itself was often unstructured, and the search engines were inadequate for conducting keyword searches to find information.

After testing several search engine technologies, BAE incorporated the best performer into the KM application on its corporate intranet. The system paid for itself in just seven months. The first demonstration of its effectiveness came in late 1999 when two different groups of BAE engineers in the United Kingdom were working on wing construction issues for the company's Harrier 2 military aircraft. After using the KM system to search for wing specification information across the company's intranet, one of the engineering groups discovered that the other group was working on the same problem. Catching this redundancy early in the cycle saved BAE millions—more than enough to pay for the entire new system! Within one year, BAE estimated the new KM system reduced the time needed to retrieve information from its intranet by 90%. Even a company that specializes in building things that go very fast above the ground can learn how to do things faster on the ground [15, 28].

Summary

- **Strategic Uses of Information Technology.** Information technologies can support many competitive strategies. They can help a business cut costs, differentiate and innovate in its products and services, promote growth, develop alliances, lock in customers and suppliers, create switching costs, raise barriers to entry, and leverage its investment in IT resources. Thus, information technology can help a business gain a competitive advantage in its relationships with customers, suppliers, competitors, new entrants, and producers of substitute products. Refer to Figures 2.3 and 2.5 for summaries of the uses of information technology for strategic advantage.
- **Building a Customer-Focused Business.** A key strategic use of Internet technologies is to build a company that develops its business value by making customer value its strategic focus. Customer-focused companies use Internet, intranet, and extranet e-commerce Web sites and services to keep track of their customers' preferences; to supply products, services, and information anytime, anywhere; and to provide services tailored to the individual needs of the customers.
- **Reengineering Business Processes.** Information technology is a key ingredient in reengineering business operations because it enables radical changes to business processes that dramatically improve their efficiency and effectiveness. Internet technologies can play a major role in supporting innovative changes in the design of workflows, job requirements, and organizational structures in a company.
- **Becoming an Agile Company.** A business can use information technology to help it become an agile company. Then it can prosper in rapidly changing markets with broad product ranges and short model lifetimes in which it must process orders in arbitrary lot sizes and can offer its customers customized products while maintaining high volumes of production. An agile company depends heavily on Internet technologies to help it be responsive to its customers with solutions customized to their needs and cooperate with its customers, suppliers, and other businesses to bring products to market as rapidly and cost effectively as possible.
- **Creating a Virtual Company.** Forming virtual companies has become an important competitive strategy in today's dynamic global markets. Internet and other information technologies play a key role in providing computing and telecommunications resources to support the communications, coordination, and information flows needed. Managers of a virtual company depend on IT to help them manage a network of people, knowledge, financial, and physical resources provided by many business partners to quickly take advantage of rapidly changing market opportunities.
- **Building a Knowledge-Creating Company.** Lasting competitive advantage today can only come from the innovative use and management of organizational knowledge by knowledge-creating companies and learning organizations. Internet technologies are widely used in knowledge management systems to support the creation and dissemination of business knowledge and its integration into new products, services, and business processes.

Key Terms and Concepts

These are the key terms and concepts of this chapter. The page number of their first explanation is in parentheses.

1. Agile company (57)
2. Business process reengineering (53)
3. Competitive forces (42)
4. Competitive strategies (45)
5. Create switching costs (47)
6. Customer value (49)
7. Interenterprise information systems (58)
8. Knowledge-creating company (60)
9. Knowledge management system (60)
10. Leverage investment in IT (47)
11. Lock in customers and suppliers (46)
12. Raise barriers to entry (47)
13. Strategic information systems (42)
14. Value chain (51)
15. Virtual company (58)

Review Quiz

Match one of the key terms and concepts listed previously with one of the brief examples or definitions that follow. Try to find the best fit for answers that seem to fit more than one term or concept. Defend your choices.

