

1 OVERVIEW OF ELECTRONIC COMMERCE

Learning Objectives

1. To learn the activities encompassed by electronic commerce and the role of the Internet and World Wide Web.
2. To understand the benefits that can be achieved through the use of electronic commerce.
3. To compare various electronic commerce business models.
4. To examine the general nature of security concerns surrounding electronic commerce.

INTRODUCTION

Electronic commerce and the electronization of business processes have revolutionized many industries, such as the travel and financial services industries, and they are shaking up most other industries as well. Electronic commerce and electronic business are two of the most common business terms in use today. In fact, try to find a business periodical or trade journal that does not have several articles discussing how businesses are applying some form of “e” business process or application. So what exactly are electronic commerce and electronic business? Will these terms still be important in the years to come, or will they be two more overused and discarded buzzwords? This chapter examines the definitions of electronic commerce and electronic business and their surrounding environments. The Internet and the World Wide Web (WWW) as enablers of electronic commerce are discussed in this chapter as well as their effect on traditional business models. Security issues relating to electronic commerce are introduced. Finally, an overview of the remainder of this textbook is presented, along with a discussion of the implications of electronic commerce on the accounting profession.

DEFINITION OF ELECTRONIC COMMERCE

One only has to pick up virtually any newspaper or business-related magazine to see a story about some facet of electronic commerce. Businesses are incorporating electronic commerce into strategic plans, business schools have offered new areas of concentration,

and consulting and software firms are marketing electronic commerce “solutions.” So what exactly is electronic commerce? We define **electronic commerce** as

The use of electronic transmission mediums (telecommunications) to engage in the exchange, including buying and selling, of products and services requiring transportation, either physically or digitally, from location to location.

Electronic commerce involves all sizes of transaction bases. As one would expect, electronic commerce requires the digital transmission of transaction information. While transactions are conducted via electronic devices, they may be *transported* using either traditional physical shipping channels, such as a ground delivery service, or digital mechanisms, such as the download of a product from the Internet.

Those readers familiar with traditional **electronic data interchange (EDI)** systems may be questioning what makes electronic commerce different from the EDI systems that have been in place for the past 20 to 30 years. EDI is a subset of electronic commerce. A primary difference between the two is that electronic commerce encompasses a broader commerce environment than EDI. **Traditional EDI** systems allow preestablished trading partners to electronically exchange business data. The vast majority of traditional EDI systems are centered around the purchasing function. These EDI systems are generally costly to implement. The high entry cost precluded many small and mid-sized businesses from engaging in EDI. Electronic commerce allows a marketplace to exist where buyers and sellers can “meet” and transact with one another. Chapter 6 more clearly traces the evolution of traditional EDI to electronic commerce.

The Internet and the WWW provide the enabling mechanisms to foster the growth of electronic commerce. The actual and projected growth rates and uses of the Internet, discussed below, indicate that electronic commerce is no passing fad, but rather a fundamental change in the methods used by businesses to interact with one another and their consumers. One only needs to look at Boeing and General Electric. Prior to its Web-based site, only 10 percent of Boeing’s customers used its EDI system to order replacement parts. As early as 1998, Boeing reported that it received \$100 million in orders of spare parts through its website. During 1999, GE began the process of combining its plastics distribution business, Polymerland, with its direct supply business. GE’s goal: to form a new commercial model for the future that gives its “customers the full advantage of the speed and productivity of the Internet.” Internet sales at Polymerland grew from basically zero in January 1999 to more than \$5 million *per week* by the end of the year! General Electric has also realized a 50 percent reduction in the purchasing cycle and a 30 percent reduction in processing costs due to its Internet procurement system. Thus, GE is realizing benefits from e-business on both the buying and selling side. Consider the following quote from GE:

GE is in the midst of an incredible transformation brought on by the Internet explosion. “Our pursuit of e-Business will rapidly change our dealings with our vendors, partners, and most of all, our customers. E-Business represents a revolution that may be the greatest opportunity for growth that our Company has ever seen.

(GE website—January 2001, www.ge.com/investor)

Electronic Business

The term *electronic commerce* is restricting, however, and does not fully encompass the true nature of the many types of information exchanges occurring via telecommunication devices. The term **electronic business** also includes the exchange of information not directly related to the actual buying and selling of goods. Increasingly, businesses are us-

ing electronic mechanisms to distribute information and provide customer support. These activities are not “commerce” activities; they are “business” activities. Thus, the term *electronic business* is broader. The electronization of business is having significant effects on many businesses and industries. This revolution is so important that we have devoted an entire chapter (Chapter 2) to examine the effects of the electronization of business on business models and on many different business industries. Although the term electronic commerce is used throughout this text, many of the activities described are more accurately classified as electronic business.

POTENTIAL BENEFITS OF ELECTRONIC COMMERCE

For businesses to invest resources to engage in electronic commerce, the benefits must exceed the costs. So what benefits can businesses potentially gain from engaging in electronic commerce?

- Internet and Web-based electronic commerce is more affordable than traditional EDI.
- Internet and Web-based electronic commerce allows more business partners to be reached than with traditional EDI.
- Internet and Web-based electronic commerce can reach a more geographically dispersed customer base.
- Procurement processing costs can be lowered.
- Cost of purchases can be lowered.
- Inventories can be reduced.
- Cycle times can be lowered.
- Better customer service can be provided.
- Sales and marketing costs can be lowered.

The first three benefits are relative benefits of Internet and Web-based electronic commerce over traditional EDI methods. The cost and installation of EDI systems is generally quite high, and it has typically been beneficial only to larger firms that have enough sales volume to justify the costs of developing their own networks or subscribing to a value-added network. A **value-added network (VAN)** is a service to which a firm can subscribe. VANs provide many services, including data transmission, EDI translation, and store and forward messaging of transaction data. VANs and the other services they provide are discussed in greater detail in Chapter 6. Because of the low cost of connecting to the Internet, medium and small businesses can now afford the connection cost. Further, because of software developments that allow Web-based EDI systems to interface with traditional EDI systems, businesses of all sizes can now transact with one another. This vastly expands the number of potential electronic business partners, some of which may be a substantial geographical distance away. The Internet offers a greater choice of global partners with which to conduct electronic commerce.

Procurement costs can be lowered by traditional EDI systems by consolidating purchases, developing relationships with key suppliers, negotiating volume discounts, and better integrating the manufacturing process. Internet electronic commerce offers additional benefits and potential for cost reductions over traditional EDI. Procurement costs can be lowered for all companies, regardless of size, due to the increased ability to transact electronically with one another. Data transmission costs can be lowered. A wider net can be cast when searching for suppliers. Options for partnering with other firms

increase. For example, small and mid-sized companies benefit because they are now able to conduct business with the larger firms that are casting the wider nets. The smaller firms also have the opportunity to reduce their processing costs by using integrated electronic processing systems. As mentioned earlier, General Electric realized a 30 percent reduction in the processing costs of its procurement cycle. The cost of the items purchased can also be lowered due to the ability to seek out and negotiate with a greater number of suppliers. Because of this, General Electric was able to reduce its cost of purchases by 20 percent.

A reduction in inventory is desirable because of the associated reductions in storage, handling, insurance, and administrative costs. Internet electronic commerce can help firms to more optimally order the inventories by electronically linking suppliers and purchasers and allowing them to share updated production forecasts and projected inventory levels in order to allow both parties to collaboratively “fine tune” their production and delivery schedules. Businesses can also use the Internet to “unload” unwanted inventory or sell excess capacity very quickly and with extremely low marketing costs. Both American Airlines and USAir determine on a weekly basis which flights have excess capacity and offer last-minute (actually two to three days’ notice) deals to Internet subscribers of this service via e-mail. This strategy allows these airlines to reduce the excess capacity on these flights and generate additional revenues.

