

Mark G. Simkin

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Carolyn S. Norman

Core Concepts of
**ACCOUNTING
INFORMATION SYSTEMS**

Thirteenth Edition

WILEY

Sample

CORE CONCEPTS OF
**Accounting
Information
Systems**

Thirteenth Edition

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In memory of my father, Edward R. Simkin (Mark G. Simkin)
Chase your big dreams! (Jacob M. Rose)
Thank you to my students –you're the best! (Carolyn S. Norman)

Sample

ABOUT THE AUTHORS

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PREFACE

Information technologies affect every aspect of accounting, and as technologies advance, so does our accounting profession. For example, today's accountants use the many helpful features in spreadsheet software to build, analyze, and update spreadsheet models. Similarly, the Internet and mobile devices continue to change the way accountants work, communicate, obtain training, and access professional information.

Because most accounting systems are computerized, accountants must understand how hardware, software, and human procedures turn data into decision-useful financial information and also how to develop and evaluate internal controls. Business and auditing failures continue to force the profession to emphasize internal controls and to rethink the state of assurance services. As a result, the subject of accounting information systems (AIS) continues to be a vital component of the accounting profession.

The purpose of this book is to help students understand basic AIS concepts. Exactly what comprises these AIS concepts is subject to some interpretation, and it is certainly changing over time, but most accounting professionals believe that basic AIS concepts consist of the knowledge that accountants need for understanding and using information technologies and for knowing how an accounting information system gathers and transforms data into useful decision-making information. In this edition of our textbook, we include the core concepts of Accounting Information Systems. The book is flexible enough that instructors may choose to cover the chapters in any order.

ACCOUNTING INFORMATION SYSTEMS COURSE CONTENT AREA COVERAGE

AIS Applications	10, 11, 12
IT Auditing	15
Database Concepts	7, 8, 9
Internal Control	13, 14
Management of Information Systems	4, 5, 6
Management Use of Information	1, 2, 5, 10, 11, 12
Systems Development Work	6
Technology of Information Systems	All chapters

About This Book

The content of AIS courses varies widely from school to school. Some schools use their AIS courses to teach accounting students how to use computers. In other colleges and universities, the course focuses on business processes and data modeling. Yet other courses emphasize transaction processing and accounting as a communication system that has little to do with the technical aspects of how systems gather, process, or store underlying accounting data.

Given the variety of objectives for an AIS course and the different ways that instructors teach it, we developed a textbook that attempts to cover the core concepts of AIS. In writing the text, we assumed that students have completed basic courses in financial and managerial accounting and have a basic knowledge of computer hardware and software concepts. The text is designed for a one-semester course in AIS and may be used at the community college, baccalaureate, or graduate level.

Our hope is that individual instructors will use this book as a foundation for an AIS course, building upon it to meet their individual course objectives. Thus, we expect that many instructors will supplement this textbook with other books, cases, software, or readings. The arrangement and content of the chapters permits *flexibility* in covering subject materials and allows instructors to omit chapters that students have covered in prior courses.

Special Features

This edition of our book uses a large number of special features to enhance the coverage of chapter material as well as to help students understand chapter concepts. Thus, each chapter begins with a list of learning objectives that emphasize the important subject matter of the chapter. This edition of the book also includes many new real world Cases-in-Point, which we include to illustrate a particular concept or procedure. Each chapter also includes a more-detailed real-world case as an end-of-chapter *AIS-at-Work* feature.

Each chapter ends with a summary and a list of key terms. To help students understand the material, each chapter includes multiple-choice questions for self-review with answers. There are also three types of end-of-chapter exercises: (1) discussion questions, (2) problems, and (3) case analyses. This wide variety of review material enables students to examine many different aspects of each chapter's subject matter and also enables instructors to vary the exercises they use each semester.

The end-of-chapter materials include references and other resources that allow interested students to explore the chapter material in greater depth. In addition, instructors may wish to assign one or a number of articles listed in each chapter reference section to supplement chapter discussions. These articles are also an important resource for instructors to encourage students to begin reading such professional journals as *Strategic Finance*, *The Journal of Accountancy*, and *The Internal Auditor*. We also included a selection of current videos at the end of each chapter.

Supplements

There are a number of supplements that accompany this textbook. One is an instructor's manual containing suggested answers to the end-of-chapter discussion questions, problems, and case analyses. There is also a test bank consisting of true-false, multiple-choice, and matching-type questions, as well as short answer problems and fill-in-the-blank questions, so that instructors have a wide variety of choices. In addition, PowerPoint lecture slides accompany the text, and all of these materials can be accessed from the book's companion website at www.wiley.com/college/simkin.

What's New in the Thirteenth Edition?

This edition of our book includes a number of changes from prior editions.

- An expanded section in Chapter 1 describes career paths for accountants interested in predictive analytics, where acute shortages exist for qualified individuals.
- A new color—both inside and on the cover! This edition uses **red** to highlight information and to make the book more interesting to read.

- The book offers expanded coverage of important topics, such as big data, cloud computing, and the 2013 COSO Report, as well as updated information on the importance of XBRL and new uses of IT in the sales and purchasing processes.
- New material addresses topics such as e-accounting, accounting uses of social media, fraud detection with accounting data, virtual currencies, decision trees, and systems acquisition of small-scale ERP systems.
- Many new *Case-in-Points* illustrate the concepts discussed in the textbook and give students a better grasp of the material.
- New *AIS at Work* features at the end of many chapters help students better understand the impact of systems in a wide variety of contexts.
- More Test Yourself multiple choice questions help students assess their understanding of the chapter material.
- Many new discussion questions, problems, and cases at the end of chapters give instructors more choices of comprehensive assignments for students.
- New links to video clips and recommended readings highlight important topics.

The end of the book contains an updated glossary of AIS terms.

Acknowledgements

We wish to thank the many people who helped us during the writing, editing, and production of our textbook. Our families and friends are first on our list of acknowledgments. We are grateful to them for their patience and understanding as we were revising this textbook. Next, we thank those instructors who read earlier drafts of this edition of our textbook and provided enormously valuable ideas and suggestions to improve the final version.

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Mark G. Simkin
Jacob M. Rose
Carolyn S. Norman

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Chapter 1

Accounting Information Systems and the Accountant

After reading this chapter, you will:

1. *Better understand* the huge impact information technology (IT) has on the accounting profession and why you need to study accounting information systems.
2. *Be familiar with* career opportunities that combine accounting and IT knowledge and skills.
3. *Learn* how IT influences accounting systems.
4. *Understand* how financial reporting is changing with advances in IT, such as XBRL.
5. *Appreciate* how accountants use business intelligence for decision-making.
6. *Be aware of* what is new in the area of accounting information systems.
7. *Be able to* distinguish between such terms as “systems,” “information systems,” “information technology,” and “accounting information systems.”

“Cloud computing ... It’s about reallocating the IT budget from maintenance—such as keeping servers running, performing upgrades, and making backups—to actually improving business processes and delivering innovation to the finance organization.”

Gill, R. 2011. Why cloud computing matters to finance.
Strategic Finance 92(7): 43–47.

1.1 INTRODUCTION: WHY STUDY ACCOUNTING INFORMATION SYSTEMS?

This chapter begins by answering the question “why should you study accounting information systems?” There are many reasons, but one of the most important is because of the special career opportunities that will enable you to combine your study of accounting subjects with your interest in computer systems. In today’s job market, accounting employers expect new hires to be computer savvy. A large number of specialized and highly compensated employment opportunities are only available to those students who possess an integrated understanding of accounting and information systems and can bring that understanding to bear on complicated business decisions.

Think about it. When is the last time you went into a bank, filled out a piece of paper to withdraw cash from your bank account, and then stood in line waiting for a teller to help you? When is the last time you went to a travel agency to ask someone to find you an airline ticket for your spring break vacation to Florida or the Virgin Islands?

Or when is the last time you stood in line to fill out paperwork for the courses you wanted to take for next semester? Most likely, the answer to each of these questions is “never.” And that is because of IT. Information technology is so pervasive today that it is nearly impossible to do anything that does not in some way involve technology. So ask yourself the question, “how can you possibly be a successful accountant if you do not have a basic understanding of how technology influences the profession?”

1.2 CAREERS IN ACCOUNTING INFORMATION SYSTEMS

Our introductory remarks to this chapter suggest a variety of reasons why you should study **accounting information systems (AISs)**. Of them, perhaps the most interesting to students is the employment opportunities available to those who understand both accounting and information systems.

Traditional Accounting Career Opportunities

Certainly, a number of traditional accounting jobs are available to those who choose to study accounting as well as accounting information systems. Because technology plays such a strong role in internal auditing, public accounting, managerial accounting, auditing, and taxation, AIS majors enjoy the advantage of understanding both traditional accounting concepts and information systems concepts. Recognizing the importance to accountants of knowledge about information systems, the American Institute of Certified Public Accountants (AICPA) developed a new designation: **Certified Information Technology Professional (CITP)**, which accountants can earn if they have business experience and if they pass an examination.

Systems Consulting

A consultant is an outside expert who helps an organization solve problems or who provides technical expertise on an issue. **Systems consultants** provide help with issues concerning information systems—for example, by helping an organization design a new information system, select computer hardware or software, or reengineer business processes so that they operate more effectively.

One of the most important assets a consultant brings to the job is an objective view of a client’s organization and its processes and goals. AIS students who are skilled in both accounting and information systems are particularly competent systems consultants because they understand how data flow through accounting systems as well as how business processes function. Systems consultants can help a variety of organizations, including professional service organizations, private corporations, and government agencies. This broad work experience, combined with technical knowledge about hardware and software, can be a valuable asset to CPA clients. Because it is likely that a newly designed system will include accounting-related information, a consultant who understands accounting is particularly helpful. Many systems consultants work for large professional service organizations, such as Accenture or Cap Gemini Ernst & Young. Others may work for specialized organizations that focus on the custom design of accounting information systems.

Consulting careers for students of accounting information systems also include jobs as **value-added resellers (VARs)**. Software vendors license VARs to sell a particular

software package and provide consulting services to companies, such as help with their software installation, training, and customization. That is, VARs are individuals who take a product and add value to the product for their customers, which might include such services as strategic planning, system design and implementation, technical support, database development, and other similar services. A VAR may set up a small one-person consulting business or may work with other VARs and consultants to provide alternative software solutions to clients.

Case-in-Point 1.1 American Management Technology (AMT) is a locally owned computer business in Chesterton, Indiana and provides both computer products and services to small businesses. It is especially focuses on providing network systems and services to small and medium-sized businesses. Its services include design and installation of network systems, training, and support. The staff at AMT consists of several technicians with over a combined 70 years of experience serving the Northwest Indiana computing community.¹

Certified Fraud Examiner

Due to increased concerns about terrorism and corporate fraud, forensic accounting is an important area for accountants to study and develop their skills. An accountant can acquire the **Certified Fraud Examiner (CFE)** certification by meeting the qualifications of the Association of Certified Fraud Examiners. To become a Certified Fraud Examiner, an individual must first meet the following qualifications: have a bachelor's degree, at least two years of professional experience in a field either directly or indirectly related to the detection or deterrence of fraud, be of high moral character, and agree to abide by the bylaws and code of professional ethics of the ACFE. If these are met, then the individual may apply for the CFE examination.

