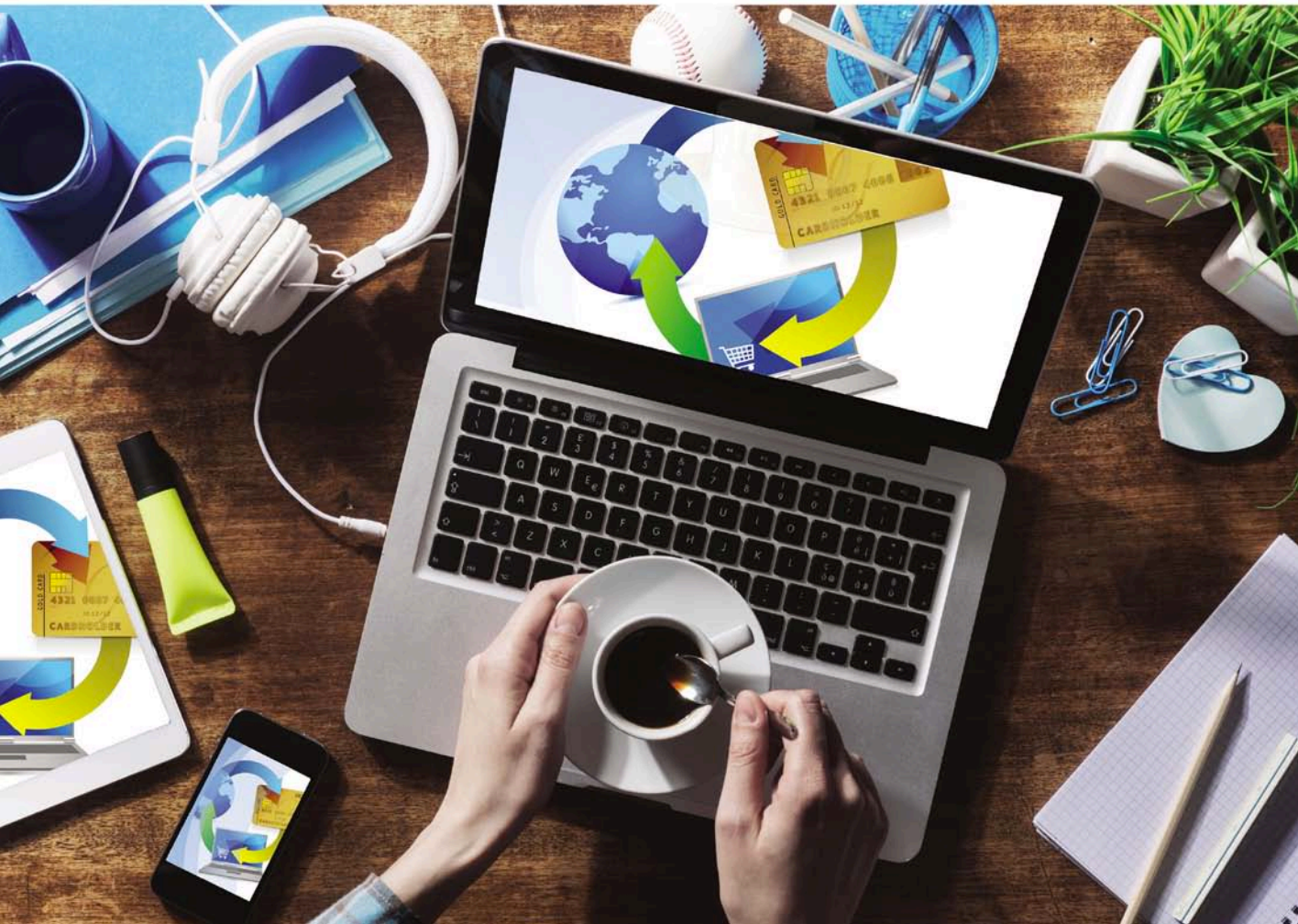
Twelfth Edition

ELECTRONIC COMMERCE

Gary P. Schneider



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Twelfth Edition

ELECTRONIC COMMERCE

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Electronic Commerce, Twelfth Edition
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Brief Contents

Part 4: Integration

Table of Contents

Part 2: Business Strategies for Electronic Commerce

Preface

Electronic Commerce, Twelfth Edition, provides complete coverage of the key business and technology elements of electronic commerce. The book does not assume that readers have any previous electronic commerce knowledge or experience.