____ 1. A business must deal with customers, suppliers, competitors, new entrants, and substitutes.

____ 2. Cost leadership, differentiation of products, and new product innovation are examples.

____ 3. Using investments in technology to keep firms out of an industry.

____ 4. Making it unattractive for a firm's customers or suppliers to switch to its competitors.

____ 5. Time, money, and effort needed for customers or suppliers to change to a firm's competitors.

____ 6. Information systems that reengineer business processes or promote business innovation are examples.

____ 7. This strategic focus recognizes that quality, rather than price, has become the primary determinant in customers choosing a product or service.

____ 8. Highlights how strategic information systems can be applied to a firm's business processes and support activities for competitive advantage.

____ 9. A business finding strategic uses for the computing and telecommunications capabilities it has developed to run its operations.

____ 10. Information technology helping a business make radical improvements in business processes.

____ 11. A business can prosper in rapidly changing markets while offering its customers individualized solutions to their needs.

____ 12. A network of business partners formed to take advantage of rapidly changing market opportunities.

____ 13. Learning organizations that focus on creating, disseminating, and managing business knowledge.

____ 14. Information systems that manage the creation and dissemination of organizational knowledge.

____ 15. Using the Internet and extranets to link a company's information systems to those of its customers and suppliers.

Discussion Questions

1. Suppose you are a manager being asked to develop computer-based applications to gain a competitive advantage in an important market for your company. What reservations might you have about doing so? Why?
2. How could a business use information technology to increase switching costs and lock in its customers and suppliers? Use business examples to support your answers.
3. How could a business leverage its investment in information technology to build strategic IT capabilities that serve as a barrier to new entrants into its markets?
4. Refer to the Real World Case on FedEx Corporation in the chapter. Could any of FedEx's information technology strategies be copied by a small business to give it a competitive advantage? Why or why not? Use an example to illustrate your answer.

5. What strategic role can information play in business process reengineering?
6. How can Internet technologies help a business form strategic alliances with its customers, suppliers, and others?
7. How could a business use Internet technologies to form a virtual company or become an agile competitor?
8. Refer to the Real World Case on GE Energy and GE Healthcare in the chapter. Is it really necessary for GE's industrial capital leasing division to capture data each time a door or window is opened or closed in one of its leased trailers at construction sites all over the world? Is this overkill or a proper use of IT for competitive advantage? Defend your answer.
9. Information technology can't really give a company a strategic advantage, because most competitive advantages don't last more than a few years and soon become strategic necessities that just raise the stakes of the game. Discuss.
10. MIS author and consultant Peter Keen says: "We have learned that it is not technology that creates a competitive edge, but the management process that exploits technology." What does he mean? Do you agree or disagree? Why?

Analysis Exercises

1. End User Computing
Skill Assessment
Not all programs are written by dedicated programmers. Many knowledge workers write their own software using familiar word processing, spreadsheet, presentation, and database tools. This textbook contains end-user computing exercises representing a real-world programming challenge. This first exercise will allow your course instructor to assess the class. Assess your skills in each of the following areas:

a. Word processing: Approximately how many words per minute can you type? Do you use styles to manage document formatting? Have you ever set up your own mail merge template and data source? Have you created your own macros to handle repetitive tasks? Have you ever added branching or looping logic in your macro programs?
b. Spreadsheets: Do you know the order of operations your spreadsheet program uses (what does "55*2^2-10" equal)? Do you know how to automatically sort data in a spreadsheet? Do you know how to create graphs and charts from spreadsheet data? Can you build pivot tables from spreadsheet data? Do you know the difference between a relative and a fixed cell reference? Do you know how to use functions in your spreadsheet equations? Do you know how to use the IF function? Have you created your own macros to handle repetitive tasks? Have you ever added branching or looping logic in your macro programs?
c. Presentations: Have you ever used presentation software to create presentation outlines? Have you added your own multimedia content to a presentation? Do you know how to add charts and graphs from spreadsheet software into your presentations so that they automatically update when the spreadsheet data change?
d. Database: Have you ever imported data into a database from a text file? Have you ever written queries to sort or filter data stored in a database table? Have you built reports to format your data for output? Have you built forms to aid in manual data entry? Have you built functions or programs to manipulate data stored in database tables?