You might be asking yourself what sort of professional experience might be useful if you wish to satisfy the two-year requirement for certification. Not surprisingly, these jobs may be located within CPA firms across the United States, as well as within international public accounting firms. Other such positions might include working within a for-profit organization as an internal auditor, with a valuation expert in a law firm, with an FBI or CIA agent, or as an auditor for Medicaid, Medicare, or many other government organizations.

The salary ranges and possible job locations are varied. Most positions will likely be located in larger metropolitan areas, but may also be found in mid-sized cities. From the chart below (Figure 1-1) you can see that the salary ranges include several levels of positions in the internal audit area. Why do you think that might be the case?

Job Title	Salary Range
Fraud Investigator	\$39,551–91,715
Senior Internal Auditor	\$53,424–90,613
Internal Auditing Manager	\$74,441–111,778
Internal Auditor	\$42,971–76,480
Senior Auditor	\$50,848–95,600

FIGURE 1-1 Examples of job titles and pay range for CFEs. Source: PayScale.com, Average Salary for Certification: Certified Fraud Examiner (CFE), accessed March 2014.

¹ AMT Computers, Chesterton, Indiana, accessed from www.amtcomputers.com, March 2014.

Assurance Services

- Financial statement attestation
- Internal control reporting
- Assess procedures and controls concerning privacy and confidentiality, performance measurement, systems reliability, outsourced process controls, information security

Business Risk Services**Fraud Investigation and Dispute Services****Technology and Security Risk Services****Specialty Advisory Services**

FIGURE 1-2 A sample of the many types of services offered by Ernst & Young LLP, one of the largest international professional service organizations.

Essentially, fraud occurs where there are weak internal controls or when a manager or employee circumvents the internal controls that are in place. A more detailed explanation of internal controls is contained in Chapters 13 and 14.

Information Technology Auditing and Security

Information technology (IT) auditors focus on the risks associated with computerized information systems. These individuals often work closely with financial auditors to assess the risks associated with automated AISs—a position in high demand because almost all systems are now computerized. Information systems auditors also help financial auditors decide how much time to devote to auditing each segment of a company's business. This assessment may lead to the conclusion that the controls within some portions of a client's information systems are reliable and that less time need be spent on them—or the opposite. Due to the growing need for this type of auditor, we devote an entire chapter to IT auditing—Chapter 15.

IT auditors are involved in a number of activities apart from assessing risk for financial audit purposes. Many of these auditors work for professional service organizations, such as Ernst & Young, PricewaterhouseCoopers, or KPMG. Figure 1-2 identifies a partial listing of the types of services offered by Ernst & Young.

IT auditors might be CPAs, or they might be licensed as **Certified Information Systems Auditors (CISAs)**—a certification given to professional information systems auditors by the **Information Systems Audit and Control Association (ISACA)**. To become a CISA, you must take an examination and obtain specialized work experience. Many CISAs have accounting and information systems backgrounds, although formal accounting education is not required for certification. IT auditors help in documenting and evaluating IT controls.

According to the ISACA website, there is a growing demand for employees who have IS audit, control, and security skills. The CISA certification is therefore in high demand worldwide because these individuals: (1) are qualified, experienced professionals; (2) provide the enterprise with a certification for IT assurance that is recognized by multinational clients, lending credibility to the enterprise; (3) have proficiency in technology controls; (4) demonstrate competence in five domains, including standards and practices; organization and management; processes; integrity, confidentiality, and availability; and software development, acquisition, and maintenance; (5) demonstrate a commitment to providing the enterprise with trust in and value from information

systems; and (6) maintain ongoing professional development for successful on-the-job performance.²

Case-in-Point 1.2 According to Marios Damianides, a Partner at E&Y, LLP, USA, who is himself CISA certified, “the world of technology is ever-changing, and I need to know that my employees are prepared to face such challenges. The CISA designation is an excellent indicator of proficiency in technology controls.”³

Sometimes the best way to assess the risks associated with a computerized system is to try to penetrate the system, which is referred to as **penetration testing**. These tests are usually conducted within a systems security audit from which the organization attempts to determine the level of vulnerability of their information systems and the impact such weaknesses might have on the viability of the organization. If any security issues are discovered, the organization will typically work swiftly to correct the problems or at least mitigate the impact they might have on the company. But what if someone else penetrates an organization’s systems? That is commonly called “hacking” and is usually a very serious problem for any company. We cover hacking in more detail in Chapter 3.

Case-in-Point 1.3 In December 2013, the Target company had their systems hacked, which affected customers who shopped at US Target stores between November 27 and December 15. The hacker(s) were able to steal customer names, credit or debit card numbers, expiration dates, and CVVs (the security code on the back of each card). The company said the hackers could use the data to make card replicas. To help mitigate the damage, Target management immediately notified the Secret Service, which safeguards the nation’s payment and financial systems.⁴

Predictive Analytics

What you will soon learn from reading this book, and hopefully through reading professional accounting journals, is that the accounting profession is constantly changing. To be successful as an accounting professional you will need to stay abreast of these changes, or better yet—get out in front of some of the expected trends in the profession. One of those trends that we want to alert you to is the rapidly growing opportunities in the field of predictive analytics, which is the result of the tremendous amount of data that is now available within organizations (e.g., data warehouses which offer opportunities for data mining). In the future, this is the most likely area where you can add value—by being able to analyze that data and make useful business predictions for your clients.

You might be surprised to learn that a number of accounting jobs already require this type of skill set—for example, jobs such as client service analyst, quantitative analyst, risk analyst, and FP&A analyst (responsible for preparing the annual plan and long-range or five-year plan for a company and usually reports to the CFO).⁵ So what exactly is predictive analytics, and what does this type of professional do? The **predictive analytics professional** uses a variety of skills and abilities, ranging from statistical analysis, data modeling, and data mining to make predictions about future events for management decision-making.

² ISACA (www.isaca.org).

³ The Benefits of CISA, accessed from ISACA (www.isaca.org), March 2014.

⁴ Wallace, G. “Target credit card hack: What you need to know,” December 23, 2013, CNN Money, accessed March 2014.

⁵ icrunchdata.com, accessed March 2014.

This might require a mind shift for some accounting majors. Rather than seeking an MBA degree or an MS in Accounting, consider an MS degree in Analytics or Business Analytics. There are now at least 44 such degree programs in the United States, offering full-time, part-time, and online delivery. So that you can appreciate the strong demand for this new type of credential, the first MS in Analytics program was available in 2007, and 8 of the 44 programs just started in 2014.⁶ If you go to the website at footnote 5, you can find the 44 universities that offer these programs, the length of each program, the cost, and the curriculum. You might also be interested in starting salaries (see Institute for Advanced Analytics, MSA Career Placement, Annual Employment Report, analytics.ncsu.edu, accessed March 2014).

1.3 ACCOUNTING AND IT

Information technology is pervasive and impacts every area of accounting. Instantaneous access is available to the Internet via mobile communication devices such as cell phones, iPads, smart phones, and so on, which enable activities to take place anytime, anywhere. For example, managerial accountants can complete important work tasks while traveling in the field, auditors can communicate with each other from remote job sites (while auditing the same client), staff accountants can text message one another from various locations, and tax experts can download current information on tax rulings.

Figure 1-3 provides an overview of the major areas within the field of accounting that are impacted by information technology. This section of the chapter considers the influence of IT on each of them.

Financial Accounting

The major objective of **financial accounting information system** is to provide relevant information to individuals and groups *outside* an organization's boundaries—for example, investors, federal and state tax agencies, and creditors. Accountants achieve

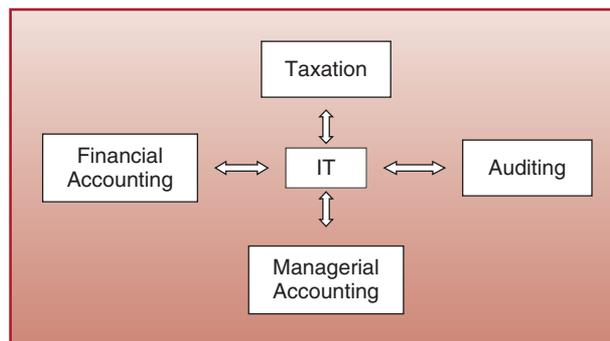


FIGURE 1-3 Overview of the major areas of accounting that are impacted by information technology.

⁶“Survey of Graduate Degree Programs in Analytics,” Institute for Advanced Analytics, analytics.ncsu.edu, accessed March 2014.

these informational objectives by preparing such financial statements as income statements, balance sheets, and cash flow statements. Of course, managers *within* a company might also use financial reports for planning, decision-making, and control activities. However, for most decisions within the firm, managers likely use managerial accounting reports.

Recall from your financial accounting course, an organization's financial accounting cycle begins with analyzing and journalizing transactions (e.g., captured at the point of sale) and ends with its periodic financial statements. Accounting clerks, store cashiers, or even the customers themselves input relevant data into the system that stores these data for later use. In financial AISs, the processing function also includes posting these entries to general and subsidiary ledger accounts and preparing a trial balance from the general ledger account balances.

Nonfinancial Data. The basic inputs to, and outputs from, traditional financial accounting systems are usually expressed in monetary units. This can be a problem if the AIS ignores nonmonetary information that is also important to users. For example, an investor might like to know what the prospects are for the future sales of a company, but many financial AISs do not record such information as unfulfilled customer sales because such sales are not recognizable financial events—even though they are important ones. This is the basic premise behind **REA accounting**—the idea of also storing important nonfinancial information about resources, events, and agents in databases precisely because they are relevant to the decision-making processes of their users. We discuss the REA framework in greater detail in Chapter 5.

Inadequacies in financial performance measures have encouraged companies to consider nonfinancial measures when evaluating performance. Some of the advantages include: (1) nonfinancial measures can provide a closer link to long-term organizational strategies; (2) drivers of success in many industries are “intangible assets” such as intellectual capital and customer loyalty, rather than the “hard assets” that are recorded on balance sheets; (3) such measures can be better indicators of future financial performance; and (4) investments in customer satisfaction can improve subsequent economic performance by increasing revenues and loyalty of existing customers, attracting new customers, and reducing transaction costs.⁷

Several professional associations now formally recognize that nonfinancial performance measures enhance the value of purely financial information. For example, in 1994 a special committee of the American Institute of Certified Public Accountants (AICPA) recommended several ways that businesses could improve the information they were providing to external parties by including management-analysis data, forward-looking information such as opportunities and risks, information about management and shareholders, and background information about the reporting entity. Similarly, in 2002, the American Accounting Association (AAA) Financial Accounting Standards Committee recommended that the *Securities and Exchange Commission (SEC)* and the *Financial Accounting Standards Board (FASB)* encourage companies to voluntarily disclose more nonfinancial performance measures.