In 1998, having spent several years doing electronic commerce research, consulting, and corporate training, I began developing undergraduate and graduate business school courses in electronic commerce. Although I had used a variety of books and other materials in my corporate training work, I was concerned that those materials would not work well in university courses because they were written at widely varying levels and did not have the organization and pedagogic features, such as review questions, that are so important to students.

After searching for a textbook that offered balanced coverage of both the business and technology elements of electronic commerce, I concluded that no such book existed. The first edition of *Electronic Commerce* was written to fill that void. Since that first edition, I have worked to improve the book and keep it current with the rapid changes in this dynamic field.

New to This Edition

This edition includes the usual updates to keep the content current with the rapidly occurring changes in electronic commerce. It also includes new material on the following topics:

- The emergence of mobile apps as a driver of retail sales in the United States (Chapter 1)
- Technology developments such as Google's Project Loon, new wireless technologies, and the first commercial applications of Semantic Web research (Chapter 2)
- Revenue model developments in online video (Chapter 3)
- New online advertising standards and developments in mobile advertising (Chapter 4)
- How supply chain management enhances organizations' abilities to implement lean production and just-in-time inventory management (Chapter 5)
- Chinese banks' use of online auctions to sell off nonperforming loans (Chapter 6)
- Legal issues facing lodging brokers such as Airbnb and ride brokers such as Lyft and Uber (Chapter 7)
- Cloud computing and content-delivery networks (Chapter 8)
- Advanced shopping cart management services, enterprise resource planning systems in the form of software-as-a-service, and detailed coverage of customer relationship management system architectures (Chapter 9)

- LastPass hack, new viruses including Regin and TeslaCrypt, and emerging initiatives for making digital certificates more widely available (Chapter 10)
- Mobile device payment systems and electronic bill presentment and payment systems (Chapter 11)
- Business accelerators (Chapter 12)

ORGANIZATION AND COVERAGE

Electronic Commerce, Twelfth Edition, introduces readers to both the theory and practice of conducting business over the Internet and World Wide Web. The book is organized into four sections: an introduction, business strategies, technologies, and integration.

Introduction

The book's first section includes two chapters. Chapter 1, "Introduction to Electronic Commerce," defines electronic commerce and describes how companies use it to create new products and services, reduce the cost of existing business processes, and improve the efficiency and effectiveness of their operations. The concept of electronic commerce waves is presented and developed in this chapter. Chapter 1 also outlines the history of the Internet and the Web, explains the international environment in which electronic commerce exists, provides an overview of the economic structures in which businesses operate, and describes how electronic commerce fits into those structures. Two themes are introduced in this chapter and recur throughout later chapters: that examining a firm's value chain can reveal opportunities for electronic commerce initiatives, and reductions in transaction costs are important elements of many electronic commerce initiatives.

Chapter 2, "Technology Infrastructure: The Internet and the World Wide Web," introduces the technologies used to conduct business online, including topics such as Internet infrastructure, protocols, packet-switched networks, and the Internet of Things. Chapter 2 also describes the markup languages used on the Web (HTML and XML) and discusses Internet connection options and tradeoffs, including wireless technologies.

Business Strategies for Electronic Commerce

The second section of the book includes five chapters that describe the business strategies that companies and other organizations are using to do business online. Chapter 3, "Selling on the Web," describes revenue models that companies are using online and explains how some companies have changed their revenue models as the Web has matured. The chapter also explains how firms that understand the nature of communication on the Web can identify and reach the largest possible number of qualified customers.