The **production cycle time** is the time it takes a business to build a product beginning with the design phase and ending with the completed product. Internet electronic commerce is enabling the reduction of the cycle time by allowing engineers and production teams to electronically share design specifications for initial approval and refinement processes. In addition to reducing the design and production phases, lower cycle times also reduce the amount of fixed overhead that needs to be allocated to each unit produced, thus positively affecting the ability to pass cost savings on to the customer or to achieve higher net earnings.

Customer service can be enhanced using Internet electronic commerce by helping the customer to access information before, during, and after the sale. Before the sale is made, customers can electronically retrieve product specifications, quantity, and pricing information. During the product/service fulfillment cycle, customers can electronically check on the status of the order. For example, UPS and FedEx customers can electronically track the status of their packages without the need to speak with a human. Support services for customers are also enhanced by electronic services, such as electronic notification of returned items and the ability to download and print the necessary documentation and shipping labels to return an item for servicing. Convenience and reduced processing costs result for both the buyer and seller.

The omnipresent nature of the Internet allows firms to reach many customers in a very low cost fashion. Some firms are able to shift some of their sales and marketing functions to electronic processes. This shift in communication mediums allows the firm to either reduce their overhead costs or better utilize their human resources to engage in building customer relations rather than performing tedious sales processing tasks. Insight Enterprises Inc. has used this strategy; its sales representatives build relationships with customers and then encourage them to use the Internet to place their orders.

Businesses are not the only benefactors of Internet electronic commerce; consumers may also reap benefits from using the Internet. Some benefits that consumers may expect to receive are

- Increased choice of vendors and products.
- Convenience from shopping at home or office.

- Greater amounts of information that can be accessed on demand.
- More competitive prices and increased price comparison capabilities.
- Greater customization in the delivery of services.

(U.S. Department of Commerce, 1998)

Customers have an increased choice of vendors because they are no longer geographically constrained by a reasonable walking or driving distance. Customers have a greater choice of services they can receive from global Internet companies. For example, a foreign-born resident of the United States may subscribe to an electronic news service from his or her home country and receive an electronic “newspaper” on a daily basis that is sent directly from his or her home country’s news service. Regarding product selection, virtual stores such as Amazon.com offer consumers with a choice of more than 28 million unique items; physical stores do not have the actual retail space—nor is it feasible—to stock that many items in each physical retail establishment.

The convenience of shopping at home allows consumers to shop when it is convenient for them and not during prescribed store hours. For handicapped or ill consumers, the ability to shop from home opens up new shopping opportunities and offers greater convenience. The capability of employees to shop online from their office is viewed as a benefit by some and as a detriment by others, and both sides have valid points. Whether the availability to access the Internet for personal use is abused or misused by an employee depends on the employee’s personal characteristics and work ethic. For busy employees who work long hours, the ability to take care of some errands may ease tension and allow them to actually devote more, and better quality, time to their tasks. For example, busy workers facing overtime may need to complete some personal errands, including grocery shopping, buying and mailing a birthday present, and retrieving some income tax forms to complete their tax return. While these errands may require a total time of two hours if done physically, they may all be conducted on the Internet in 15 to 20 minutes. Thus, if employees can perform these tasks during their lunch hour, they may still have time to eat, reduce stress regarding their personal life, and feel better prepared to face the rest of the day’s workload.

Consumers now have greater access to information that is provided online, and this translates into greater buying power. For example, many consumers are self-educating themselves on car pricing information via the Internet. In fact, one automobile general sales manager, Mike Dobres, claims his profits have declined by about 25 percent. He claims, “People know what you pay for your car, and they don’t let you make big profits.”

Search engines and intelligent agents, the topics of Chapter 13, are making the process of sorting through information and conducting price comparisons increasingly easier. Information is buying power to consumers, and the Internet is unleashing access to vast amounts of information. How will Internet vendors compete if price comparison is so easy? They are quickly learning that service and reliability are also important. Amazon.com does not just sell books and music, it provides book and music reviews, suggests other books that may be of interest based on the books being examined, and provides sound clips for many of the music titles. It also provides inventory status and expected shipping time.

Internet electronic commerce also offers customers the chance to customize many of the products and services offered by merchants. For example, many online news services allow their customers to “design” the look of their daily newspaper. The Morning Paper (www.boutell.com/morning) allows online users to prespecify their favorite

websites. Each morning, a “morning paper” is delivered electronically to the user with updates that have occurred on their favorite websites. Customers buying computers over the Internet have the opportunity at many sites to “configure” their own computer easily with pop-up screens and compare prices of alternative configurations, while ensuring that the components selected are compatible with one another.

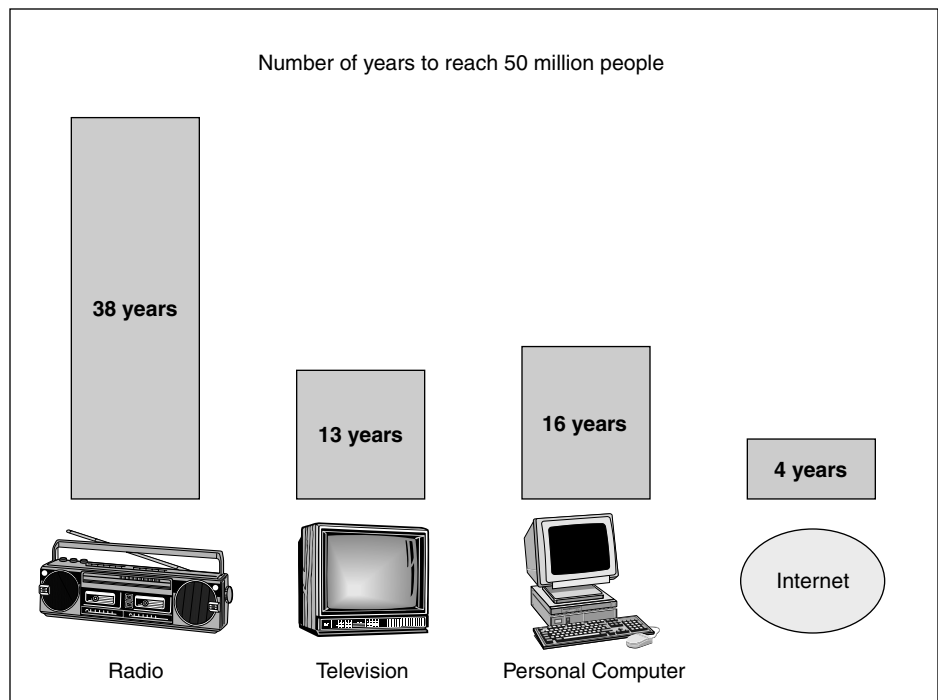
THE INTERNET AND WWW AS ENABLERS OF ELECTRONIC COMMERCE

The Internet’s growth rate has far surpassed the growth rates of any previously introduced electronic information dissemination mediums. Figure 1–1 compares the length of time that it took for radio, television, and personal computer use to reach 50 million people with the time for the Internet to do so. Only four years after it was opened “to the public,” the Internet was able to reach 50 million people, which is just a fraction of the time it took for radio, television, and personal computers to reach the same usage rate.

So what is the Internet? The Internet is a very unique infrastructure in that it is “owned” by no one. The most accurate definition of the Internet is admittedly not very informative: The **Internet** is a network of networks. The Internet has evolved over time into its current form, which is still evolving. The Internet came “online” in 1969 as a joint

FIGURE 1–1

Comparison of transmission mediums



Source: Morgan Stanley U.S. Investment Research: Internet Retail.

project between the Defense Advanced Research Projects Agency (DARPA) and four university host computers. These host nodes transferred data using the packet switching theory first developed by Leonard Kleinrock. The same packet switching theory is still the basis of today's data transfer methods. More computer sites were added to the network, and electronic mail was introduced in 1972. Over the next decade, the National Science Foundation (NSF) became involved, and various standard-setting bodies to help structure and develop the Internet were formed. These Internet-related agencies are further discussed in Chapter 9.