However, there are several suggestions that are important to keep in mind if a company chooses to collect metrics around nonfinancial performance measures. For example, keeping track of the information, such as using a dashboard is very helpful.

⁷ Source: Ittner, C. and D. Larcker, “Non-Financial Performance Measures: What Works and What Doesn't,” December 6, 2000, Knowledge@Wharton (knowledge.wharton.upenn.edu), accessed March 2015.

(We discuss dashboards in more depth in the next section of this chapter and in Chapter 12.) Also, limiting the number of measures is important so that a company remains focused on those that are truly critical to the performance of the company. And third, management should closely monitor the nonfinancial performance measures to be sure they use those that are relevant to the company's success.

Case-in-Point 1.4 The ThyssenKrupp company uses nonfinancial performance indicators to monitor sustainability, innovations, employees, environment and climate, and corporate citizenship. The company summarizes their goal in the following statement. “Our performance is reflected not only in our financial results, but also in the sustainability of our actions. We develop efficient solutions that conserve resources and protect the climate and the environment. For this we need capable employees—so we place strong emphasis on training and development and health and safety.”⁸

Real-Time Reporting. Another impact of IT on financial accounting is the timing of inputs, processing, and outputs. Financial statements are periodic and most large companies traditionally issue them quarterly, with a comprehensive report produced annually. With advances in IT that allow transactions to be captured immediately, accountants and even the AIS itself can produce financial statements almost in real time. Of course, some of the adjustments that accountants must make to the records are not done minute-by-minute, but a business can certainly track sales and many of its expenses continuously. This is especially useful to retailing executives, many of whom now use dashboards.

Interactive Data and XBRL. A problem that accountants, investors, auditors, and other financial managers have often faced is that data used in one application are not easily transferable to another. This means that accountants may spend hours preparing spreadsheets and reports that require them to enter the same data in different formats over and over. **Interactive data** are data that can be reused and carried seamlessly among a variety of applications or reports. Consider, for example, a data item such as total assets. This number might need to be formatted and even calculated several different ways for reports such as filings with the Securities and Exchange Commission (SEC), banks, performance reports, and so on. With interactive data, the data are captured once and can be used wherever needed.

Interactive data require a language for standardization that “tags” the data at its most basic level. As an example, for total assets, this would be at the detail level for each asset. **Extensible business reporting language (XBRL)** is the language of choice for this purpose. As of 2010, the SEC requires public companies to file their financial reports in XBRL format. In addition, many companies, software programs, and industries are beginning to incorporate XBRL for creating, transforming, and communicating financial information.

We will discuss cloud computing later in this chapter, but at this point, we want to make you aware of this technology with respect to XBRL. XBRL Cloud made a viewer available that allows anyone to examine SEC XBRL financial filings, and it is called the XBRL Cloud EDGAR Dashboard.⁹ When a filing is posted on the SEC website, XBRL Cloud takes the information and adds a new line to the Dashboard that indicates the name of the filing company, the form type filed, the percent of extended elements,

⁸ ThyssenKrupp, A.G., “Non-financial Performance Indicators,” Online Annual Report 2010/2011, accessed March 2014.

⁹ Rivet Software (rivetsoftware.com). “The Sadistic EDGAR Filer Manual—Sections 6.6.6 and 6.(1)6.6,” posted May 22, 2012.

the creation software that was used to prepare the filing, and free validation checking. A description of some of the Dashboard's features can be found at xbrl.squarespace.com. We discuss XBRL in more detail in Chapter 2, and you can learn about the current status of XBRL at www.XBRL.org.

Case-in-Point 1.5 The Federal Deposit Insurance Corporation (FDIC) insures bank deposits over a specific amount. FDIC wanted to create an Internet-based Central Data Repository that stored all the call (quarterly) data they received from more than 7,000 banks. They convinced their software vendors to incorporate XBRL language to standardize the data. The tagged data the FDIC receives from banks now has improved accuracy and can be published and made available to users much more quickly than before.¹⁰

Managerial Accounting

The principal objective of managerial accounting is to provide relevant information to organizational managers—that is, users who are internal to a company or government agency. Cost accounting and budgeting are two typical parts of a company's managerial accounting system. Let us examine each of them in turn.

Cost Accounting. Due to globalization, decentralization, deregulation, and other factors, companies continue to face stiff competition. The result is that companies must be more efficient and be more adept at controlling costs. The **cost accounting** part of managerial accounting specifically assists management in measuring and controlling the costs associated with an organization's various acquisition, processing, distribution, and selling activities. In the broadest sense, these tasks focus on the *value added* by an organization to its goods or services, and this concept remains constant whether the organization is a manufacturer, a bank, a hospital, or a police department.

Take health care for an example. Although much controversy surrounded the health care legislation that was signed into law in 2010, there is one fact that most currently agree upon—that the health care industry is a very large portion of the US economy and that it is growing rapidly as the “baby boomer generation” reaches retirement age. These facts, coupled with increased regulatory demands on health care providers and hospitals, suggest the need for sophisticated accounting systems to maintain critical data, as well as the need for up-to-date reports for decision-making.

Case-in-Point 1.6 Survey data from more than 100 hospital CFOs suggests five major themes regarding the evolution of financial practices in health care. Two of those themes are (1) a greater focus on internal controls (supported by information and management systems) and (2) an increased reliance on business analysis (requirement to develop and measure business performance).¹¹

Activity-Based Costing. One example of an AIS in the area of cost accounting is an **activity-based costing (ABC) system**. Traditionally, cost accountants assigned overhead (i.e., indirect production costs) on the basis of direct labor hours because the number of labor hours was usually directly related to the volume of production. The problem with this traditional system is that, over time, increased reliance on automation has caused manufacturers to use less and less direct labor. Thus, managers became frustrated using this one method of assigning overhead costs when a clear

¹⁰ Improved Business Process through XBRL: A Use Case for Business Reporting, Federal Financial Institutions Examination Council, White Paper, February 2, 2006. Accessed from XBRL.org on March 2014.

¹¹ Langabeer, J., J. Dellifraire, and J. Helton. 2010. Mixing finance and medicine. *Strategic Finance* 92(6): 27–34.

relationship between labor and these overhead expenses no longer seemed to exist. Instead, managers in a variety of manufacturing and service industries now identify specific activities involved in a manufacturing or service task and then assign overhead costs based on the resources directly consumed by each activity.

Although activity-based costing techniques have been available for several decades, they are more common now that computerized systems can track costs. These systems can move an organization in new strategic directions, allowing corporate executives to examine fundamental business processes and enabling them to reengineer the way they do business. ABC systems can also play an essential strategic role in building and maintaining a successful e-commerce business because they can answer questions about production costs and help managers allocate resources more effectively.

Case-in-Point 1.7 “Chrysler, an American car manufacturer, claims that it has saved hundreds of millions of dollars since introducing activity based costing in the early 1990s. ABC showed that the true cost of certain parts that Chrysler made was 30 times what had originally been estimated, a discovery that persuaded the company to outsource the manufacture of many of those parts.”¹²

Corporate Performance Measurement and Business Intelligence. Another example of an AIS used in the area of cost accounting is in corporate performance measurement. In a **responsibility accounting system**, for example, managers trace unfavorable performance to the department or individuals that caused the inefficiencies. Under a responsibility accounting system, each subsystem within an organization is only accountable for those items over which it has control. Thus, when a particular cost expenditure exceeds its standard cost, managers can take immediate corrective action.

In addition to the traditional financial measures, cost accountants also collect a variety of nonfinancial performance measures to evaluate such things as customer satisfaction, product quality, business innovation, and branding effectiveness. The **balanced scorecard** measures business performance in four categories: (1) financial performance, (2) customer knowledge, (3) internal business processes, and (4) learning and growth. A company may choose to rank these categories to align with their strategic values. For example, a company may stress “customer knowledge” because customer satisfaction is important to its market position and planned sales growth.

Balanced scorecards and corporate performance measurement are not new ideas. But with the Internet, integrated systems, and other advanced technologies, balanced scorecards and other approaches to CPM are becoming increasingly valuable **business intelligence** tools. Businesses use **key performance indicators (KPIs)** to measure and evaluate activities in each quadrant of the balanced scorecard. For example, a financial KPI might be return on investment. In the customer area, a company might track the number of new customers per month.

Dashboards (Figure 1-4) are commonly used to monitor key performance metrics. Dashboards usually appear in color, so that red, for example, might indicate a failure to meet the goal. Another indicator might be up and down arrows to show how a key activity performs for a certain time period. Dashboards are especially useful to managers who appreciate the presentation of important performance data in easy-to-understand graphic formats.

Case-in-Point 1.8 Accounting and advisory firms often work with organizations to select appropriate software to serve their information and IT needs. Most dashboards can be adapted for use at the highest level of the firm—even at the board of directors’ level—or at any level below. Four

¹² *The Economist*, “Idea: Activity-based costing,” June 29, 2009.

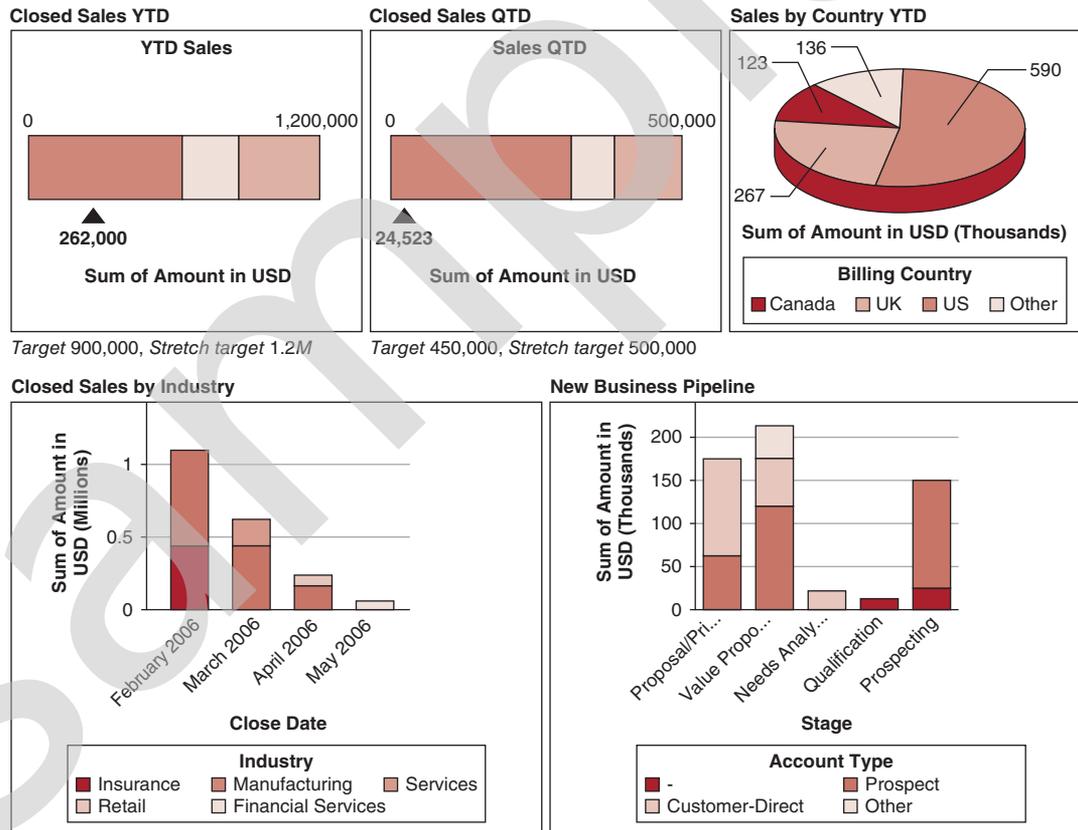


FIGURE 1-4 An example of an executive dashboard.

of the industry leaders that offer software that can design a dashboard are IBM (Cognos), Actuate (PerformanceSoft), SAP (Business Objects/Pilot Software), and iDashboard.¹³

Budgeting. A budget is a financial projection for the future and is thus a valuable managerial planning aid. Companies develop both short- and long-range budget projections. Short-range budget projections disclose detailed financial plans for a 12-month period, whereas long-range budgets are less-detailed financial projections for five or more years into the future. Management accountants are normally responsible for an organization's budget.