Chapter 4, "Marketing on the Web," provides an introduction to Internet marketing and online advertising. It includes coverage of market segmentation, technology-enabled customer relationship management, rational branding, contextual advertising, localized advertising, viral marketing, and permission marketing. The chapter also explains how online businesses can share and transfer brand benefits through affiliate marketing and cooperative efforts among brand owners. Effective use of mobile apps to advertise and promote products and services is also included here.

Chapter 5, "Business-to-Business Activities: Improving Efficiency and Reducing Costs," explores the variety of methods that companies are using to improve their purchasing and logistics primary activities with Internet and Web technologies. The chapter describes how companies are using EDI, and outsourcing or offshoring some of their business processes to less-developed countries, and using collaborative commerce in precision manufacturing supply chains. Chapter 5 describes how businesses are using technologies such as e-procurement, radio-frequency identification, and reverse auctions in the practice of supply chain management online.

Chapter 6, "Social Networking, Mobile Commerce, and Online Auctions," explains how companies now use the Web to do things that they have never done before, such as creating social networks, engaging in mobile commerce, and operating auction sites. The chapter describes how businesses are developing social networks and using existing social networking Web sites to increase sales and do market research. The development of mobile commerce, order and pay services, and location-aware online services is discussed. The chapter also explains how companies are using Web auctions to sell goods and generate advertising revenue.

Chapter 7, "The Environment of Electronic Commerce: Legal, Ethical, and Tax Issues," discusses the legal and ethical aspects of intellectual property usage, the privacy rights of customers, and the protection of children who use the Internet. Online crime, terrorism, and warfare are covered as well. The chapter also explains that the large number of government units that have jurisdiction and power to tax makes it essential that companies doing business on the Web understand the potential liabilities of doing business with customers in those jurisdictions.

Technologies for Electronic Commerce

The third section of the book includes four chapters that describe the technologies of electronic commerce and explains how they work. Chapter 8, "Web Server Hardware and Software," describes the computers, operating systems, e-mail systems, utility programs, and Web server software that organizations use in the operation of their electronic commerce Web sites, including cloud computing technologies. The chapter describes the problem of unsolicited commercial e-mail (UCE, or spam) and outlines both technical and legal solutions to the problem.

Chapter 9, "Electronic Commerce Software," describes the basic functions that all electronic commerce Web sites must accomplish and explains the various software options used to perform those functions. This chapter includes an overview of Web services, database management, shopping carts, content delivery networks, cloud computing, and other types of software used in electronic commerce. The chapter also includes a discussion of Web hosting options for online businesses of various sizes.

Chapter 10, "Electronic Commerce Security," discusses security threats and countermeasures that organizations can use to ensure the security of client computers (and smartphones and tablet devices), communications channels, and Web servers. The chapter emphasizes the importance of a written security policy and explains how encryption and digital certificates work. The chapter also includes an overview of significant computer viruses, worms, and other threats that have affected online business activities.

Chapter 11, "Payment Systems for Electronic Commerce," presents a discussion of electronic payment systems, including electronic bill presentment and payment, mobile banking, digital cash, digital wallets, and the technologies used to make stored-value cards, credit cards, debit cards, and charge cards work. The chapter describes how payment systems operate, including approval of transactions and disbursements to merchants, and describes how banks use Internet technologies to improve check clearing and payment-processing operations. The use of mobile devices as digital wallets to make payments and doing online banking is outlined. The chapter also includes a discussion of the threats that phishing attacks and identity theft crimes pose for individuals and online businesses.

Integration

The fourth and final section of the book includes one chapter that integrates the business and technology strategies used in electronic commerce. Chapter 12, "Managing Electronic Commerce Implementations," presents an overview of key elements that are typically included in business plans for electronic commerce implementations, such as the setting of objectives and estimating project costs and benefits. The chapter describes online business incubators and accelerators, outsourcing strategies, and the use of project management and project portfolio management as formal ways to plan and control tasks and resources used in electronic commerce implementations. This chapter includes a discussion of change management and outlines specific jobs available in organizations that conduct electronic commerce.