2. Marketing: Competitive Intelligence
Strategic Marketing
Marketing professionals use information systems to gather and analyze information about their competitors. They use this information to assess their product's position relative to the competition and make strategic marketing decisions about their product, its price, its distribution (place), and how to best manage its promotion. Michael Bloomberg, founder of Bloomberg (www.bloomberg.com), and others have made their fortunes gathering and selling data about businesses. Marketing professionals find information about a business's industry, location, employees, products, technologies, revenues, and market share useful when planning marketing initiatives.

During your senior year, you will find yourself in close competition for jobs. You can take the same intelligence-gathering approach used by professional marketers when planning how to sell your own skills. Use the following questions to help you prepare for your job search.

a. Product: Which business majors are presently in greatest demand by employers? Use entry-level salaries as the primary indicator for demand.
b. Product: What colleges or universities in your region pose the greatest competitive threat to students with your major?
c. Price: What is the average salary for entry-level employees in your major and geographic region? Is salary your top concern? Why or why not?
d. Place: What areas of the country are currently experiencing the greatest employment growth?
e. Promotion: What is your marketing plan? Describe how you plan to get your name and qualifications in front of prospective employers. How can the Internet help you get noticed?

3. Competing against Free

Wikipedia Faces Down Encyclopedia Britannica

The record and movie industries are not the only industries to find themselves affected by free access to their products. Encyclopedia Britannica faces challenges by a nonprofit competitor that provides its services without charge or advertising, Wikipedia.org. Wikipedia depends on volunteers to create and edit original content under the condition that contributors provide their work without copyright.

Who would work for free? During the creation of the Oxford English Dictionary in the 19th century, the editors solicited word articles and references from the general public. In the 20th century, AOL.com found thousands of volunteers to monitor its chat rooms. Amazon.com coaxed over a hundred thousand readers to post book reviews on its retail Web site. Outdoing them all in the 21st century, Wikipedia published its one millionth English language article in March 2006. Wikipedia includes more than 2 million articles in over 200 languages, all created and edited by more than 1 million users.

Can Wikipedia compete on quality? Wikipedia provides its users both editing and monitoring tools, which allows users to self-police. Wikipedia also uses voluntary administrators who block vandals, temporarily protect articles, and manage arbitration processes when disputes arise. A paper published by *Nature* in December 2005 evaluated 50 Wikipedia articles and found an average of four factual errors per Wikipedia article compared with an average of three errors per article in the Encyclopedia Britannica. More significantly, Wikipedians (as the volunteers call themselves) corrected each error by January 2006. Alexa.com rated Wikipedia.com as the 17th most visited Web site on the Internet, while Britannica.com came in 2,858th place (Yahoo and Google ranked in the 1st and 2nd places).

Wikipedia has already built on its success. In addition to offering foreign language encyclopedias, it also provides a common media archive (commons.wikimedia.org), a multilingual dictionary (www.wiktionary.org), and a news service (www.wikinews.org).

a. How does the Wikimedia Foundation meet the criteria for an "agile" company?
b. How does the Wikimedia Foundation meet the criteria for a "virtual" company?
c. How does the Wikimedia Foundation meet the criteria for a "knowledge-creating" organization?
d. How would you recommend Encyclopedia Britannica adapt to this new threat?

4. Knowledge Management

Knowing What You Know

Employees often receive a great deal of unstructured information in the form of e-mails. For example, employees may receive policies, announcements, and daily operational information via e-mail. However, e-mail systems typically make poor enterprisewide knowledge management systems. New employees don't have access to e-mails predating their start date. Employees typically aren't permitted to search others' e-mail files for needed information. Organizations lose productivity when each employee spends time reviewing and organizing his or her e-mail files. Lastly, the same information may find itself saved across thousands of different e-mail files, thereby ballooning e-mail file storage space requirements.