A good budgetary system is also a useful *managerial control* mechanism. Because managers use budgets to predict future financial expectations, they can compare the causes of significant variations between *actual* and *budgeted* results during any budget period. Through timely performance reports that compare actual operating results with prescribed norms, managers are able to identify and investigate significant variations. While negative variations are normally cause for concern, favorable budget variations are not always good news either. For example, managers might find cheaper inputs and have a positive variation from the standard cost, but such a savings might cause quality problems with the finished product. Regardless of whether variations are positive or negative, managers can use the information for better decision-making.

¹³ Ballou, B., D. Heitger, and L. Donnell. 2010. Creating effective dashboards. *Strategic Finance* 91(9): 27–32.

Auditing

The traditional role of auditing has been to evaluate the accuracy and completeness of a corporation's financial statements. In recent years, however, the individuals working in CPA firms would probably argue that they are actually in the assurance business—that is, the business of providing third-party testimony that a client complies with a given statute, law, or similar requirement. Historically, the growth of such assurance services can be traced to a conference of the American Institute of Certified Public Accountants in 1993, which created a Special Committee on Assurance Services to identify and formalize some other areas (besides financial audits) in which accountants could provide assurance services. Figure 1-5 describes the first six areas identified by the committee.

Today, there are several additional areas in which auditors can perform assurance work, many involving accounting information systems. One example is to vouch for a client's compliance with HIPAA laws, the privacy requirements of the Health Insurance Portability and Accountability Act. Another example is **CPA Trust Services**, a set of professional service areas built around a set of common principles and criteria related to the risks and opportunities presented by IT environments. Trust services include online privacy evaluations, security audits, tests of the integrity of information processing systems, verification of the availability of IT services, and tests of systems confidentiality.

Despite the rise in ancillary assurance services, auditors mainly focus on traditional financial auditing tasks. As noted earlier, computerized AISs have made these tasks more challenging. For example, automated data processing also creates a need for auditors to evaluate the risks associated with such automation. Chapter 15 discusses the audit of computerized accounting information systems and the ways in which auditors use information technology to perform their jobs.

In addition to the auditing and assurance businesses mentioned above, many CPA firms also perform management consulting tasks—for example, helping clients acquire, install, and use new information systems. The AIS at Work feature at the end of this chapter describes one such consulting area. However, the corporate accounting

Risk Assessment

Provide assurance that an organization's set of business risks is comprehensive and manageable.

Business Performance Measurement

Provide assurance that an organization's performance measures beyond the traditional measures in financial statements are relevant and reasonable for helping the organization to achieve its goals and objectives.

Information Systems Reliability

Provide assurance that an organization's information system has been designed to provide reliable information for decision-making.

Electronic Commerce

Provide assurance that organizations doing business on the Internet can be trusted to provide the goods and services they promise, and that there is a measure of security provided to customers.

Health Care Performance Measurement

Provide assurance to health care recipients about the effectiveness of health care offered by a variety of health care providers.

Eldercare Plus

Provide assurance that various caregivers offering services to the elderly are offering appropriate and high-quality services.

FIGURE 1-5 Assurance services identified by the American Institute of Certified Public Accountants Special Committee on Assurance Services.

scandals in the early 2000s led members of the Securities and Exchange Commission and the US Congress to question whether a CPA firm can conduct an independent audit of the same systems it recently assisted a client in installing and using—a concern intensified when audit staff at Arthur Andersen LLP apparently deliberately destroyed auditing papers for the Enron corporation that many believe would have confirmed doubts. Thus, the Sarbanes-Oxley Act of 2002 expressly forbids such potential conflicts of interest by not allowing CPA firms from simultaneously acting as a “management consultant” and the “independent auditor” for the same firm.

Despite this requirement, however, there are still many areas in which CPA firms provide consulting services to clients. Examples include business valuations, litigation support, systems implementation, personal financial planning, estate planning, strategic planning, health care planning, making financing arrangements, and performing forensic (fraud) investigations.

Taxation

Although some individuals still complete their income tax returns manually, many now use computer programs such as *TurboTax* for this task. Such tax preparation software is an example of an AIS that enables its users to create and store copies of trial tax returns, examine the consequences of alternative tax strategies, print specific portions of a return, and electronically transmit complete copies of a state or federal tax return to the appropriate government agency.

Similarly, information technology also helps tax professionals research challenging tax questions—for example, by providing access to electronic tax libraries online and other more up-to-date tax information than traditional paper-based libraries. Tax professionals typically subscribe to online tax services by paying a fee for the right to access databases of tax information. Online services can provide tax researchers with databases of federal and state tax laws, tax court rulings, court decisions, and technical advice.

1.4 WHAT ARE ACCOUNTING INFORMATION SYSTEMS?

Now that you know the exciting career opportunities that are available to accountants who also have technology skills and understand the impact of technology on the profession, let us now focus on the terminology surrounding accounting information systems. What exactly do we mean by information systems, and why do we care about the difference between information and data?

Accounting Information Systems

Accounting information systems (AISs) stand at the crossroads of two disciplines: “accounting” and “information systems.” As a result, the study of AISs is often viewed as the study of computerized accounting systems. Thus, we define an **accounting information system** as a collection of data and processing procedures that creates needed information for its users. Let us examine in greater detail what this definition really means. For our discussion, we’ll examine each of the words in the term “accounting information systems” separately.

Applications	Examples of AIS information
Finance	Credit card transaction summaries, cash and asset management, multi-company and multi-currency management
Human resources	Workforce training and employee management, benefits management, payroll summaries and management
Marketing	Customer relationship management, sales management, sales forecasts and annual summaries
Production	Materials requirement planning, inventory management and summaries, product cost analysis
Supply chain management	Supplier relationship management, demand trends, inventory levels, warehouse management

FIGURE 1-6 Examples of information an AIS can generate for various business functions.

Accounting. You probably have a pretty good understanding of accounting because you have already taken one or more courses in the area. You know that the accounting field includes financial accounting, managerial accounting, taxation, and so forth. Accounting information systems are used in all these areas—for example, to perform tasks in such areas as payroll, accounts receivable, accounts payable, inventory, and budgeting. In addition, AISs help accountants maintain general ledger information, create spreadsheets for strategic planning, and distribute financial reports.

It is difficult to think of an accounting task that is not integrated, in some way, with an accounting information system. As a result, accountants must determine how best to provide the information contained in an AIS to support business decisions. AISs also create information that is useful to nonaccountants, such as individuals working in marketing, production, or human relations. Figure 1-6 provides some examples. For this information to be effective, the individuals working in these subsystems must help the developers of an AIS identify what information they need for their planning, decision-making, and control functions. These examples illustrate why an AIS course is useful not only for accounting majors, but for all business majors.

Information (versus Data). Although the terms **data** and **information** are often used interchangeably, they do not have the same meaning. *Data* (the plural of *datum*) are raw facts about events that have little organization or meaning—for example, a set of raw scores on a class examination. To be useful or meaningful, most data must be processed into useful *information*. An example might be to take the raw scores of a class exam and compute the class average.

Do raw data *have* to be processed in order to be meaningful? The answer is no. Imagine, for example, that *you* take a test in a class. Which is more important to you—the average score for the class as a whole (a processed value) or *your* score (a raw data value)? Similarly, suppose you own shares of stock in a particular company. Which of these values would be *least* important to you: (1) the *average* price of a stock that was traded during a given day (a processed value), (2) the price *you* paid for the shares of stock (an unprocessed value), or (3) the *last* price trade of the day (another unprocessed value)?

Raw data are also important because they mark the starting point of an **audit trail**—the path that data follow as they flow through an AIS. In a payroll system, for example, an input clerk enters the data for a new employee, and the AIS keeps track of the wages due that person each pay period. An auditor can verify the existence of employees and whether each employee received the correct amount of money.

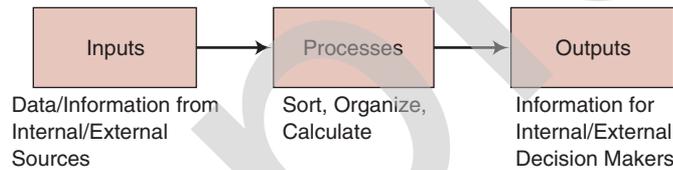


FIGURE 1-7 An information system's components. Data or information is input, processed, and output as information for planning, decision-making, and control purposes.

Case-in-Point 1.9 A former payroll manager at the Brooklyn Museum pleaded guilty to embezzling \$620,000 by writing paychecks to “ghost employees.” Dwight Newton, 40, admitted committing wire fraud by adding workers to the payroll who did not exist and then wiring their wages directly into a joint bank account that he shared with his wife. Under a plea agreement, Newton must repay the museum the stolen funds. He was ordered to forfeit \$77,000 immediately, sell his Barbados timeshare, and liquidate his pension with the museum.¹⁴

Despite the potential usefulness of some unprocessed data, most end users need financial totals, summary statistics, or exception values—that is, processed data—for decision-making purposes. Figure 1-7 illustrates a model for this—a three-stage process in which (1) raw and/or stored data serve as the primary inputs, (2) processing tasks process the data, and (3) meaningful information is the primary output. An AIS typically performs the necessary tasks in each step of the process. For example, a catalog retailer might use web pages on the Internet to gather customer purchase data, then use central file servers and data storage to process and store the purchase transactions, and finally employ other web pages and printed outputs to confirm and distribute information about the order to appropriate parties.

While computers are efficient and useful tools, they can also create problems. One is that computers do not automatically catch the simple input errors that humans do. For example, if you were performing payroll processing, you would know that a value of “-40” hours for the number of hours worked was a mistake—the value should be “40.” A computer can be programmed to look for (and reject) bad input, but it is difficult to anticipate all possible errors.

Another problem created by computers is that they make audit trails more difficult to follow. This is because the path that data follow through computerized systems is electronic. However, a well-designed AIS can still document its audit trail with listings of transactions and account balances both before and after the transactions update the accounts. A major focus of this book is on developing effective internal control systems for companies, and audit trails are important elements. Chapters 13, 14, and 15 discuss these topics in detail.