FEATURES

The twelfth edition of *Electronic Commerce* includes a number of features and offers additional resources designed to help readers understand electronic commerce. These features and resources include:

- **Business Case Approach** The introduction to each chapter includes a real business case that provides a unifying theme and backdrop for the material described in the chapter. Each case illustrates an important topic from the chapter and demonstrates its relevance to the current practice of electronic commerce.
- **Learning From Failures** Not all electronic commerce initiatives have been successful. Each chapter in the book includes a short summary of an electronic commerce failure related to the content of that chapter. We all learn from our mistakes—this feature is designed to help readers understand the missteps of electronic commerce pioneers who learned their lessons the hard way.
- **Summaries** Each chapter concludes with a Summary that concisely recaps the most important concepts in the chapter.
- **Web Links** The Web Links are a set of Web pages maintained by the publisher for readers of this book. The Web Links complement the book by linking to Web sites mentioned in the book and to other relevant online resources. The Web Links are continually monitored and updated for changes so they

continue to lead to useful Web resources for each chapter. You can find the Web Links for this book by visiting the companion site.

- **Web Links References in Text** Throughout each chapter, there are Web Links references that indicate the name of a link included in the Web Links. Text set in bold, green, sans-serif letters (**Metabot Pro**) indicates a like-named link in the Web Links. The links are organized under chapter and subchapter headings that correspond to those in the book. The Web Links also contains many supplemental links to help students explore beyond the book's content.
- **Review Questions and Exercises** Each chapter concludes with meaningful review materials including both conceptual discussion questions and hands-on exercises. The review questions are ideal for use as the basis for class discussions or as written homework assignments. The exercises give students hands-on experiences that yield computer output or a written report.
- **Cases** Each chapter concludes with two comprehensive cases. One case uses a fictitious setting to illustrate key learning objectives from that chapter. The other case gives students an opportunity to apply what they have learned from the chapter to an actual situation that a real company or organization has faced. The cases offer students a rich environment in which they can apply what they have learned and provide motivation for doing further research on the topics.
- **For Further Study and Research** Each chapter concludes with a comprehensive list of the resources that were consulted during the writing of the chapter. These references to publications in academic journals, books, and the IT industry and business press provide a sound starting point for readers who want to learn more about the topics contained in the chapter.
- **Key Terms and Glossary** Terms within each chapter that may be new to the student or have specific subject-related meaning are highlighted by boldface type. The end of each chapter includes a list of the chapter's key terms. All of the book's key terms are compiled, along with definitions, in a Glossary at the end of the book.

TEACHING TOOLS

When this book is used in an academic setting, instructors may obtain the following teaching tools:

- **Instructor's Manual** The Instructor's Manual has been carefully prepared and tested to ensure its accuracy and dependability. The Instructor's Manual is available on the instructor companion site.
- **Cengage Learning Testing Powered by Cognero** is a flexible, online system that allows you to:
  - author, edit, and manage test bank content from multiple Cengage Learning solutions

- create multiple test versions in an instant
- deliver tests from your LMS, your classroom, or wherever you want

- **PowerPoint Presentations** Microsoft PowerPoint slides are included for each chapter as a teaching aid for classroom presentations, to make available to students on a network for chapter review, or to be printed for classroom distribution. Instructors can add their own slides for additional topics they introduce to the class. The presentations are available on the instructor companion site.

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DEDICATION

To the memory of my father, Anthony J. Schneider.