In the early 1980s, the commercial sector became increasingly interested in the Internet and began to funnel resources into commercial Internet uses. The WWW was not developed until 1990, when Tim Berners-Lee implemented his groundbreaking concepts and became known as its father. The **World Wide Web (WWW)** incorporates the use of hypertext links, software portability, and network and socket programming. **Hypertext links** allow WWW users to easily and rapidly transport themselves to another site. **Software portability** allows users running previously incompatible platforms to create sites that can be interpreted and easily read by multiple platforms. The transfer of data that occurs from the use of hypertext links is enabled by the network and socket programming concepts developed by Berners-Lee. The ease of use of the WWW has contributed to the Internet's exponential growth rates.

So how important is the growth of the Internet and the WWW to businesses? The following statement concisely describes the importance of the WWW to the information technology field:

The stage was set for the Web's emergence as the single most dynamic force in the IT [information technology] industry and a historical agent of change during the 1980s when a number of market forces joined and grew to critical mass. This confluence of forces included:

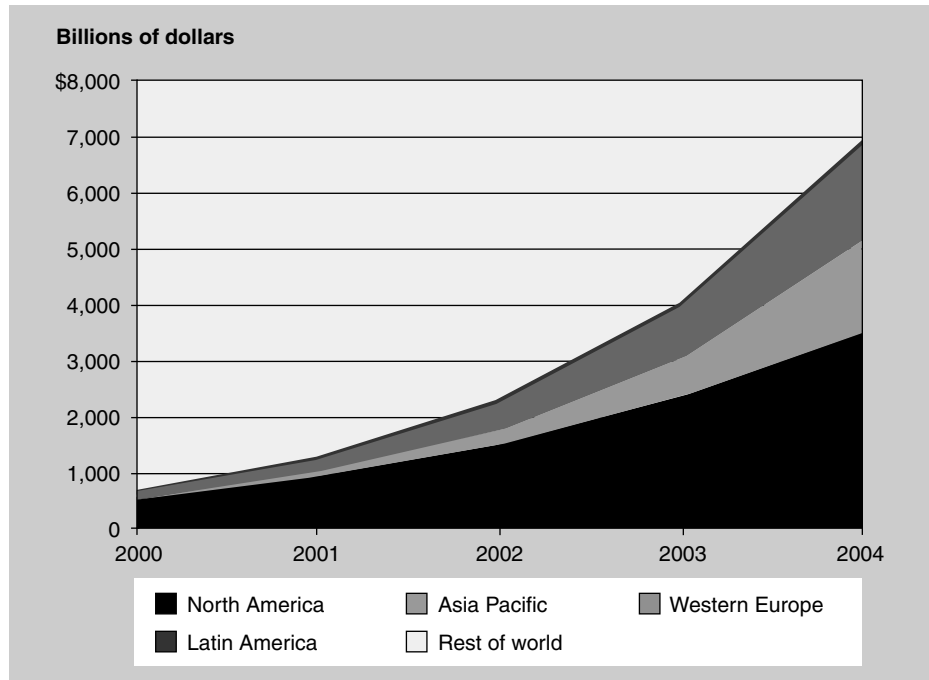
- The advent of increasingly powerful and inexpensive technologies that permitted the use of IT by more and more people and provided the base for scalable systems and applications.
- The growing availability of telecommunications due to declining costs and increasing bandwidth.
- The spread of digital information with its incredible flexibility and fidelity.

(Karl Salnoske, IBM, May 21, 1998)

The potential benefits that can be reaped by businesses and consumers were mentioned in the preceding section. Forrester Research estimates that global electronic commerce may reach as high as \$6.9 trillion by 2004. Figure 1–2 illustrates Forrester Research's projected growth rates for five geographic areas. While North America is forecasted to maintain the leadership share, its percentage of overall electronic commerce gradually declines over the five-year period as other areas' shares increase. Western Europe and Asia-Pacific countries will see a tremendous increase in terms of dollars. Fueling European electronic commerce is the euro currency. Many European sites that hesitated to launch sites due to multiple currency barriers have launched Web-based sites since the euro was phased in. Western Europe and North America are forecasted, however, to have the smallest percentage growth rate over the five-year period. The steepest growth rates are predicted for Asia-Pacific and Latin American countries, which will experience "hyper" growth as illustrated in Figure 1–3. Thus, the growth of the Internet and the WWW is happening so rapidly that businesses are literally caught up in a whirlwind of change. The next section discusses the effect of the growth of the Internet on business models.

FIGURE 1-2

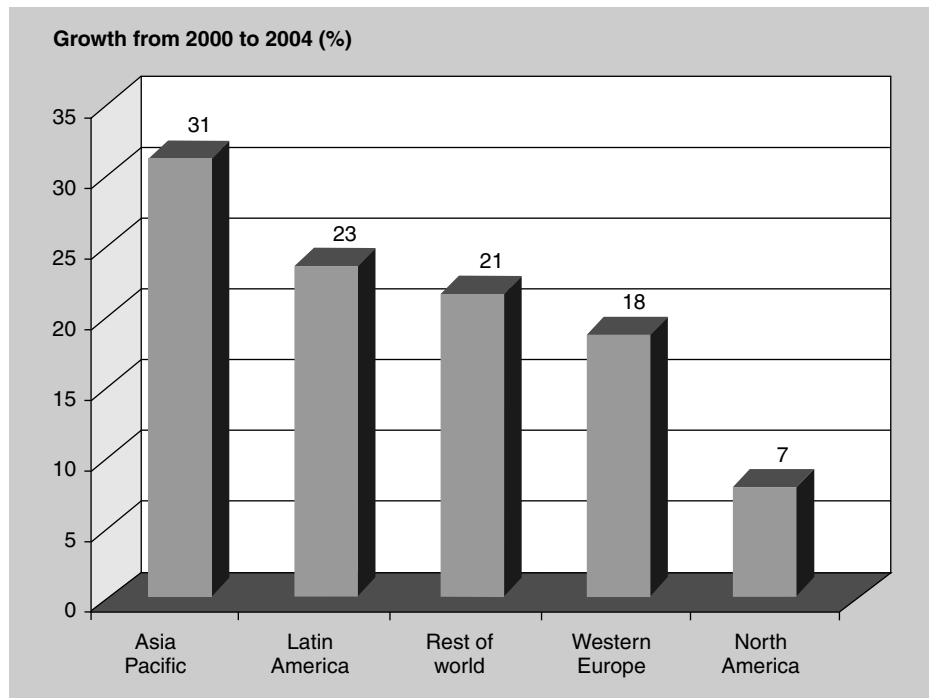
Forecasted geographic region e-commerce growth rates



Source: Forrester Research.

FIGURE 1-3

Forecasted growth rates by geographic region



Source: Forrester Research.

EFFECT OF ELECTRONIC COMMERCE ON BUSINESS MODELS

Given the astounding growth rates mentioned earlier, electronic commerce is forcing businesses to rethink their traditional business models:

Today's forward thinking CEO recognizes the challenge of eCommerce as a strategic business issue, not just one more technical issue to be delegated to the IS department, perhaps the existing EDI group. Although a company may have reengineered its internal business process and perhaps painfully installed an ERP system to bring inefficiencies to the back office, eCommerce is about reengineering outward-facing processes—industry process reengineering.

(Peter Fingar, 1998)

Thus, electronic commerce is not just a technology, it is a way of conducting business that has the potential to affect every aspect of the firm's value chain. Implementing full-scale, innovative applications of electronic commerce requires management teams to view the marketplace beyond the typical physical boundaries:

The biggest problem that electronic commerce pioneers encounter is the limited set of mental models that constrain our thinking. We tend to think of the Web in our "industrial age" paradigm—where everything must be described and related to the physical world.