In addition to collecting and distributing large amounts of data and information, AISs must also organize and store data for future uses. In a payroll application, for example, the system must maintain running totals for the earnings, tax withholdings, and retirement contributions of each employee in order to prepare end-of-year tax forms. These data-organization and storage tasks are major challenges and is one of the reasons why this book contains three chapters on the subject (see Chapters 7, 8, and 9).

Besides deciding *what* data to store, businesses must also worry about how best to *integrate* the stored data for end users. An older approach to this problem was to maintain independently the data for each of its traditional organization functions—for example, finance, marketing, human resources, and production. A problem with this

¹⁴ Brooklyn Museum Embezzlement in *New York Magazine* (nymag.com), accessed March 2014.

approach is that, even if all the applications are maintained internally by the same IT department, there will be separate data-gathering and reporting responsibilities within each subsystem, and each application may store its data independently of the others. This often leads to a duplication of data-collecting and processing efforts, as well as conflicting data values when specific information (e.g., a customer's address) is changed in one application but not another.

Organizations recognize the need to integrate the data associated with their functions into large, seamless data warehouses. This integration allows internal managers and possibly external parties to obtain the information needed for planning, decision-making, and control, whether or not that information is for marketing, accounting, or some other functional area in the organization. To accomplish this task, many companies are now using large, expensive **enterprise resource planning (ERP)** software packages to integrate their information subsystems into one application. An example of such a software product is *SAP R/3*, which combines accounting, manufacturing, and human resource subsystems into an enterprisewide information system—that is, a system that focuses on the *business processes* of the organization as a whole. We discuss these systems in more depth in Chapter 12.

SAP, SAS Institute, IBM, and Oracle have recognized the need for integrated information and therefore developed business intelligence software to meet this need. As a result, software developers are including **predictive analytics** features into their main software suites. These analytics tools include a variety of methodologies that managers might use to analyze current and past data to help predict future events or trends. In March 2010, IBM opened a predictive analytics lab in China, which is the latest in an estimated \$12 billion commitment to build out IBM's analytics portfolio.¹⁵

Case-in-Point 1.10 Accountants and other managers are using predictive and real-time analytics, which take advantage of data stored in data warehouses to create systems that allow them to use their data to improve performance. For example, two weeks every August and September, the United States Tennis Association welcomes hundreds of thousands of spectators to the US Open tennis tournament. Predictive and real-time analytics drive IBM's SlamTracker, which identifies key actions players must take to enhance their odds of winning. These same technologies are being used by police departments to prevent crime, retailers to drive sales, and financial firms to reduce fraud.¹⁶

It is no secret that the amount of data in data warehouses around the globe has been exploding. As a result, managers are grappling with how best to analyze these large data sets (called "**big data**") for competitive advantage, to identify consumer trends, and for other critical decisions. In a 2012 white paper from Intel, the authors claim that "the ability to mine and analyze big data gives organizations deeper and richer insights into business patterns and trends, helping drive operational efficiencies and competitive advantage in manufacturing, security, marketing, and IT."¹⁷

Systems. Within the accounting profession, the term "systems" usually refers to "computer systems." As you know, IT advances are changing the way we do just about everything. Less than a decade ago, the authors never imagined that people could

¹⁵ Vance, J. "Business Intelligence Software and Predictive Analytics," ITBusinessEdge (www.itbusinessedge.com), accessed March 24, 2010.

¹⁶ "Data Is a Game Changer," IBM Smarter Enterprise, U.S. Open Case Study (www.ibm.com), accessed March 2014.

¹⁷ Fania, M. and J. D. Miller. July 2012. IT@Intel White Paper, IT Best Practices, "Mining Big Data in the Enterprise for Better Business Intelligence," accessed March 2014 from www.intel.com.

someday purchase a book from a “virtual bookstore” on the Internet using a wireless device, while enjoying a latte in a Starbucks! The explosion in electronic connectivity and commerce are just some of the many ways that IT influences how people now access information or how firms conduct business. Today, IT is a vital part of what accountants must know to be employable.

Returning to our definition, you probably noticed that we did *not* use the term “computer,” although we did use the term “processing procedures.” You already know the reason for this—not all AISs are computerized or even need to be. But most of the ones in businesses today are automated ones and thus the term “processing procedures” could be replaced by the term “computerized processing” for almost all AISs.

In summary, it is convenient to conceptualize an accounting information system as a set of components that collect accounting data, store it for future uses, and process it for end users. This abstract model of data inputs, storage, processing, and outputs applies to almost all the traditional accounting cycles with which you are familiar—for example, the payroll, revenue, and expenditure cycles—and is thus a useful way of conceptualizing an AIS. Again, we stress that many of the “end users” of the information of an AIS are not accountants, but include customers, investors, suppliers, financial analysts, and government agencies.

The Role of Accounting Information Systems in Organizations

Information technology (IT) refers to the hardware, software, and related system components that organizations use to create computerized information systems. IT has been a major force in our current society and now influences our lives in many personal ways—when we use digital cameras to take pictures, access the Internet to make a purchase or learn about something, or email friends and family. It is perhaps less clear that computer technology has also had profound influences on commerce. In our current **information age**, fewer workers actually make products while more of them produce, analyze, manipulate, and distribute information *about* business activities. These individuals are often called **knowledge workers**. Companies find that their success or failure often depends upon the uses or misuses of the information that knowledge workers manage.

Case-in-Point 1.11 According to a 2010 report from InfoTrends, mobile knowledge workers make up more than 60 percent of the total workforce in Brazil, Germany, India, and Japan. That number is even higher in the United States—over 70 percent of the total workforce. Current projections suggest that these numbers are expected to grow through 2014.¹⁸

The information age has important implications for accounting because that is what accountants are—knowledge workers. In fact, accountants have always been in the “information business” because their role has been, in part, to communicate accurate and relevant financial information to parties interested in how their organizations are performing. And this includes the increasing importance and growth of **e-business**, conducting business over the Internet or dedicated proprietary networks and **e-commerce**, a subset of e-business, which refers mostly to buying and selling on the Internet.

¹⁸ *InfoTrends* (www.infotrends.com). “Mobile Knowledge Workers the Fastest Growing Segment of the Office Workforce” (Weymouth, MA), January 20, 2011, accessed March 2014.

In many ways, accounting is itself an information system—that is, a communicative process that collects, stores, processes, and distributes information to those who need it. For instance, corporate accountants develop financial statements for external parties. But users of accounting information sometimes criticize AISs for only capturing and reporting *financial* transactions. They claim that financial statements often ignore some of the most important activities that influence business entities. For example, the financial reports of a professional basketball team would not include information about hiring a new star because this would not result in journal entries in the franchise's double-entry accounting system.

Today, however, AISs are concerned with nonfinancial as well as financial data and information. Thus, our definition of an AIS as an enterprise-wide system views accounting as an organization's primary producer and distributor of many different types of information. This matches the contemporary perspective that accounting systems are not only financial systems.

1.5 WHAT'S NEW IN ACCOUNTING INFORMATION SYSTEMS?

The last few years have witnessed some of the most startling changes in the uses and applications of accounting information systems, causing us to reassess our understanding and uses of accounting data. Below are a few examples.

Cloud Computing—Impact for Accountants

In Chapter 2 we identify the basics of cloud computing, but in this section we want to discuss why this technology is important to accountants and then describe some of the current issues surrounding cloud computing as it relates to accounting professionals. According to Ron Gill, **cloud computing** is a way of using business applications over the Internet—like you use the Internet for your bank transactions. Think of cloud computing as a way to increase IT capacity or add capabilities without investing in new infrastructure, training new people, or licensing new software. Mostly, we're talking about a subscription-based or pay-per-use service that makes IT's existing capabilities scalable whenever the need exists, using the Internet. Gartner predicts that from 2013 to 2016, \$677 billion will be spent on cloud services worldwide, and \$310 billion of that amount will be spent on cloud advertising.¹⁹

Cloud computing resources may be categorized as data storage, infrastructure and platform, or application software (i.e., business applications such as purchases, HR, sales). If a firm would like to take advantage of cloud computing, it would most likely need to subscribe to all three of these categories from the service provider. For example, business applications depend on company data that is stored in the database, and data storage depends on the appropriate infrastructure.²⁰

Experts identify a number of important benefits of using the cloud. One is the ability to only pay for the applications that you use, and those applications are offered over the Internet. Of course, this sort of flexibility also suggests that a firm has the ability to quickly modify the scale of its IT capability. Another benefit is that an organization may not have to purchase or operate expensive hardware and software—providers own

¹⁹ Gartner Press Release (www.gartner.com). "Gartner Says Worldwide Public Cloud Services Market to Total \$131 Billion," Stamford, CT. February 28, 2013, accessed March 2014.

²⁰ Du, H. and Y. Cong. 2010. Cloud computing, accounting, auditing, and beyond. *The CPA Journal* 80(10): 66–70.

Why Is Everyone Choosing Cloud Computing?	
• Support 24/7	• Only Pay for What You Use
• Lower Total Cost of Owning	• Reliable, Sustainable, Scalable
• Secure Storage Management	• Lowers Capital Expenditures
• Freed-Up Internal Resources	• Highly Automated
• Utility Based	• Easy Deployment
• Independent of Location	• Independent of Devices

FIGURE 1-8 Some of the reasons why cloud computing is becoming so pervasive.

and operate the equipment and software, much as a taxi company owns and operates its own fleet of vehicles. Also, cloud computing providers offer only one (current) version of an application, so individual firms no longer have to deal with expensive, time-consuming upgrades for software. See Figure 1-8.

Case-in-Point 1.12 For years, millions of people who attended the 10-day Taste of Chicago Festival carried around a 28-page brochure to find the various foods and music offerings. In 2009, the city posted this information online—a cloud technology from Microsoft that now delivers the same information right to the festival-goers’ smartphones.²¹

Accountants always talk about cost-benefit trade-offs. We just identified several possible benefits surrounding this new technology, so it is appropriate to mention that there are also costs and/or concerns. The first potential concern is reliability of the Internet since this is the medium for delivering all cloud services. Other issues include (1) data security measures that the provider offers (i.e., appropriate internal controls), (2) the quality of service that the provider gives the firm (i.e., careful crafting of the service contract is similar to that of any outsourcing contract, which includes vigilant monitoring of services for quality purposes), and (3) the reliability of the service provider (i.e., going concern issues). Accordingly, management accountants, internal auditors, and external auditors will need to evaluate the different risks that a firm may face if it decides to “use the cloud.”

Sustainability Reporting

Sustainability reporting focuses on nonfinancial performance measures that might impact an organization’s income, value, or future performance. A survey conducted in 2005 indicated that only 32 percent of the top 100 US companies (based on revenue) issued sustainability reports, while a similar survey in 2008 indicated that the reporting rate increased to 73 percent.²²

Case-in-Point 1.13 Johnson & Johnson began setting environmental goals in 1990 and reported to the public in 1993 and 1996. In 1998, they began annual sustainability reports for two reasons: because it’s the right thing to do and to create shareholder wealth through increased profits. The result is that Johnson & Johnson is a company that has experienced continued and sustained growth.²³

²¹ Barkin, R. January 1, 2011. “The cloud comes down to earth,” American City and County” accessed March 2014 at: americancityandcounty.com.