ABOUT THE AUTHOR

Gary Schneider is currently a Professor at the California State University Monterey Bay College of Business. His previous appointments include the William S. Perlroth Professorship at Quinnipiac University and the Clarence L. Steber Professorship at the University of San Diego. He has also taught at the University of Cincinnati, Northern

Kentucky University, the University of Tennessee, and Xavier University. He has won a number of teaching and research awards at these universities and served as academic director of the University of San Diego's graduate programs in electronic commerce and information systems. Gary has published more than 50 books and 100 research papers on a variety of accounting, information systems, and management topics. His books have been translated into Chinese, French, Italian, Korean, and Spanish. Gary's research has been funded by the Irvine Foundation and the U.S. Office of Naval Research. His work has appeared in *Accounting Horizons*, the *Journal of Information Systems*, *Interfaces*, *Issues in Accounting Education*, and the *Information Systems Audit and Control Journal*. He has served as editor of the *Business Studies Journal* and the *Accounting Systems and Technology Reporter*, as accounting discipline editor of *Advances in Accounting, Finance and Economics*, as associate editor of the *Journal of Global Information Management*, and on the editorial boards of the *Journal of Information Systems*, the *Journal of Electronic Commerce in Organizations*, the *Journal of Database Management*, and the *Information Systems Audit & Control Journal*. Gary has lectured on electronic commerce topics at universities and businesses in the United States, Europe, South America, and Asia. He has provided consulting and training services to a number of major clients, including Gartner, Gateway, Honeywell, the National Science Foundation, Qualcomm, and the U.S. Department of Commerce. In 1999, he was named a Fellow of the Gartner Institute. In 2013, he was named a Distinguished Visiting Professor at the *Instituto Tecnológico y de Estudios Superiores de Monterrey* in Guadalajara, Mexico. Gary is a licensed CPA in Ohio, where he practiced public accounting for 14 years. He holds a Ph.D. in accounting information systems from the University of Tennessee, an M.B.A. in accounting from Xavier University, and a B.A. in economics from the University of Cincinnati.

PART 1

Introduction

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Chapter 1

Introduction to Electronic Commerce

LEARNING OBJECTIVES

In this chapter, you will learn:

- What electronic commerce is and how it has evolved in three waves of development
- Why companies concentrate on revenue models and the analysis of business processes instead of business models when they undertake electronic commerce initiatives
- How to identify opportunities for and barriers to electronic commerce initiatives
- How economic forces have led to the development and continued growth of electronic commerce
- How businesses use value chains and SWOT analysis to identify electronic commerce opportunities
- How the international nature of electronic commerce affects its growth and development

INTRODUCTION

Electronic commerce began in the United States and for many years was conducted primarily through English-language Web sites. As you will learn in this chapter, that has changed dramatically in recent years. Since 2013, China has been the leader in online retail sales, with a growing proportion of those sales being made on smartphones rather than computers.

With a population of 1.4 billion, some 650 million of whom have an Internet connection of some kind, China is the world's largest potential online market. Recent studies have identified the Chinese

as especially active Internet users, with more than 90 percent reporting that they go online two to four times a day. Combined with an overall upward trend in economic growth in the country, current and projected online retail sales are expected to continue their recent upward trends. Although Chinese buyers do use U.S.-based sites such as **Amazon** (*Note*: This typeface indicates a corresponding link to a related Web page in the book's Web Links. Google's URL is http://www.amazon.com) and **eBay**, they are also frequent users of domestic sites with well-developed brand awareness such as **JD.com** and **Tmall**.

The differences between Chinese and U.S. online shoppers do not stop at the different languages they use. Chinese online buyers are more highly influenced by and want to consult online reviews far more often than shoppers elsewhere. They also like to discuss potential purchases with others online to a greater degree. These cultural characteristics have led to the development of independent online review sites and in sellers such as Nike becoming active participants in Chinese chat and messaging sites such as **Sina Weibo** and **WeChat**.

Sellers in China also find that they must take into account regional differences within a diverse country. In the major cities, shoppers are buying branded luxury goods and big-ticket items such as cars; while in smaller towns, consumers are more price-conscious and looking to find deals on everyday goods. Distribution and delivery can be tricky in parts of China that do not have well-developed roads and standardized shipping practices. Some sellers are overcoming these issues by creating their own distribution systems. For example, JD.com has built more than 80 warehouses in 34 cities which it uses to make faster and more reliable deliveries than its competitors.

In this chapter, you will learn how online businesses have emerged and grown to accommodate the various cultures and infrastructure challenges around the world.