(Enix Consulting Limited, 1998)

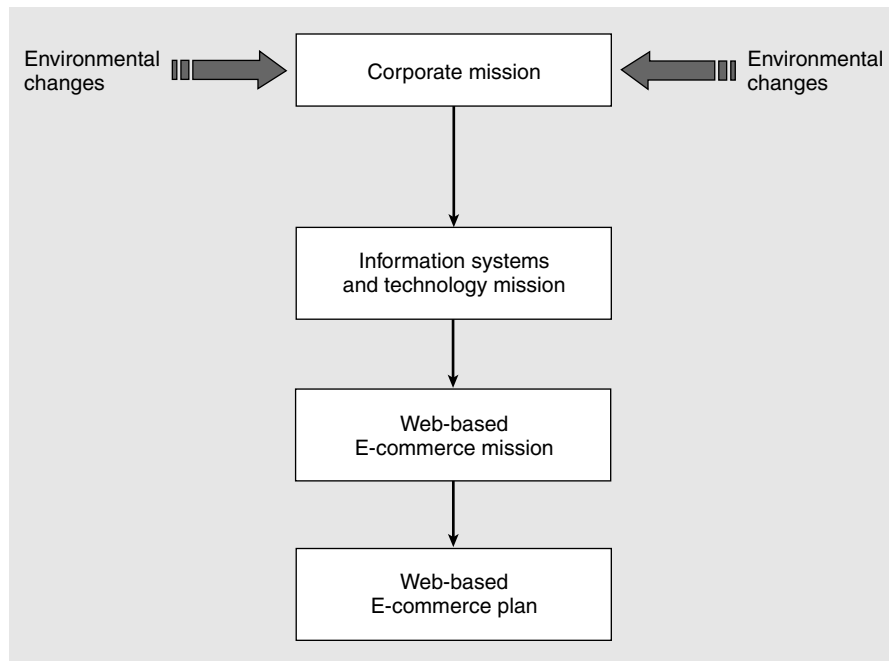
If electronic commerce applications are not placed in the proper business context and the strategy aligned with the business's overall business strategy, then the electronic commerce application is likely to fail. Thus, new business models are necessary that integrate electronic commerce initiatives with overall business goals. This section first discusses the need to align a firm's online strategy with its overall business strategy. Following that discussion, emerging business paradigms that fully embrace the electronic commerce philosophy are discussed, including a new view of the value chain.

Overall Business and E-Commerce Goal Congruence

Electronic commerce strategies need to be formulated so that they help a business achieve its overall business goals. Figure 1-4 illustrates the relationship between a firm's overall corporate mission and goals and its Web-based electronic commerce plan. Environmental changes may cause a business to rethink or adjust its missions and goals, such as the entrance of "new" competitors into the marketplace. These competitors may arise from previously unknown businesses, unknown perhaps because they are located in foreign countries. Such competitors may launch a Web-based commerce site and have a newly found ability to cost effectively draw customers away from the business.

Once the corporate mission and goals are set, then the information systems and technology group's mission can be set to help accomplish that mission. Ultimately, a Web-based electronic commerce plan can be set. In the box "Air Products Takes E-Business Seriously," one of the overall company objectives is to be a knowledge leader. The launching of the new Product Stewardship section of its website is clearly aligned with this objective.

Unfortunately, various research findings indicate that a disconnect exists between a firm's overall business goals and its Web-based electronic commerce initiatives. A study by the Cambridge Information Network found that more than one-third of firms studied did not believe that their company successfully implemented its electronic commerce

FIGURE 1.4*Business and electronic commerce goal congruence*

Focus on Air Products

Air Products Takes E-Business Seriously

Air Products and Chemicals Inc., a multinational organization that produces and sells industrial and specialty gases, chemicals and polymers, was founded in 1940. Air Products is a *Fortune 500* company that generates close to \$5 billion in sales annually. It has operations in more than 30 countries and employs 17,000 people worldwide.

Air Products', E-Business Vision

Air Products' director of E-Business, Dave Ashworth, and his "crew" consider themselves to be on a "voyage of discovery through cyberspace, exploring numerous electronic commerce concepts and new business models that have the potential to generate significant new trade—and increased profitability—for the company." The crew consists of 15 cross-functional team members, and they make sure to have a mix of IT specialists and business expertise.

Their Vision is this:

By 2003, the company would like to shift a sizeable chunk of its revenues to the Internet, generate millions more in new

business on the Web, and realize significant cost savings through global E-Business initiatives.

The team recognizes that to achieve these goals, creativity and willingness to experiment will be required. They are not scared by the new business models, and they embrace the concept that Internet environment brings about wonderful opportunities if your company is willing to adjust.

Air Products has already been doing some experimenting for the past five years. They began their online journey by placing marketing information on the company website. Then they upgraded and split off the site to become a series of interactive sites. The amount of information was increased, but the sites still provided features that allowed visitors to locate the information in an easier fashion. Their interactive sites include such tools as helping customers to assess the feasibility and appropriateness of alternative gas products for specific uses.

The next step was a pilot project for online orders and associated technical information for the packaged gases customers. They relied on assistance from some of their customers to design, implement, and refine the system.

Not to rest with this accomplishment, however, the team now wants to continue its progression and take the company “to a much higher level of business-to-business capability—implementing a wide variety of applications that will add up to additional sales, lower costs, better customer service, and optimal supply chain management.”

A Changing Business Environment

According to Steve Cameron, Manager of Communication Programs and E-Business team member: “E-Business gets more sophisticated every day. We now have competitors we never had before—for example, third-party ‘aggregators’ who put buyers and sellers of surplus and slightly off-spec chemicals together. The key for us is to be active in trying out new E-Business ideas, and to learn and move forward.”

Specific E-Business Initiatives

Value-Added Marketing. “Supply interactive electronic information to current and prospective customers to help them make informed buying decisions using the latest Web tools for guided selling.”

Selling. “Provide opportunities for current and future customers to purchase company products and services online, 24 hours a day, seven days a week, through our public web site and specific customer Extranets.”

New Channels. “Develop new Web-based sales channels that provide company information or transaction capabilities through online relationships, partnerships, auctions, or acquisitions.”

Procurement. “Implement companywide initiatives with selected, preferred suppliers that simplify procurement and reduce purchasing costs.”

Why Provide Information, “Knowledge” Materials, and Knowledge Tools?

One strategy that Air Products has identified is to be a knowledge leader and provide information to its industry, such as safe handling, distribution, use, and disposal of industrial, specialty, and medical gas products. It already does this on its Product Stewardship site. This site Air Products has been cleverly populated with very useful content for its customers and industry in general. The content includes

- Approximately 100 downloadable Material Safety Data Sheets.
- Safety bulletins.
- Answers to “Frequently Asked” technical questions.
- Conversion tables that calculate formulas when the appropriate data are entered.

Ultimately, Air Products believes that if you serve the industry, the service will eventually pay off in terms of sales. “Our thinking is that if potential customers keep coming to our sites for information, they will eventually turn to us to meet their business needs,” says Cameron. “We call it ‘guided selling.’ We help solve their problem, and that can lead to an immediate online sale.”