Microsoft's Exchange server, IBM's Domino server, and Interwoven's WorkSite, along with a wide variety of open-standard Web-based products, aim to address an organization's need to share unstructured information. These products provide common repositories for various categories of information. For example, management may use a "Policy" folder in Microsoft Exchange to store all their policy decisions. Likewise, sales representatives may use a "Competitive Intelligence" database in IBM's Domino server to store information obtained during the sales process about competing products, prices, or marketplace rumors. WorkSite users categorize and store all their electronic documents in a large, searchable, secured common repository. Organizations using these systems can secure them, manage them, and make them available to the appropriate personnel. Managers can also appoint a few specific employees requiring little technical experience to manage the content.

However, these systems cannot benefit an organization if its employees fail to contribute their knowledge, if they fail to use the system to retrieve information, or if the system simply isn't available where and when needed. To help managers better understand how employees use these systems, knowledge management systems include usage statistics such as date/time, user name, reads, writes, and even specific document access information.

Research each of the products mentioned above and answer the following questions.

a. What steps might a manager take to encourage his or her employees to use their organization's knowledge management system?
b. Should managers set minimum quotas for system usage for each employee? Why or why not?
c. Aside from setting employee usage quotas, how might an organization benefit from knowledge management system usage statistics?

REAL WORLD CASE 3

GE, Dell, Intel, GM, and Others: Debating the Competitive Advantage of Information Technology

There's nothing like a punchy headline to get an article some attention. A piece in the *Harvard Business Review* (May 2003), shockingly labeled "IT Doesn't Matter," garnered the magazine more buzz than at any time since the Jack Welch affair. The article was approvingly cited in *The New York Times*, analyzed in Wall Street reports, and e-mailed around the world. But without such a dramatic and reckless title, the article probably would have received little notice. It's a sloppy mix of ersatz history, conventional wisdom, moderate insight, and unsupportable assertions. And it is dangerously wrong.

Author Nicholas Carr's main point is that information technology is nothing more than the infrastructure of modern business, similar to railroads, electricity, or the internal combustion engineering advances that have become too commonplace for any company to wangle a strategic advantage from them. Once innovative applications of information technology have now become merely a necessary cost. Thus, Carr thinks today's main risk is not underusing IT but overspending on it.

But before we get any further, let's have a reality check. First, let's ask Jeff Immelt, the CEO of General Electric Co., one of the premier business corporations in the world, "How important is information technology to GE?" Immelt's answer: "It's a business imperative. We're primarily a service-oriented company, and the lifeblood for productivity is more about tech than it is about investing in plants and equipment. We tend to get a 20 percent return on tech investments, and we tend to invest about $2.5 billion to $3 billion a year."

Then let's ask Dell Corp. CEO Michael Dell, "What's your take on Nick Carr's thesis that technology no longer gives corporate buyers a competitive advantage?" His answer: "Just about anything in business can be either a sinkhole or a competitive advantage if you do it really, really bad or you do it really, really well. And information technology is an often misunderstood field. You've got a lot of people who don't know what they're doing and don't do it very well. For us, IT is a huge advantage. For Wal-Mart, GE, and many other companies, technology is a huge advantage and will continue to be. Does that mean that you just pour money in and gold comes out? No, you can screw it up really bad."

Finally, let's ask Andy Grove, former CEO and now chairman of Intel Corp., "Nicholas Carr's recent *Harvard Business Review* article says: 'IT Doesn't Matter.' Is information technology so pervasive that it no longer offers companies a competitive advantage?" Grove says: "In any field, you can find segments that are close to maturation and draw a conclusion that the field is homogeneous. Carr is saying commercial-transaction processing in the United States and some parts of Europe has reached the top parts of an S-curve. But instead of talking about that segment, he put a provocative spin on it—that information technology doesn't matter—and suddenly the statement is grossly wrong. It couldn't be further from the truth. It's like saying: I have an old three-speed bike, and Lance Armstrong has a bike. So why should he have a competitive advantage?"

So, basically, Carr misunderstands what information technology is. He thinks it's merely a bunch of networks and computers. He notes, properly, that the price of those has plummeted and that companies bought way too much in recent years. He's also right that the hardware infrastructure of business is rapidly becoming commoditized and, even more important, standardized. Computers and networks per se are just infrastructure. However, one of the article's most glaring flaws is its complete disregard for the centrality of software and the fact that human knowledge or information can be mediated and managed by software.