²² Ibid.

²³ Ibid.

Employee Health Indicators	Economic Factors	Employee Safety Factors
Tobacco use	Sales revenue	Fleet car accidents
High cholesterol	Net earnings	Lost workdays
Absenteeism	Share price	Employee accidents

FIGURE 1-9 Examples of sustainability items of interest to a firm and data that would be collected to report on each item of interest.

You might be asking yourself how this might be considered an accounting information systems issue if the information is “nonfinancial” in nature. As you will discover in Chapter 12, enterprise-wide systems are widely used to collect qualitative as well as quantitative information for decision-making within organizations. In fact, management control systems are the backbone of sustainability reports. That is, organizations need to establish well-defined sustainability strategies that identify achievable and measurable goals.²⁴ Figure 1-9 identifies examples of sustainability items of interest to firms and some of the data that would be collected to report on each item of interest.

Suspicious Activity Reporting

A number of **suspicious activity reporting (SAR)** laws now require accountants to report questionable financial transactions to the US Treasury Department. Examples of such transactions are ones suggestive of money laundering, bribes, or wire transfers to terrorist organizations. Federal statutes that mandate SARs include sections of the Annunzio-Wylie Anti-Money Laundering Act (1992), amendments to the Bank Secrecy Act of 1996, and several sections of the Patriot Act (2001). Institutions affected by these laws include (1) banks, (2) money service businesses such as currency traders, (3) broker dealers, (4) casinos and card clubs, (5) commodity traders, (6) insurance companies, and (7) mutual funds. Over the years, such filings have enabled the federal government to investigate a wide number of criminal activities, gather evidence, and in some cases, repatriate funds sent overseas. Testimony to the importance of suspicious activity reporting is the growth of SAR filings—from about 62,000 reports in 1996 to almost 1.5 million reports in 2012.

Case-in-Point 1.14 A cooperating witness indicated that a pharmaceutical network was selling controlled drugs through affiliated websites to customers without authorized prescriptions. To evade US laws, the owners located their headquarters in Central America and their web servers in the Middle East. A federal investigation and a SAR filed by a financial institution involved in the matter documented almost \$5 million in suspicious wire transfers. The result: indictments against 18 individuals and the repatriation of over \$9 million from overseas accounts as part of the forfeiture proceedings.²⁵

Suspicious activity reporting impacts AISs in several ways. Because so much of the information within AISs is financial, these systems are often used to launder money or fund criminal activities. As a result, AISs become important sources of SAR evidence and subsequent legal action. Finally, SAR can act as a deterrent to criminal or terrorist activities—and is therefore an important control for AISs.

²⁴ Busco, C., M. Frigo, E. Leone, and A. Riccaboni. 2010. Cleaning up. *Strategic Finance* 92(1): 29–37.

²⁵ “BSA Documents Lead to Repatriation & Seizure of over \$9 Million Generated by Illegal Internet Pharmacy,” Published in *The SAR Activity Review—Trends, Tips & Issues*, Issue 14, October 2008.

Forensic Accounting, Governmental Accountants, and Terrorism

As we discussed in the beginning section of this chapter, **forensic accounting** is a career field that is important and growing. This area of accounting has become a popular course at many universities over the past decade and some universities now have a number of specialized courses that are included in a fraud examination track or a forensic accounting track so that students may specialize in this area of accounting.²⁶ In general, a forensic accountant combines the skills of investigation, accounting, and auditing to find and collect pieces of information that collectively provide evidence that criminal activity is in process or has happened. British Prime Minister Gordon Brown claims that financial information and forensic accounting has become one of the most powerful investigative and intelligence tools available in the fight against crime and terrorism.²⁷

Terrorists need money to carry out their criminal activity, and as a result, forensic accountants have become increasingly important in the fight against their activities because these accountants use technology for data mining. For example, Audit Command Language (ACL) and Interactive Data Extraction and Analysis (IDEA), are popular data extraction software tools that auditors can use to spot anomalies and trends in data.

One example of the use of accounting information systems for this purpose is using banking systems to trace the flow of funds across international borders. Other examples include: (1) identifying and denying financial aid to terrorist groups and their sympathizers, (2) tracing arms and chemical orders to their final destinations, thereby identifying the ultimate—perhaps unauthorized—purchasers, (3) using spreadsheets to help plan for catastrophic events, (4) using security measures to control cyber terrorism, and (5) installing new internal controls to help detect money laundering and illegal fund transfers.

But where do terrorists get the money to finance their activities? Generally speaking, they rely on the following sources for funding: state sponsors, individual contributions, corporate contributions, not-for-profit organizations, government programs, and illegal sources—and here is where government accountants can play an important part in the fight against terrorism. Apparently, terrorists choose to live unpretentiously, they exploit weaknesses in government assistance programs, and they are skillful at concealing their activities.²⁸ Similar to forensic accountants, government accountants should use data extraction software to spot anomalies, suspicious activity, or red flags that might suggest illegal transactions.

Corporate Scandals and Accounting

Although corporate frauds and scandals are hardly new, the latest set of them has set records for their magnitude and scope. Of particular note are the Enron scandal and the case against Bernard Madoff. The Enron scandal is important because of the amount of money and jobs that were lost, and also because so much of it appears to be

²⁶ Examples include Georgia Southern University, West Virginia University, and North Carolina State University.

²⁷ The Role of Forensic Accounting in Terrorism, by Drew Nelson in eHow (<http://www.ehow.com>), accessed March 2014.

²⁸ Brooks, R., R. Riley, and J. Thomas, 2005. Detecting and preventing the financing of terrorist activities. *Journal of Government Financial Management* 54(1): 12–18.

directly related to the adroit manipulation of accounting records. Although the details of these manipulations are complex, the results were to understate the liabilities of the company as well as to inflate its earnings and net worth. The opinion of most experts today is that the mechanics of these adjustments might not have been illegal, but the intent to defraud was clear and therefore criminal.

Accounting rules allow for some flexibility in financial reporting. Unfortunately, some financial officers have exploited this flexibility to enhance earnings reports or present rosier forecasts than reality might dictate—that is, they “cooked the books.” Examples are Scott Sullivan, former Chief Financial Officer at WorldCom, Inc., Mark H. Swartz, former Chief Financial Officer at Tyco International, Inc., and Andrew Fastow, Enron’s former Chief Financial Officer. While some accountants have been guilty of criminal and unethical behavior, others have emerged from the scandals as heroes. These include Sherron Watkins, who tried to tell Ken Lay that the numbers at Enron just didn’t add up, and Cynthia Cooper, an internal auditor at WorldCom, who blew the whistle on the falsified accounting transactions ordered by her boss, Scott Sullivan.

As the credit crunch worked its way through the economy in 2008, a number of financial institutions either collapsed or narrowly avoided doing so and accounting was in the news once again. In March 2009, Bernard Madoff pleaded guilty to 11 federal felonies and admitted that he turned his wealth management business into a **Ponzi scheme** that defrauded investors of billions of dollars. Named for Charles Ponzi, this is a pyramid fraud in which new investment funds are used to pay returns to current investors. The fraud relies on new money continuously entering the system so that investors believe their money is actually earning returns. The problem is that when new money stops flowing, the pyramid collapses.

AIS AT WORK

The Cost of Not Filing a SAR²⁹

The name Madoff has become a household name in the United States. Bernard Lawrence “Bernie” Madoff, discussed in the previous section, was a stockbroker, investment advisor, and financier. Even before Madoff pleaded guilty to the largest Ponzi scheme in history, countless informed individuals wondered how in the world he could deceive so many people for decades—and many of these people were financial experts, including the staff at JPMorgan, where Madoff banked. In fact, as early as 1999 a man by the name of Harry Markopolos repeatedly tried to warn the authorities over a 10-year period.

As it turns out, the bank’s London desk did circulate a memo describing JPMorgan’s inability to validate his trading activity or custody of any assets. The memo also noted Madoff’s odd choice of a one-man accounting firm. Think about that—a wealth management firm with assets estimated to be \$65 billion—and Madoff employed a sole proprietor (with two nonaccounting employees) to audit his firm. That’s more assets than that of Etrade (\$45.5B), JPMorgan Asset Management (\$63.4B), Principal Financial Group (\$44.8B), or Charles Schwab (\$34.2B)! Each of these firms uses the following

²⁹ The Associated Press. 2014. JPMorgan to pay \$2.5B for ignoring “alarm bells” on fraud. *Richmond Times-Dispatch*. January 8: D3. Also: Fitzpatrick, D. 2013. JPMorgan is in talks with US over Madoff warnings. *Wall Street Journal (online)*, December 6, 2013.

independent audit firms, respectively: Deloitte & Touche, PricewaterhouseCoopers LLP, Ernst & Young LLP, and Deloitte & Touche.

But to the point—SARs are not optional. There are a number of laws that require a SAR filing if individuals are concerned about any suspicious financial activities. JPMorgan filed a suspicious activity report (SAR) with UK regulators about one month prior to Madoff's arrest—but did not file a SAR with US regulators. This is especially curious since JPMorgan typically files 150,000—200,000 such reports every year. How can it be the case that Madoff's activities did not alert bank employees? The bank had been doing business with Madoff for more than two decades prior to his arrest in December 2008.

As you might imagine, the Justice Department was not amused! The result of JPMorgan's silence to the American authorities will cost them dearly—\$2.5 billion to be exact. This is the largest forfeiture by a US bank and largest Department of Justice penalty for a Bank Secrecy Act violation. Although JPMorgan is negotiating a settlement to avoid criminal charges, that's a huge price for not filing a SAR with US regulators!



SUMMARY

- ✓ There are many reasons to study accounting information systems, and one of the most important is the availability of many exciting career opportunities.
- ✓ A forensic accountant combines the skills of investigation, accounting, and auditing to find and collect pieces of information that collectively provide evidence that criminal activity is in process or has happened.
- ✓ Information technology affects virtually every aspect of accounting, including financial and managerial accounting, auditing, and taxation.
- ✓ Financial accounting information is becoming increasingly relevant and important as advances in IT allow for creation of new reporting systems.
- ✓ Managerial accounting is impacted by IT in the following areas: balanced scorecards, business intelligence, dashboards, and other key performance indicators.
- ✓ Auditors perform many types of assurance services, in addition to financial statement attestation.
- ✓ The availability of tax software and extensive tax databases influences both tax preparation and tax planning.
- ✓ IT refers to the hardware, software, and related system components that organizations use to create computerized information systems.
- ✓ Computerized information systems collect, process, store, transform, and distribute financial and nonfinancial information for planning, decision-making, and control purposes.
- ✓ Data are raw facts; information refers to data that are meaningful and useful.
- ✓ Accountants and other managers are using predictive analytics, a technique that takes advantage of data stored in data warehouses to improve performance.
- ✓ Cloud computing is a way of using business applications over the Internet.
- ✓ The basic concept of sustainability reporting is that a company focuses on nonfinancial performance measures that might impact its income, value, or future performance.
- ✓ By law, the accountants in many specific financial institutions must now file suspicious activity reports that document potential instances of fraud, money laundering, or money transfers to terrorist organizations.
- ✓ Some of the recent corporate scandals involved manipulation of accounting data, which led to the passage of legislation to protect investors.