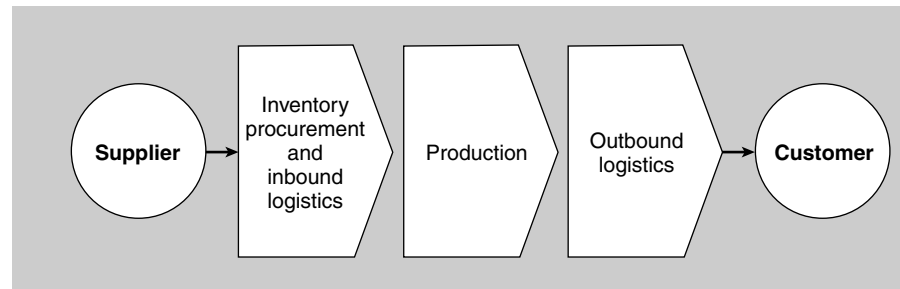
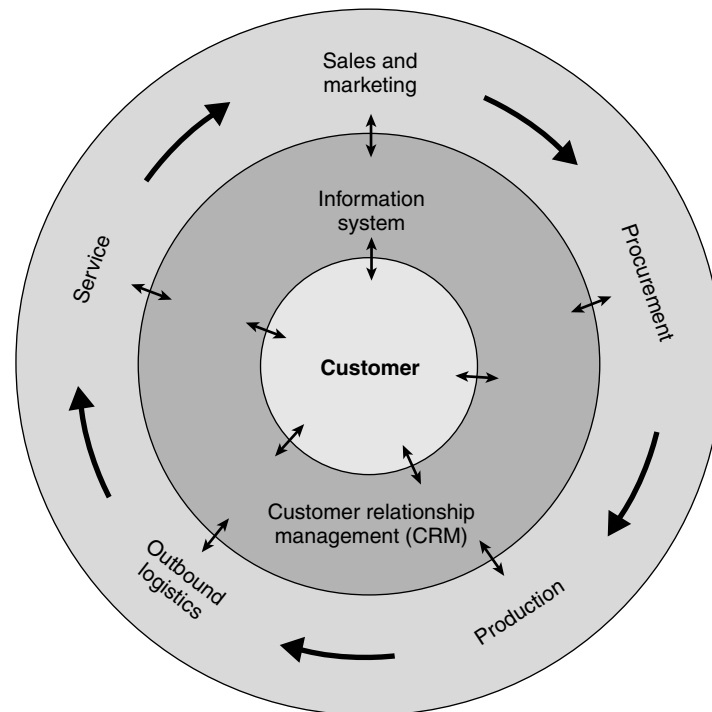
Storefronts on B2B Portals Not content to stop at hosting its own website, Air Products launched two sites on VerticalNet, an Internet business exchange that operates almost 50 separate business-to-business sites. Customers go to these types of sites, and Air Products wants to be there in full force.

Source: Air Products and Chemicals, Inc., Winter 2000 Inside Air Products, www.apci.com.

initiative. Approximately one-fourth of these firms attributed the lack of success to a failure to connect the electronic commerce effort with the goals of the business. A study by Jupiter Communications reported that only 24 percent of the top executives of traditional consumer businesses currently measure the success of their online initiatives as an integrated part of their core businesses. Why is it important to integrate the evaluation of online initiatives in a holistic manner with offline initiatives? Isolated measurements, such as online revenues, may not accurately reflect the contribution to the business if the sales would have been made offline (cannibalization of sales). On the other hand, online initiatives may contribute to the overall health of a business, such as increased customer base and cost reductions. These items need to be measured at an overall business level and by the contribution provided from each sales medium, such as Web-based electronic commerce.

The Effect of E-Commerce on the Value Chain

The traditional view of the value chain, depicted in Figure 1–5, is no longer rich enough to encompass the true relationships underlying the flows of information between a firm, its customers, and its suppliers. The **traditional value chain** typically depicts the information system data as flowing sequentially through the processes with inputs/outputs to the supplier at the back-end stage and to the customer at the front-end stage. In reality, firms engaging in electronic commerce may share information with their customers and suppliers at many stages of the value chain. Figure 1–6 depicts a new view

FIGURE 1–5
Traditional value chain

FIGURE 1–6
Customer-oriented value chain


Source: Greenstein and Hamilton, 1999.

of the value chain with the customer set as the center of focus to a firm. The firm's information system is the "glue" that links all phases of its processes together. This **customer-oriented value chain** enables the customer to access the firm's (the supplier's) information system at virtually every phase to assess the progress of the order. When firms talk about **customer relationship management (CRM)** systems, they are ultimately talking about the information system that binds the business with the customer and services that customer's need. A customer may link to the firm's inventory data (such as price, quantity, and availability) prior to entering into a sales contract. Further, the customer may be able to electronically receive design and product specifications prior to entering into a sales contract. The actual sales may be placed electronically, and a promised or expected shipping date is given by the supplier's information system to the customer. Once the order is placed, the customer may be able to check the status of the order or service placed.

The customers can also check the shipping status of orders placed with a supplier that have been completed and are in the shipping process. The customer's use of the supplier's information system to help provide better customer service after the sale is complete is another positive use. For example, a customer may wish to return a defective item to its supplier. The customer may be able to access the firm's information system and request a return slip, which the customer can then print out and use to send the item back to the supplier at the cost of the supplier. The supplier benefits by knowing in advance that defective goods were sent to a customer and when to expect to receive them back. These are just some of the many ways in which customers and suppliers may advantageously share the information stored in the supplier's information system.

The customer-oriented value chain illustrated in Figure 1.6 also demonstrates the need to link procurement information systems to those of a firm's supplier. The supplier needs to access its supplier's information system in order to best serve its own customers. The supplier becomes the customer to its suppliers and should be able to interface its procurement systems with its suppliers' information systems to receive the same types of information that it provides to its own customers. The Internet is enabling companies to fully integrate their supply chains, and this integration has a dramatic influence on the structure of participating companies to fully integrate their supply chains:

In the process of integrating suppliers more closely for efficiency and cost savings, companies are giving rise to **virtual enterprises** in which it is difficult to tell where one organization begins and the other ends.

(Karl Salnoske, IBM, May 21, 1998)

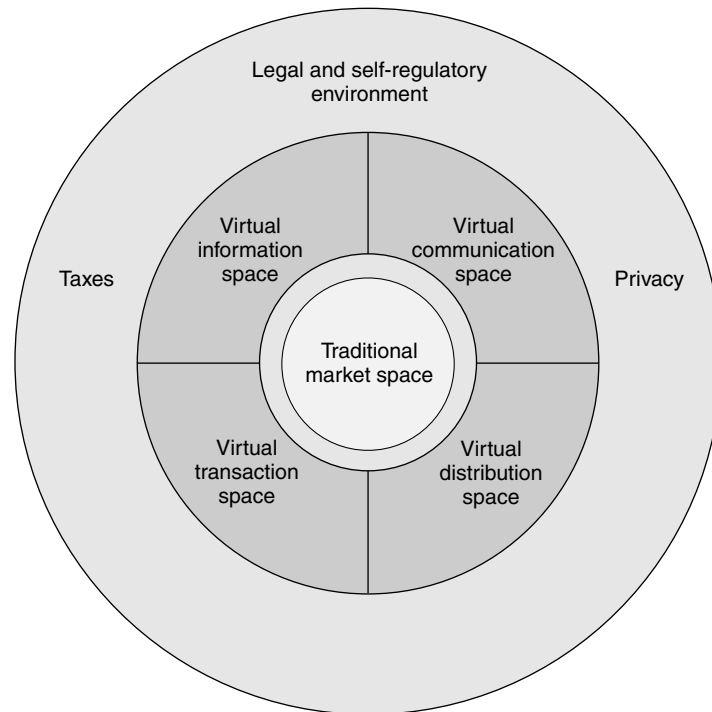
A customer may seemingly be ordering from one supplier, for example, Amazon.com, when in actuality it is ordering from one of many virtual bookstores that is independently owned and operated and that seamlessly interfaces with Amazon.com. A model of the virtual operations of an organization is discussed in the following section.

The ICDT Business Strategy Model

A model developed by Albert Angehrn, called the *Information, Communication, Transaction, and Distribution (ICDT)* model, is used as a basis for discussing the Internet strategy of businesses. While the Internet strategy of a business may be the primary or

FIGURE 1-7

The expanded ICDT model



Adapted from Albert Angehrn, 1997.

overriding strategy of one firm, it may be only one component of the strategy of another business. Figure 1-7 illustrates an adaptation of Angehrn's model; the difference between the model illustrated and Angehrn's model is the addition of the outer ring, called the "constraints" ring. Angehrn's model is based on four virtual spaces:

- **Virtual information space.** This space is where a firm displays information about its organization, products, or services. This space is the easiest space for a business to enter and is typically the first step taken toward entering the virtual marketplace. For electronic commerce, major concerns are

- Is the information displayed accurately and currently?
- Is the information displayed only viewed by authorized users?
- Can customers easily find the site and navigate through it once they have reached the site?
- Is the site accessible without long wait times?