The Evolution of Electronic Commerce

The business phenomenon that we now call electronic commerce has had an interesting history. From humble beginnings in the mid-1990s, electronic commerce grew rapidly until 2000, when a major downturn occurred prompting endless news stories describing how the "dot-com boom" had turned into the "dot-com bust." Between 2000 and 2003, many industry observers were writing obituaries for electronic commerce. Just as the unreasonable expectations for immediate success had fueled unwarranted high expectations during the boom years, overly gloomy news reports colored perceptions during this time.

Beginning in 2003, electronic commerce began to show signs of a profound rebirth. Companies that had survived the downturn were not only seeing growth in sales again, but many of them were showing profits for the first time. As the economy grew, electronic commerce also grew, but at a faster pace than the overall economy. Thus, electronic commerce gradually became a larger part of the total economy.

In the general economic recession that started in 2008, electronic commerce suffered far less than most of the economy. Looking back from today's perspective, we can see that as the general economy has expanded and contracted, electronic commerce has consistently expanded more in the good times and contracted less in the bad times than other economic sectors. This section defines electronic commerce and describes its evolution from a novelty to its current place as an important component of global business activity.

Electronic Commerce and Electronic Business

To many people, the term "electronic commerce" means shopping on the part of the Internet called the World Wide Web (the Web). However, **electronic commerce (or e-commerce)** also includes many other activities, such as businesses trading with other businesses and internal processes that companies use to support their buying, selling, hiring, planning, and other activities. Some people use the term **electronic business (or e-business)** when they are talking about electronic commerce in this broader sense. For example, IBM defines electronic business as "the transformation of key business processes through the use of Internet technologies." Most people use the terms "electronic commerce" and "electronic business" interchangeably. In this book, the term electronic commerce (or e-commerce) is used in its broadest sense and includes all business activities that use Internet technologies. Internet technologies include the Internet, the World Wide Web, and other technologies such as wireless transmissions on mobile telephone networks. Companies that operate only online are sometimes called **dot-com** or **pure dot-com** businesses to distinguish them from companies that operate in physical locations (solely or together with online operations); however, online business activity has become so integrated with everyday life in much of the world that few people worry about these distinctions any longer.

Categories of Electronic Commerce

Categorizing electronic commerce by the types of entities participating in the transactions or business processes is a useful and commonly accepted way to define online business.

The five general electronic commerce categories are business-to-consumer, business-to-business, transactions and business processes, consumer-to-consumer, and business-to-government. The three categories that are most commonly used are:

- Consumer shopping on the Web, often called **business-to-consumer (or B2C)**
- Transactions conducted between businesses on the Web, often called **business-to-business (or B2B)**
- Business processes in which companies, governments, and other organizations use Internet technologies to support selling and purchasing activities

A single company might participate in activities that fall under multiple e-commerce categories. Consider a company that manufactures stereo speakers. The company might sell its finished product to consumers on the Web, which would be B2C electronic commerce. It might also purchase the materials it uses to make the speakers from other companies on the Web, which would be B2B electronic commerce. Businesses often have entire departments devoted to negotiating purchase transactions with their suppliers. These departments are usually named **supply management** or **procurement**. Thus, B2B electronic commerce is sometimes called **e-procurement**.

In addition to buying materials and selling speakers, the company must also undertake many other activities to convert the purchased materials into speakers. These activities might include hiring and managing the people who make the speakers, renting or buying the facilities in which the speakers are made and stored, shipping the speakers, maintaining accounting records, obtaining customer feedback, purchasing insurance, developing advertising campaigns, and designing new versions of the speakers. An increasing number of these transactions and business processes can be done on the Web. Manufacturing processes (such as the fabrication of the speakers) can be controlled using Internet technologies within the business. All of these communication, control, and transaction-related activities have become an important part of electronic commerce. Some people include these activities in the B2B category; others refer to them as underlying or supporting business processes.