KEY TERMS YOU SHOULD KNOW

accounting information system (AISs)	data	interactive data
activity-based costing (ABC) systems	e-business	key performance indicators (KPIs)
audit trail	e-commerce	knowledge workers
balanced scorecard	enterprise resource planning (ERP) system	penetration testing
big data	extensible business reporting language (XBRL)	Ponzi scheme
business intelligence	financial accounting information systems	predictive analytics
Certified Fraud Examiner (CFE)	forensic accounting information	predictive analytics professional REA accounting
Certified Information Systems Auditors (CISAs)	information age	responsibility accounting system
Certified Information Technology Professionals (CITP)	Information Systems Audit and Control Association (ISACA)	suspicious activity reporting (SAR)
cloud computing	information technology (IT)	sustainability reporting
cost accounting	information technology (IT)	systems consultant
CPA Trust Services	auditors	value-added resellers (VARs)
dashboards		

TEST YOURSELF

- Q1-1.** Which of the following is NOT true about accounting information systems (AISs)?
- all AIS are computerized
 - AIS may report both financial and nonfinancial information
 - AIS, in addition to collecting and distributing large amounts of data and information, also organize and store data for future uses
 - a student who has an interest in both accounting and IT, will find many job opportunities that combine these knowledge and skills areas
- Q1-2.** Which of the following is likely to be information rather than data?
- sales price
 - customer number
 - net profit
 - employee name
- Q1-3.** With respect to computerized AIS, computers:
- turn data into information in all cases
 - make audit trails easier to follow
 - cannot catch mistakes as well as humans
 - do not generally process information more quickly than humans
- Q1-4.** A dashboard is:
- a computer screen used by data entry clerks for input tasks
 - a physical device dedicated to AIS processing tasks
 - a summary screen typically used by managers
 - a type of blackboard used by managers to present useful information to others
- Q1-5.** The Sarbanes-Oxley Act of 2002:
- enables US officers to wiretap corporate phones if required
 - has led to a decrease in the amount of work done by auditors and accountants
 - forbids corporations from making personal loans to executives
 - requires the Chief Executive Officer of a public company to take responsibility for the reliability of its financial statements
- Q1-6.** The acronym SAR stands for:
- simple accounting receipts
 - suspicious accounting revenue
 - suspicious activity reporting
 - standard accounts receivable

- Q1-7.** Which of the following is NOT true regarding assurance services?
- auditors of public companies are no longer allowed to provide assurance services to any public company as a result of the Sarbanes-Oxley Act of 2002
 - assurance services include online privacy evaluations
 - activity-based costing is not a type of assurance service
 - only CPAs can provide assurance services to clients
- Q1-8.** Assigning overhead costs based on the resources, rather than only direct labor, used in manufacturing is an example of:
- activity based costing (ABC)
 - budgeting
 - cost-plus accounting
 - financial, rather than managerial, accounting
- Q1-9.** Which of these acronyms represents a law involving health assurance and privacy?
- ABC
 - HIPAA
 - CPA
 - SOX
 - XBRL
- Q1-10.** Which of these acronyms stands for a computer language used for reporting business activities?
- ABC
 - HIPAA
 - CPA
 - SOX
 - XBRL
- Q1-11.** Which of these acronyms is a certification for information professionals?
- ABC
 - HIPAA
 - CBA
 - CITP
 - XBRL
- Q1-12.** Which of the following describes “cloud computing”?
- business applications over the Internet
 - it is a subset of e-business
 - the ability of a company to exchange data with its subsidiaries
 - none of the above
- Q1-13.** How would you describe “big data”?
- cloud computing can be used to support data analytics projects
 - a combination of large, complex data sets
 - the definition depends on the capabilities of the organization that manages the data
 - all of the above
- Q1-14.** A forensic accountant is one who:
- has a variety of skills, such as investigation, accounting, and auditing
 - can find and collect pieces of information that provide evidence of criminal activity
 - might be certified
 - all of the above

DISCUSSION QUESTIONS

- 1-1.** Take a survey of the students in your class to find out what jobs their parents hold. How many are employed in manufacturing? How many are employed in service industries? How many could be classified as knowledge workers?
- 1-2.** Hiring an employee and taking a sales order are business activities, but are not accounting transactions requiring journal entries. Make a list of some other business activities that would not be captured as journal entries in traditional AISs. Do you think managers or investors would be interested in knowing about these activities? Why or why not?
- 1-3.** Advances in IT are likely to have a continuing impact on financial accounting. What are some changes you think will occur in the way financial information is gathered, processed, and communicated as a result of increasingly sophisticated information technology?
- 1-4.** XBRL is becoming established as the language to create interactive data that financial

managers can use in communication. How do you think the use of interactive data might enhance the value of a company's financial statements?

- 1-5. Discuss suspicious activity reporting. For example, do you think that such reporting should be a legal requirement, or should it be just an ethical matter? Do you think that the majority of SAR activity is illegal, or are these just mostly false alarms?
- 1-6. Managerial accounting is impacted by IT in many ways, including enhancing corporate performance measurement. How do you think a university might be able to use a scorecard or dashboard approach to operate more effectively?
- 1-7. Look again at the list of assurance services shown in Figure 1-5. Can you think of other assurance services that CPAs could offer which would take advantage of their AIS expertise?
- 1-8. Interview a sample of auditors from professional service firms in your area. Ask them whether or not they plan to offer any of the assurance services suggested by the AICPA. Also, find out if they offer services other than

financial auditing and taxation. Discuss your findings in class.

- 1-9. This chapter described several career opportunities available to students who combine a study of accounting with course work in accounting information systems, information systems, and/or computer science. Can you think of other jobs where these skill sets would be desirable?
- 1-10. This chapter stressed the importance of IT for understanding how accounting information systems operate. But is this the only skill valued by employers? How important do you think "analytical thinking skills" or "writing skills" are? Discuss.
- 1-11. In this chapter we talked about predictive analytics and big data. Using the Internet and your research skills, identify the skills and abilities accounting majors might need (i.e., what type of courses should you take while at your university) so that they can leverage these skills in their entry-level accounting positions such as (1) public accountants, (2) internal auditors, or (3) management accountants. Discuss specifically how you would use these skills to impress your supervisor.

PROBLEMS

- 1-12. What words were used to form each of the following acronyms?

a. AAA	i. CPM	q. PATRIOT
b. ABC	j. ERP	Act
c. AICPA	k. FASB	r. REA
d. AIS	l. HIPAA	s. SAR
e. CFO	m. ISACA	t. SEC
f. CISA	n. IT	u. SOX
g. CITP	o. KPI	v. VAR
h. CPA	p. OSC	w. XBRL

- 1-13. Choose three or four issues of one of these journals: *Journal of Accountancy*, *Internal Auditor*, *Strategic Finance*, and *Management Accounting*. Next, count the number of articles that are related to IT. In addition, make a list of the specific technology discussed in each article (where possible). When you are finished, discuss the impact you think IT is having on the accounting profession.

- 1-14. Shervonne Thomas is the controller at a large manufacturing company located in Chesterfield, Virginia. The company has several divisions that evaluate their performance using a return on investment (ROI) formula (calculated by dividing profit by the book value of total assets). In a meeting with the company president, Shervonne warned that ROI might not accurately reflect each division's performance. Shervonne is concerned that managers might be too focused on short-term results.

The president asked Shervonne to identify a better way to evaluate each division's performance. Shervonne told the president that the company allocates a lot of overhead costs to the divisions on what some managers consider an arbitrary basis. She agreed to discuss this problem with the managers and to get back to the president very soon.

Requirements

- a. Explain what managers can do in the short run to maximize return on investment. What other accounting measures could the company use to evaluate the performance of its divisional managers?
 - b. Describe other instances in which accounting numbers might lead to dysfunctional behavior in an organization.
 - c. Search the Internet and find at least one company that offers an information system (or software) that might help Shervonne and the managers do a better job of evaluating performance.
- 1-15.** In a recent article in the *New York Times*, Jeff Zucker—CEO of NBC-Universal—described the digital age as one “trading analog dollars for digital pennies.”³⁰ Discuss this comment from the viewpoint of each of the following:
- a. a music company executive
 - b. a consumer
 - c. a TV executive
- 1-16.** Select one new trend in the field of accounting information systems today that was not mentioned in the chapter, but that you feel is important. Write a short report describing your findings. Be sure to provide reasons why you feel that your choice of topics is important and therefore of interest to others in your class.
- 1-17.** The participants of such recreational activities as hang gliding, soaring, hiking, rock collecting, or skydiving often create local “birds-of-a-feather” (affinity) organizations. Two examples are the Chicago sky divers (www.chicagoskydivers.com) or the soaring club of western Canada (www.canadianrockiessoaring.com). Many of these clubs collect dues from members to pay for the printing and mailing costs of monthly newsletters. Some of them maintain only minimal accounting information on manual pages or, at best, in spreadsheets.
- a. What financial information are such clubs likely to collect and maintain?
 - b. Assuming that the club keeps manual accounting records, would you consider such systems “accounting information systems?” Why or why not?
 - c. Assume that the club treasurer of one such organization is in charge of all financial matters, including collecting and depositing member dues, paying vendor invoices, and preparing yearly reports. Do you think that assigning only one person to this job is a good idea? Why or why not?
 - d. What benefits would you guess might come from computerizing some or all of the club’s financial information, even if there are less than 100 members? For example, do you think that such computerization is likely to be cost effective?
- 1-18.** Many companies now provide a wealth of information about themselves on their websites. But how much of this information is useful for investment purposes? To help you answer this question, imagine that you have \$10,000, which you *must* invest in the common stock of a publicly held company.
- a. Select a company as specified by your instructor and access its online financial reports. Is the information contained in the reports complete? If not, why not? Is the information contained in these reports sufficient for you to decide whether or not to invest in the company? If not, why not? What additional information would you like?
 - b. Now select an online brokerage website such as Etrade and look up the information of that same company. Does the information provided by the brokerage firm differ from that of the company itself? If so, how? Again, answer the question: Is the information contained in these reports sufficiently detailed and complete for you to decide whether to invest in it? If not, why not?
 - c. Access the website of an investment rating service such as Value Line. How does the information on this third site differ from that of the other two? Again, answer the question: “Is the information contained on the site sufficiently detailed and complete for you to decide whether to invest in the stock? If not, why not?”
 - d. What do these comparisons tell you about the difference between “data” and “information?”

³⁰ Tim Arango, “Digital Sales Exceed CDs at Atlantic.” *New York Times* (November 26, 2008), p. B7.