- **Virtual distribution space.** This space is used to deliver the product or service requested or purchased by the consumer. For virtual delivery to occur, the products being delivered must be digital (e.g., software) or the service performed digitally (e.g., online broker). Online news services and software companies have been quick to market and deliver their products electronically. For electronic commerce, major concerns are

- Will products and services be delivered only to legitimate, approved customers?
- Will delivery of products and services be reliable?

• **Virtual transaction space.** This space is used to initiate and execute business transactions, such as sales orders. Aside from those companies engaging in the virtual distribution space, most companies have been reluctant to enter this space. The major concern contributing to this reluctance is data security. For those firms entering the virtual transaction space, the major concerns are

- Are data secure?
- Will accuracy and integrity of processing methods be preserved?
- Is the vendor reliable?
- Is the trading partner reputable?
- What are customers' privacy concerns?

• **Virtual communication space.** This space is used to enable relationship building, negotiation, and exchange of ideas such as forums, chat rooms, and virtual communities. Electronic commerce is affected if such a community is a service for which its members pay or if negotiation agents, discussed in Chapter 13, are used.

Businesses, in determining their Internet strategy, need to first determine their overall business strategy and then determine how the Internet can be leveraged, if at all, to help them achieve their business strategy. If a business does determine that Internet technology may serve as an enabler of achieving its business strategy, then it must determine in what fashion the Internet can be best utilized. Angehrn's model is useful for determining which virtual space(s) is(are) appropriate for both the long- and short-term achievement of a firm's business strategy. In the box "CollegeCapital.com," a discussion of how a firm's leader can drive the strategy is presented. Further, the business's specific activities in each of Angehrn's virtual categories are presented.

Firms do face constraints, however, and the decision whether to engage in and how to implement a particular Internet strategy needs to be made with consideration given to the constraints. Two major legal/regulatory constraints faced by businesses engaging in electronic commerce are taxation and privacy. The Chairman of the U.S. House Commerce Committee, Tom Bliley, announced a new electronic commerce initiative in March 1998. He posed the following questions that the committee will address regarding the legal and regulatory environment of the Internet:

- What is the federal government's role in electronic commerce? Should it be a regulator, or should its role be to provide legal certainty, legitimacy, and oversight?
- What real-world laws should apply to the virtual world? Is the Internet going to remain a "Wild West," as some would like, or should we apply today's laws to the Internet?
- Will Americans feel comfortable conducting their daily activities online, or will there be concerns about reliability of service, crime, and invasion of privacy?
- Electronic commerce is conducted globally. How will U.S. laws and policies interact with the laws and policies of other nations?
- What is the future of electronic commerce? Will it develop into a new sector of the economy, or will its prime role be in complimenting existing economic sectors?

E-Commerce in Practice

CollegeCapital.com



CollegeCapital.com is a business dedicated to education and the allocation of educational-related resources to students, schools, and teachers. The site is probably best known for assisting prospective and current college students to locate the necessary financial aid to fund their education. To understand how an online company such as CollegeCapital.com is driven by the vision of its leader, we need to look at its CEO, Patricia Adams. Adams has a strong background in the financial and mortgage industry. She served as CEO for the Home Mortgage Financing Corporation and has extensive experience in banking and home mortgages. She is not all business, however; she has always been very active in civic duties and has a strong sense of serving the community. When offered the position at CollegeCapital.com, Adams saw a real opportunity to match her banking knowledge with her desire to help the community. She is committed to developing a website that not only matches students with financial aid, but also assists students and their parents before, during, and after the search for college funds. Adams is devoted to creating a holistic virtual space where students can find assistance in choosing a career, choosing a school, dealing with anxieties and stress of a college student, and locating a school abroad if that is a desire of the students. She considers what is best for this virtual community and service in every decision that is made about website content and alliance relationships. Her careful planning is evident in the quality of the content of the website. The site has won 40 awards and has been named the *New York Times* Site of the Day. Adams continues the development of the site, its content, and alliances. She has many philanthropic-related initiatives, where she is pursuing activities that will provide resources back to schools, teachers, athletes, and artists.

The full range of services offered by CollegeCapital.com places it in the category of a portal community that serves as an infomediary. The scholarship and financial aid service that CollegeCapital.com provides is extensive. It has a database with more than 13.5 million different

scholarship and financial aid opportunities. The total amount of this financial compensation that is available to students is in excess of \$6 billion. The database has 30,000 schools in 179 different countries. Adams believes that if people can just look wisely and efficiently for the opportunities that are available, they will find the funds to support their educational desires. CollegeCapital.com provides such a service by helping students access an incredible database of opportunity. It helps the student filter the database efficiently and focus on applying for the most appropriate financial aid packages.

CollegeCapital.com engages in activities that fall into all four categories of Angehrn's model. Some of the activities (this list is not exhaustive and continues to grow) conducted on CollegeCapital.com's website are categorized into Angehrn's ICDT business strategy model:

Virtual Information Space

- Complete college planning program beginning with the eighth grade.
- Guide to choosing the right college.
- Tips for travel abroad.

Virtual Community Space

- Links to assistance for depression, eating disorders, and many other such problems commonly faced by college students.
- Links to child development and parenting sites.

Virtual Distribution Space

- Delivery of financial aid search service.
- Delivery of internship locator search service.
- Delivery of Educational Calculator.
- Delivery of Kolbe Instinct Assessment Test.

Virtual Transaction Space

- Online payments accepted for services mentioned as delivered in the virtual distribution search.

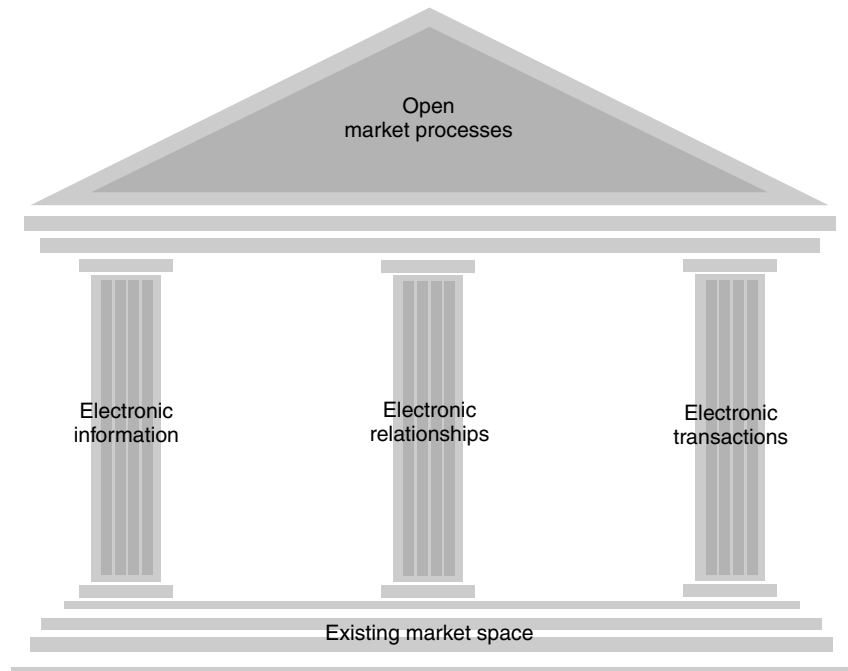
Each of these topics is covered in detail in later chapters. The legal environment surrounding the Internet is the topic of Chapter 5, including the topics of taxes and privacy. Privacy topics are further discussed in Chapter 7, and encryption techniques are further covered in Chapter 10.