Business Processes

For more than 80 years, business researchers have been studying the ways people behave in businesses. This research has helped managers better understand how workers do their jobs and what motivates them to work more effectively. The research results have helped managers, and more recently, the workers themselves, improve job performance and productivity. An important part of doing these job studies is to learn what activities each worker performs. In this setting, a **business activity** is a task performed by a worker in the course of doing his or her job.

For a much longer time—centuries, in fact—business owners have kept records of how well their businesses are performing. The formal practice of accounting, or recording transactions, dates back to the Middle Ages. A **transaction** is an exchange of value, such as a purchase, a sale, or the conversion of raw materials into a finished product. By recording transactions, accountants help business owners keep score and measure how well they are

doing. All transactions involve at least one activity, and some transactions involve many activities. Not all activities result in measurable (and therefore recordable) transactions. Thus, a transaction always has one or more activities associated with it, but an activity might not be related to a transaction.

The group of logical, related, and sequential activities and transactions in which businesses engage are often collectively referred to as **business processes**. Transferring funds, placing orders, sending invoices, and shipping goods to customers are all types of activities or transactions. For example, the business process of shipping goods to customers might include a number of activities (or tasks, or transactions), such as inspecting the goods, packing the goods, negotiating with a freight company to deliver the goods, creating and printing the shipping documents, loading the goods onto the truck, and sending payment to the freight company.

One important way that the Web is helping people work more effectively is by enabling employees of many different kinds of companies to work at home or from other locations (such as while traveling). In this arrangement, called **telecommuting** or **telework**, the employee logs in to the company network through the Internet instead of traveling to an office.

Relative Size of Electronic Commerce Elements

Figure 1-1 shows the two main types of electronic commerce as subsets of the overall business processes in which a company might engage. The figure presents a rough approximation of the relative sizes of these three elements (B2C commerce, B2B commerce, and overall business processes). In terms of dollar volume and number of transactions, B2B electronic commerce is much greater than B2C electronic commerce. However, the number of business processes that are conducted using online technologies is far greater than the number of all B2C and B2B transactions combined.

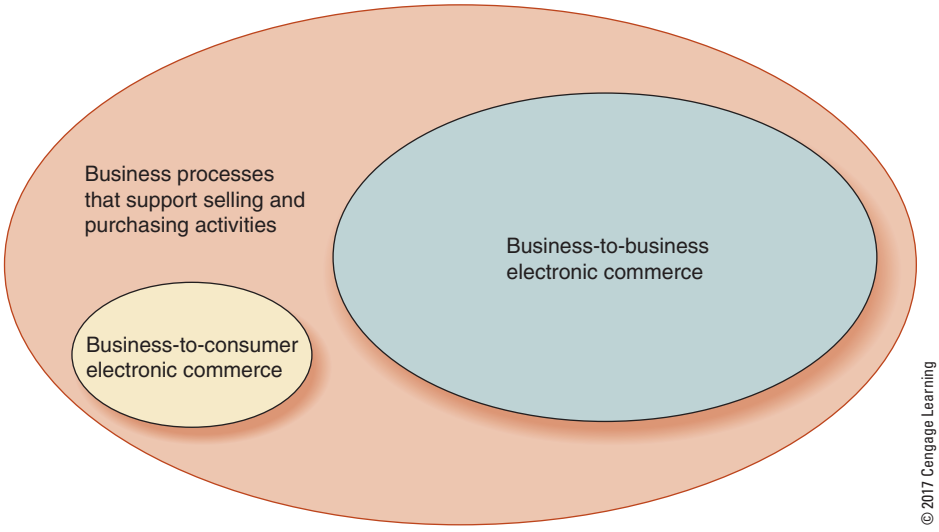

FIGURE 1-1 Elements of electronic commerce

The large oval in Figure 1-1 that represents the business processes that support selling and purchasing activities is the largest element of electronic commerce.

Some researchers define a fourth category of electronic commerce, called **consumer-to-consumer (or C2C)**, which includes individuals who buy and sell items among themselves. For example, C2C electronic commerce occurs when a person sells an item through a Web auction site to another person. In this book, C2C sales are included in the B2C category because the person selling the item acts much as a business would for purposes of the transaction.