Charles Fitzgerald, Microsoft's general manager for platform strategy, says that Carr doesn't put enough emphasis on the *I* in IT: "The source of competitive advantage in business is what you do with the information that technology gives you access to. How do you apply that to some particular business problem? To say IT doesn't matter is tantamount to saying that companies have enough information about their operations, customers, and employees. I have never heard a company make such a claim."

Paul Strassman, who has spent 42 years as a CIO—at General Foods, Xerox, the Pentagon, and most recently NASA—was more emphatic. "The hardware—the stuff everybody's fascinated with—isn't worth a damn," he says. "It's just disposable. Information technology today is a knowledge-capital issue. It's basically a huge amount of labor and software." He continues: "Look at the business powers—most of all Wal-Mart, but also companies like Pfizer or FedEx. They're all waging information warfare."

But one person with a truly unique set of qualifications with which to assess the article is Ralph Szygenda, CIO of General Motors. "Nicholas Carr may ultimately be correct when he says IT doesn't matter," Szygenda says. "Business-process improvement, competitive advantage, optimization, and business success do matter and they aren't commodities. To facilitate these business changes, IT can be considered a differentiator or a necessary evil. But today, it's a must in a real-time corporation."

Szygenda did concur with one of Carr's corollary recommendations: spend less. In the *HBR* article, Carr stated, "It's getting much harder to achieve a competitive advantage through an IT investment, but it is getting much easier to put your business at a cost disadvantage." Szygenda's reaction: "I also agree on spending the minimum on IT to reach desired business results. Precision investment on core

infrastructure and process-differentiation IT systems is called for in today's intensely cost-conscious business versus the shotgun approach sometimes used in the past."

The real message: Spend what is required but no more to achieve essential differentiation via business processes and the IT systems that support them.

The CIO of GM continues with another agreement, though one with a significant qualification: "Yes, IT has aspects of commoditization. PCs, telecommunications, software components such as payroll, benefit programs, business-process outsourcing, and maybe even operating systems and database-management systems are examples. But the application of information systems in a corporation's product design, development, distribution, customer understanding, and cost-effective Internet services is probably at the fifth-grade level."

And, in conclusion, Szygenda's thoughts on the commodity claim: "After being a part of the IT industry for 35 years, I have heard similar pronouncements during the introduction of the integrated circuit, microprocessor, PCs, office systems, ERP systems, and the Internet. Nicholas Carr and others need to be careful not to overstate the speed of the information-management journey or they may make the same mistake that Charles H. Duell, the director of the U.S. Patent Office, did in 1899 when he said, 'Everything that can be invented has been invented.'"

Source: Adapted from David Kirkpatrick, "Stupid-Journal Alert: Why HBR's View of Tech Is Dangerous," *Fortune*, June 9, 2003, p. 190; Robert Hoff, "Andy Grove: We Can't Even Glimpse the Potential," *BusinessWeek*, August 25, 2003, pp. 86–88; "Speaking Out: View from the Top," *BusinessWeek*, August 25, 2003, pp. 108–13; Bob Evans, "Business Technology: IT Is a Must, No Matter How You View It," *InformationWeek*, May 19, 2003.

CASE STUDY QUESTIONS

1. Do you agree with the argument made by Nicholas Carr to support his position that IT no longer gives companies a competitive advantage? Why or why not?
2. Do you agree with the argument made by the business leaders in this case in support of the competitive advantage that IT can provide to a business? Why or why not?
3. What are several ways that IT could provide a competitive advantage to a business? Use some of the companies mentioned in this case as examples. Visit their Web sites to gather more information to help you answer.

REAL WORLD ACTIVITIES

1. Nicholas Carr's article created a storm of debate that is still raging. Using the Internet, see if you can find Carr's original article. Also, try to find some more opinions for and against Carr's arguments beyond those provided in the case.
2. The core of Carr's arguments has some significant implications for businesses. Break into small groups with your classmates and discuss your opinion of Carr's arguments. What are some of the implications of the argument that come to mind? How might they serve to change the way we use computers to support corporate strategy?