Three Pillars of E-Commerce

Another electronic business model that builds on traditional market spaces is the three pillars of electronic commerce model by Peter Fingar, which is illustrated in Figure 1–8. At the foundation of the model is the existing market space. Three electronic pillars support open market processes: electronic information, electronic relationships, and electronic transactions. Thus, this model builds on the existing market space and utilizes electronic mechanisms as an enabler of supporting open market processes.

The first pillar, **electronic information**, is similar to Angehrn’s virtual information space. The WWW is viewed as a “global repository” of documents and multimedia data. Constructing an electronic information pillar is easy: Most word-processing software packages will easily convert documents into a Web-readable format. The challenge is to construct a good, solid pillar that will not crumble, or in WWW terms, the Web page will not freeze up nor will links lead the visitor to a dead-end or have them wandering through a maze of links without easily finding the necessary information. Thus, the construction of the electronic information pillar should not be conducted in a shoddy fashion, or it will not adequately support the objective of an open market. The retrieval of the desired electronic information is the cause of frustration to many Web “surfers.” Search engines and other intelligent agents are increasing in popularity to assist users to more efficiently and effectively navigate the WWW. Search engines and intelligent agents are the topic of Chapter 13.

The second pillar, **electronic relationships**, is the central pillar, and it is similar to Angehrn’s virtual communication space. The saying “If you build it, they will come” does not apply to website-based electronic commerce. Placing information on products

FIGURE 1–8*Three pillars of electronic commerce*

Source: Peter Fingar, 1998.

and service offerings on a website does not mean that potential customers or guests will visit that website a first time, and it especially does not mean that a user will return to the site. The electronic relationships pillar is about building a site that has the feeling of being a “port of entry” into a community. Having entrants pass through this port of entry on a somewhat regular basis is the key to successfully engaging in electronic commerce. To attract users over and over again to a site (which also means *away* from other sites), the site needs to have certain features; it must

- Be innovative.
- Add value.
- Provide information and interaction not otherwise available.
- Create forums for opinion-building activities.

(Peter Fingar, 1998)

A differentiating feature of electronic commerce from other mediums, such as print and broadcasting, is that it is interactive, and users expect to experience interaction when they visit a site. To build good customer relationships, electronic commerce websites need to be designed to give potential customers the feeling of community and interaction they are increasingly expecting. The use of intelligent agents is one way of accomplishing this goal. Electronic business-to-business relationships must be designed somewhat differently than for business-to-consumer relationships, although both are customer-centric. Business-to-business relationships are the topic of Chapter 3.

The third pillar is the **electronic transactions** pillar. This pillar is similar to Angehrn’s virtual transaction space, and it also encompasses Angehrn’s virtual distribution space. Many businesses have built an electronic information pillar and some have built or are building an electronic community pillar, but substantially fewer have constructed the electronic transaction pillar. Two impediments to constructing the pillar exist: the ability to engage in meaningful and sufficient negotiation processes and security of transaction data. The negotiation process is discussed in Chapter 13, and the security of transaction data is covered throughout the text, but emphasized in Chapters 7, 10, and 11.

ELECTRONIC COMMERCE SECURITY

Companies worldwide are challenged with taking advantage of the business benefits the Web has to offer while minimizing risk to their operations and their bottom line.

(Bruce Murphy, Partner—PricewaterhouseCoopers. 1998)

The issue of security of data transmitted over the Internet is mentioned in previous sections as an impediment to the growth of electronic commerce. How serious is the security problem? To grasp the enormity of the problem, consider the following result of a study conducted by the Computer Security Institute and the Federal Bureau of Investigation (CSI/FBI) Computer Survey 2000: More than 70 percent of the firms studied had detected unauthorized access to their systems. (Of course, the number of undetected unauthorized access is unknown.) Another study, conducted by Information Security, found that

Companies conducting either B2B or B2C e-commerce experience a significantly higher rate of both insider and outsider security breaches than companies not conducting e-commerce.

(Information Security Survey, 2000)

FIGURE 1-9

Comparison of security breaches for web-based companies

Type of Breach	Conduct E-Commerce	Do Not Conduct E-Commerce
Infection of company equipment via virus and malicious code	75%	66%
Abuse of computer access controls	64	51
Physical theft, sabotage or intentional destruction of computing equipment	50	34
Denial of service	42	31
Attacks on bugs in Web servers	33	16
Attacks related to insecure passwords	30	20
Electronic theft, sabotage, or intentional destruction of computing equipment	29	18
Fraud	18	8

Source: Information Security Survey 2000.

Some of the results of the study that are displayed in Figure 1-9 illustrate the increased risk faced by firms engaging in electronic commerce. Those companies studied engaging in electronic commerce have been victims of a greater number of security breaches in all categories reported.

Currently, implementations of enterprise resource planning (ERP) systems are widely occurring. The *1998 InformationWeek Global Information Security Survey* study indicates that businesses with such installations more frequently than firms without such installations have fallen prey to the following types of incidents:

- Revenue, information and data integrity loss.
- Theft of trade secrets or data.
- Infection with a computer virus.
- Manipulation of their internal systems or software applications.

(InformationWeek Global Information Security Survey, 1998)

Given the popularity of the installation of ERP systems, these security breaches are troubling to businesses. Further, ERP software providers, such as SAP, are increasingly investing in the development of electronic commerce modules. ERP systems that use a highly centralized repository of data that are ultimately connected to the Internet must be kept secure, especially since such systems contain mission-critical data.

Regarding security of data, the entire system is only as strong as the weakest link in the chain. Understanding the Internet environment, security risks, and security solutions is considered a key component of conducting electronic business. Consider this quote by Abner Germanow, research manager for IDC's Internet Security research program:

Dealing with security in a reactionary manner is no longer adequate. Security is now a core business requirement, and companies that continue to regard security as a necessary evil will be forced out of business by companies who use security technologies to launch high value applications.

(Abner Germanow, IDC, May 2000)

If businesses are concerned about security, what are they doing about it? Many firms are installing firewalls, the topic of Chapter 11. The answer to security solutions,

however, is not in the installation of a single technology, such as a firewall. Good security solutions consist of a well-designed battery of technological devices and good security practices and procedures. The Information Security Survey 2000 study found that approximately 22 percent of the firms studied did *not* have a security policy. For those firms that did have a security policy, 21 percent of them did not feel that their policies were very effective at detecting outside breaches. Needless to say, the best controls may not be effective if they are not implemented or maintained properly. A startling finding from the CSI/FBI 2000 study is that almost one-third of the firms could not assess whether they had suffered from unauthorized access or misuse in the last 12 months. For those firms that did identify incidents, 21 percent of them did not know whether the source of attack was internal or external. Chapters 7 through 12 address security issues, risk assessment, and preventive and detective security devices.

ORGANIZATION OF TOPICS

The objective of this textbook is to familiarize the reader with the concepts relating to electronic commerce and electronic business and the environment in which they operate. New business models and the electronization of business are discussed in Chapter 2. The electronic interaction among businesses is literally reshaping business relations, and this is the topic of Chapter 3.

The accounting profession is profoundly affected by electronic commerce. Historically, accounting professionals have attested to the reliability and integrity of the underlying transactions that form the basis for the information reported in the financial statements. As organizations change and the manner in which these transactions are conducted change, so too must the work of the accounting profession change. Electronic commerce presents new challenges to the accounting profession, as well as many new opportunities. These challenges and opportunities are the topic of Chapter 4.

As mentioned earlier, the legal and regulatory environment poses many constraints to the commerce portion of electronic commerce. To muddy the waters further, the Internet is a global infrastructure unlike any other sales and marketing medium before it. International laws are increasingly important yet difficult to interpret and apply to the ubiquitous nature of the Internet. These issues are the topic of Chapter 5.