Finally, some researchers also define a category of electronic commerce called **business-to-government (or B2G)**; this category includes business transactions with government agencies, such as paying taxes and filing required reports. An increasing number of states have Web sites that help companies do business with state government agencies. In this book, B2G transactions are included in the discussions of B2B electronic commerce. Figure 1-2 summarizes these five categories of electronic commerce.

Category	Description	Example
Business-to-consumer (B2C)	Businesses sell products or services to individual consumers.	Walmart.com sells merchandise to consumers through its Web site.
Business-to-business (B2B)	Businesses sell products or services to other businesses.	Grainger.com sells industrial supplies to large and small businesses through its Web site.
Business processes that support buying and selling activities	Businesses and other organizations maintain and use information to identify and evaluate customers, suppliers, and employees. Increasingly, businesses share this information in carefully managed ways with their customers, suppliers, employees, and business partners.	Dell Computer uses secure Internet connections to share current sales and sales forecast information with suppliers. The suppliers can use this information to plan their own production and deliver component parts to Dell in the right quantities at the right time.
Consumer-to-consumer (C2C)	Participants in an online marketplace can buy and sell goods to each other. Because one party is selling, and thus acting as a business, this book treats C2C transactions as part of B2C electronic commerce.	Consumers and businesses trade with each other in the eBay.com online marketplace.
Business-to-government (B2G)	Businesses sell goods or services to governments and government agencies. This book treats B2G transactions as part of B2C electronic commerce.	CA.gov procurement site allows businesses to sell online to the state of California.

FIGURE 1-2 Electronic commerce categories

The Development and Growth of Electronic Commerce

Over the thousands of years that people have engaged in commerce with one another, they have adopted the tools and technologies that became available. For example, the advent of sailing ships in ancient times opened new avenues of trade to buyers and sellers. Later innovations, such as the printing press, steam engine, and telephone, have changed the way people conduct commerce activities. The Internet has changed the way people buy, sell, hire, and organize business activities in more ways and more rapidly than any other technology in the history of business.

Early Electronic Commerce

Although the Web has made online shopping possible for many businesses and individuals, in a broader sense, electronic commerce has existed for many years. Since the mid-1960s, banks have been using **electronic funds transfers (EFTs**, also called **wire transfers)**, which are electronic transmissions of account exchange information over private communications' networks. Initially used to transfer money between business checking accounts, the use of EFTs gradually expanded to include payroll deposits to employees' accounts, automatic payment of auto and mortgage loans, and deposit of government payments to individuals, such as U.S. Social Security System remittances.

Businesses have also used a form of electronic commerce, known as electronic data interchange, for many years. **Electronic data interchange (EDI)** occurs when one business transmits computer-readable data in a standard format to another business. In the 1960s, businesses realized that many of the documents they exchanged were related to the shipping of goods; for example, invoices, purchase orders, and bills of lading. These documents included the same set of information for almost every transaction. Businesses also realized that they were spending a good deal of time and money entering this data into their computers, printing paper forms, and then reentering the data on the other side of the transaction. Although the purchase order, invoice, and bill of lading for each transaction contained much of the same information—such as item numbers, descriptions, prices, and quantities—each paper form usually had its own unique format for presenting the information. By creating a set of standard formats for transmitting the information electronically, businesses were able to reduce errors, avoid printing and mailing costs, and eliminate the need to reenter the data.

Businesses that engage in EDI with each other are called **trading partners**. The standard formats used in EDI contain the same information that businesses have always included in their standard paper invoices, purchase orders, and shipping documents. Firms such as General Electric, Sears, and Walmart were pioneers in using EDI to improve their purchasing processes and their relationships with suppliers. The U.S. government, which is one of the largest EDI trading partners in the world, was also instrumental in bringing businesses into EDI.

One problem that EDI pioneers faced was the high cost of implementation. Until the late 1990s, doing EDI meant buying expensive computer hardware and software and then