Earlier in the chapter, EDI was mentioned as being a subset of electronic commerce. The evolution of EDI into what is now referred to as electronic commerce is considered in Chapter 6. With electronic commerce comes new and even yet-to-be-identified risks. The risks associated with electronic commerce are discussed in Chapter 7, and the management of risks is discussed in Chapter 8.

The uniqueness of the infrastructure of the Internet makes standard setting a formidable task. Because no one owns the Internet, standard setting must occur by collaboration and agreement by many different classes of users worldwide. The topic of Internet standards, with an emphasis on security standards is the topic of Chapter 9.

One method of increased security is to use techniques such as cryptography and authentication. Electronic commerce depends on the use of such techniques because without them, neither consumers nor businesses will have an adequate level of comfort in digital transmission of transaction and personal data. Cryptographic and authentication techniques are presented in Chapter 10. Another popular security technique is the use of firewalls, which is the topic of Chapter 11.

Electronic commerce involving the sale of goods requires that some sort of monetary payment be made between the buyer and seller. Various electronic commerce pay-

ment mechanisms are discussed in Chapter 12. Finally, the use of intelligent agents is becoming more prevalent in order to allow both businesses and consumers to more effectively and efficiently navigate the Web and interact with one another. Intelligent agents and their current and potential uses are discussed in Chapter 13. Marketing professionals find electronic business exciting and challenging. The Internet offers to them a rich, new advertising medium, and this is the topic of Chapter 14.

IMPLICATIONS FOR THE ACCOUNTING PROFESSION

Electronic commerce and the change in focus from the traditional value chain to the customer-oriented value chain affects the traditional assurance function performed by the accounting profession. As firms begin to trade data and transact with new trading partners, as opposed to preestablished trading partners, the integrity of both the trading partners and their underlying transaction processing systems must be evaluated. As the various processes and steps conducted in supply chain management, such as inventory requirement planning, purchase orders, sales orders, shipping notification, and cash disbursements, are handled electronically by electronic commerce–based information systems, the ability to monitor transaction data and assess the integrity and reliability becomes challenging. The accounting profession must rise to this challenge and develop new methods of monitoring and reviewing transaction data in real time.

The ability to assess the integrity of information systems in real time is important because of the pressing need for reliable and accurate financial statement data more rapidly than previously tolerated. Companies may need to provide trading partners and other stakeholders with updated financial information in order to conduct their business. In many situations, knowledge about the clients' information systems is not sufficient information; the accountant may also need to assess the reliability and integrity of a trading partner if its system contributes significantly to the processing of its clients transaction processing data. In some situations, ascertaining where one company ends and another begins may be unclear at first glance.

As mentioned in Chapter 4 and throughout this text, members of the accounting profession have to acquire new technical skills to compete in the digital economy. New assurance opportunities are arising over which the accounting profession does not have a protected marketplace as it does over assurance of financial statements. Third-party assurance of websites is an example of a relatively new “product” offering for public accounting firms. Other business professionals, however, may perform similar services as discussed in Chapter 4. In this textbook, both the challenges and the opportunities facing the members of the accounting profession are examined at the end of each chapter.

Summary

Electronic commerce is already proving to be a very powerful business channel. Many “traditional” businesses such as General Electric, Boeing, American Airlines, and US-Air have already successfully implemented successful Web-based strategies. New businesses, such as Amazon.com, are challenging many traditional businesses to rethink the way they conduct business. The success of Amazon.com has prompted many, previously traditional businesses, such as the bookstore retailer Barnes and Noble, to enter the electronic commerce arena.

When implemented properly and when aligned with the firm's overall corporate strategy, electronic commerce can significantly enhance the operations of a firm. The potential benefits of electronic commerce to businesses depend on the extent of implementation and also the industry in which the firm operates. The outlook for Web-based revenues is particularly good for the travel, financial services, and computing hardware and software industries. The primary benefits to consumers are convenience, access to information, and price comparison. All of these benefits to the consumer result in more buying power.

Traditional business models and the value chain are no longer representative of the virtual society in which electronic commerce operates. The value chain of electronic commerce-based companies places the customer as the center of focus with a sharing of data throughout all processes of the value chain and the customer.

Finally, the success of electronic commerce depends on the assurance businesses and customers place on its underlying systems. Security is often cited as the number one impediment to the growth of electronic commerce. A primary objective of this textbook is to present the security challenges that firms face as a result of engaging in electronic commerce and to educate the reader regarding some technological tools and business practices that can be used to mitigate these risks.

Key Words

customer-oriented value chain	software portability
customer relationship management (CRM)	traditional EDI
electronic business	traditional value chain
electronic commerce	value-added network (VAN)
electronic data interchange (EDI)	virtual enterprise
electronic information	virtual communications space
electronic relationships	virtual distribution space
electronic transactions	virtual information space
hypertext links	virtual transaction space
Internet	World Wide Web (WWW)
production cycle time	

Review Questions

1. What is electronic commerce?
2. What is electronic business?
3. What are five potential benefits of electronic commerce for businesses?
4. What is the production cycle?
5. What are five potential benefits of electronic commerce for consumers?
6. How does greater access to information translate into greater buying power?
7. How long did it take the radio to reach 50 million people? The Internet?
8. What is the Internet, and who built it?
9. When was e-mail put into use?
10. What three forces lead to the WWW's emergence as the single most dynamic force in information technology?
11. What is the traditional value chain?

12. What is the customer-oriented value chain?
13. What is customer relationship management?
14. What is a virtual enterprise?
15. What are the four virtual spaces of Angehrn's model? What are the major electronic commerce concerns of each?
16. What are the three major legal/regulatory constraints facing electronic commerce?
17. What are three pillars of electronic commerce?
18. What is a differentiating feature of electronic commerce from print and broadcasting mediums?
19. What are two primary impediments to electronic transactions?
20. What are four security concerns of businesses

Discussion Questions

1. What is one difference between EDI and electronic commerce?
2. How did use of the Internet help General Electric reduce the cost of goods that it purchased?
3. How can electronic commerce help reduce inventory costs? Give an example.
4. How can electronic commerce help reduce the production cycle time? What industries can greatly benefit from this?
5. How can electronic commerce enhance customer service? Give an example.
6. How can electronic commerce help a firm reach its customers in a very low-cost fashion? Give an example.
7. Does Internet access make employees more or less productive? Give an example.
8. Why is it important for websites to differentiate their sites from other similar sites?
9. Why do you think the travel industry's Internet growth potential is so great?
10. Why is it so important to align the electronic commerce strategy with the overall business strategy?
11. Give examples of how the supplier's information system can be used at every link in the value chain by the customer?
12. Why do you think Web-based firms report more security breaches than other companies?

Cases

1. Changing business to business models
Visit Verticalnet.com and research Food/Packaging markets. Also, research how such business was conducted prior to the Internet.
 - a. Write up a summary of how the Internet and the WWW have affected the food and packaging industries.
2. Website comparison
For each of the following items, locate two websites that sell them:
 - Airline tickets.
 - Personal computers.
 - Compact disks.
 - Clothes.

- a. Mention how you located each site. Did you use a search engine or directory? Mention the search engine and the search terms you used if you used a search engine.
 - b. For each item, record the site's URL and company name. Compare the amount of information given and the relative prices.
 - c. Mention which site you preferred and why. Would you return to the site or would you continue to look for a better site? Why?
3. ICDT model
Visit Disney's website (www.disney.com) and, using Angehrn's ICDT model, classify the activities found on the site into the four virtual spaces.
4. Customer relationship management using electronic commerce
Using the Internet, locate a consulting service or software vendor that claims to help firms better manage their value chains using some form of electronic commerce. *Prepare a report for class that includes the following items:*
- a. The name of the company.
 - b. Type of firm—consulting or software vendor.
 - c. Potential benefits to customers of services/software.
 - d. If a "client list" is given by the consultant or vendor, list the names of three companies that use or endorse the service/software.

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