- 1-19.** The website of FinCen—the Financial Crimes Enforcement Center Network (a department of the US Treasury)—maintains a website at www.fincen.gov. On the left side of its home page, you will find links to information for various types of companies including banks, casinos, money service businesses, insurance companies, security and futures traders, and dealers in precious metals and jewelry—that is, the companies mandated by various federal laws to file suspicious activity reports (SARs). Select three of these types of companies, and for each type, use the information provided on these secondary pages to list at least two types of financial transactions or activities that should be considered “suspicious.”
- 1-20.** In this chapter’s “AIS at Work” feature, we discuss the events and SAR surrounding the case of Bernard Madoff. A financial analyst by the name of Harry Markopolos believed it was legally and mathematically impossible for Madoff to be posting such outrageous returns on investments. Mr. Markopolos notified the Boston SEC in 2000.
- What happened when Mr. Markopolos notified the SEC in 2000?
 - How many more times did Mr. Markopolos notify the SEC of his concerns?
 - What was the result of Mr. Markopolos’ efforts to notify the authorities about his suspicions regarding Madoff?

CASE ANALYSES

1-21. Berry & Associates, LLP

Robert Berry is the managing partner for Berry & Associates (B&A), LLP. He was recently reviewing the firm’s income statement for the previous quarter, which showed that auditing revenues were about 5 percent below last year’s totals while tax revenues were about the same. Robert also noted that the income from auditing was 10 percent less than for the previous year. During the past few years, competition for new audit clients has been intense, so B&A partners decided that it would be wise for the firm to lower its hourly billing rates for all levels in the firm.

The firm’s client base is closely held firms that are mostly very successful sole proprietors, as well as a number of small and medium-sized companies. Robert and the other partners have been brainstorming ways to expand the revenue base of the organization. The partners know that information technology is a tool that the firm can use to develop new lines of business. Accordingly, the firm hired several college graduates over the past few years with dual majors in accounting and information systems or computer science. Given the recent financial results, Robert wants to encourage the other partners to consider the potential to the firm of offering additional professional services.

Requirements

- Would it make the most sense for Robert to consider developing new types of clients or to consider offering different types of services to the types of clients typically served by B&A?
- Robert remembers that the AICPA developed a list of various types of assurance services that auditing firms might consider offering. Describe three of these assurance services that might be a good fit for this CPA firm. (*Hint:* Visit the AICPA’s web page or a website of a large accounting firm for a listing of assurance services.)
- What might B&A do to fully use the combined strengths in accounting and information systems/computer science of its new staff auditors?

1-22. Organizational Reports to Stakeholders

The annual report is considered by some to be the single most important printed document that companies produce. In recent years, annual reports have become large documents. They now include such sections as letters to the stockholders, descriptions of the business, operating highlights, financial review, management discussion and analysis, segment reporting, and inflation data as well as the basic financial statements. The expansion has been due in part to a general increase in the degree of sophistication and complexity in accounting standards and disclosure requirements for financial reporting.

The expansion also reflects the change in the composition and level of sophistication of users. Current users include not only stockholders, but financial and securities analysts, potential investors, lending institutions, stockbrokers, customers, employees, and (whether the reporting company likes it or not) competitors. Thus, a report that was originally designed as a device for communicating basic financial information now attempts to meet the diverse needs of an expanding audience.

Users hold conflicting views on the value of annual reports. Some argue that annual reports fail to provide enough information, whereas others believe that disclosures in annual reports have expanded to the point where they create information overload. The future of most companies depends on acceptance by the investing public and by their customers; therefore, companies should take this opportunity to communicate well-defined corporate strategies.

Requirements

1. The mission of the US Securities and Exchange Commission (SEC) is to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation. Identify several ways that the SEC accomplishes its mission.
2. The goal of preparing an annual report is to communicate information from a company to its targeted users. (a) Identify and discuss the basic factors of communication that must be considered in the presentation of this information. (b) Discuss the communication problems a company faces in preparing the annual report due to the diversity of the users being addressed.
3. Select two types of information found in an annual report, other than the financial statements and accompanying footnotes, and describe how they are useful to the users of annual reports.
4. Discuss at least two advantages and two disadvantages of stating well-defined corporate strategies in the annual report.
5. Evaluate the effectiveness of annual reports in fulfilling the information needs of the following current and potential users: (a) shareholders, (b) creditors, (c) employees, (d) customers, and (e) financial analysts.
6. Annual reports are public and accessible to anyone, including competitors. Discuss how this affects decisions about what information should be provided in annual reports.

1-23. North Gate Manufacturing

Neil Rogers is the controller for North Gate Manufacturing (NGM), a company with headquarters in College Station, Texas. NGM has seven concrete product plants located throughout the Southwest region of the United States. The company recently switched to a decentralized organizational structure. In the past, all revenues and expenses were consolidated to produce just one income statement.

Under the new organizational structure, each plant is headed by a general manager, who has responsibility for operating the plant like a separate company. Neil asked one of his accountants, Scott McDermott, to organize a small group to be in charge of performance analysis. This group is to prepare monthly reports on performance for each of the seven plants. These reports consist of budgeted and actual income statements. Written explanations and appraisals are to accompany variances. Each member of Scott's group has been assigned to a plant and is encouraged to interact with management and staff in that plant to become familiar with operations.

After a few months, Neil began receiving complaints from the general managers at several of the plants—claiming that the reports were slowing down operations and they felt like someone was constantly “looking over their shoulders” to see if they are operating in line with budget. They pointed out that the performance analysis staff is trying to do its job (i.e., explanation of variances). The most vocal plant manager claimed that “those accountants can't explain the variances—they don't know anything about the industry!”

The president of NGM, Ross Stewart, also complained about the new system for performance evaluation reporting. He claims that he is unable to wade through the seven detailed income statements, variances, and narrative explanations of all variances each month. As he put it, “I don't have time for this, and I think much of the information I am receiving is useless!”

Requirements

1. Do you think it is a good idea to have a special staff in charge of performance evaluation and analysis?
2. In a decentralized organization such as this one, what would seem to be the best approach to performance evaluation?
3. What information would you include in a performance evaluation report for Mr. Stewart?

READINGS AND OTHER RESOURCES

- Corkern, S., S. Parks, and M. Morgan, 2013. Embracing the future: What can accounting graduates expect? *American Journal of Business Education (Online)* 6(5): 531.
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- McPeak, D., K. Pincus, and G. Sundem, 2012. The international accounting education standards board: Influencing global accounting education. *Issues in Accounting Education* 27(3): 743–750.
- Morton-Huddleston, W. 2012. Government accountability. *The Journal of Government Financial Management* 61(4): 33–36.



Go to www.wiley.com/go/simkin/videos to access videos on the following topics:

Accounting Songs
Cyber Net Fraud
Identity Theft
Sustainability
Accounting for Sustainability

ANSWERS TO TEST YOURSELF

1. a 2. c 3. c 4. c 5. c 6. c 7. d 8. a 9. b 10. e 11. d 12. a 13. d 14. d

Sample

Chapter 2

Accounting on the Internet

After reading this chapter, you will:

1. *Understand* some of the basic concepts of the Internet, such as TCP/IP, URLs, and web page addresses.
2. *Appreciate* why electronic communication and social media are important to accountants.
3. *Know* why XBRL is important to financial reporting.
4. *Understand* electronic data interchange (EDI) and why it is important to AISs.
5. *Understand* some examples of cloud computing.
6. *Know* the differences between business-to-consumer and B2B e-commerce.
7. *Appreciate* the privacy and security issues associated with e-commerce.
8. *Know* why businesses use firewalls, proxy servers, and encryption techniques.
9. *Understand* digital signatures and digital time-stamping techniques.

“...firms that generate 40 percent or more of their leads online grow four times faster than other firms.”

Frederiksen, L.W. 2013. Wooing potential clients: Shedding light on how buyers choose an accounting firm. *CPA Practice Management Forum* 9(9): 5–8.

2.1 INTRODUCTION

Most accountants use the Internet for research, education, and email on a daily basis. Auditors regularly evaluate their client’s internal controls to ensure complete, accurate, and authentic transmissions of transactions over the Internet. In fact, it’s nearly impossible to imagine how accountants would accomplish their various job responsibilities without the many Internet technologies that support today’s businesses.

This chapter describes some accounting applications of the Internet in detail. The first section describes Internet components such as Internet addresses and software. This section also discusses some Internet concepts of special importance to accountants (i.e., intranets and extranets). We also discuss XBRL, a financial reporting language, in this section.

One of the most important uses of the Internet is for electronic commerce (e-commerce or EC)—the topic of the next section of this chapter. While the terms *e-commerce* and *e-business* are often used interchangeably, some experts prefer to view them as different concepts. E-commerce involves buying or selling goods and

services electronically. This activity can be between two businesses, between a profit-seeking company and a governmental entity, or between a business and a customer. In contrast, e-business goes beyond e-commerce and deep into the processes and cultures of an enterprise. This could include, for example, email, soliciting vendor bids electronically, making e-payments, exchanging data electronically (EDI), and a host of specialized cloud-computing services. Thus, it is the powerful business environment that organizations create when they connect their critical business systems directly to customers, employees, vendors, and business partners using Intranets, Extranets, e-commerce technologies, collaborative applications, and the web.¹ We discuss some of these topics in the third section of this chapter.

As more organizations conduct at least some business on the Internet, it is only natural that managers increasingly recognize the importance of Internet privacy and security. This includes protecting consumers' personal privacy, protecting proprietary data from hackers, and safeguarding information that businesses send to one another over the Internet. The final section of this chapter discusses these topics in detail.

2.2 THE INTERNET AND WORLD WIDE WEB

The **Internet** is a collection of local and wide-area networks that are connected together via the Internet backbone—i.e., the main electronic connections of the system. Describing the Internet as an “information superhighway” makes sense because over 3 billion people from around the world now use it, just as a set of state, interstate, and international highways connect people physically.² Almost all universities are connected to the Internet, as are most businesses, government agencies, and not-for-profit organizations. This section of the chapter discusses Internet basics, including Internet addresses and software, intranets and extranets, the World Wide Web, IDEA, groupware, electronic conferencing, and web logs.

Internet Addresses and Software

To transmit data over the Internet, computers use an Internet address and a forwarding system that works much the same way as the post office system. On the Internet, the initial computer transmits a message to other computers along the Internet's backbone, which in turn relay the message from site to site until it reaches its final destination. If the message is large, Internet computers can divide it into smaller pieces called *data packets* and send each of them along different routes. The receiving computer then reassembles the packets into a complete message at the final destination.

An Internet address begins as a **domain address**, which is also called a **uniform resource locator (URL)**. This is a text address such as “www.name.com.uk.” As suggested by this generic example, the lead item indicates the World Wide Web. The second entry designates the site name, and the third entry (“com” for commercial user) is the organization code. Other organization codes are “edu” (education), “gov” (government), “mil” (military), “net” (network service organization), “org” (miscellaneous organization), and “int” (international treaty organization). Finally, a domain address

¹ “Difference between e-commerce and e-business,” accessed at eBusinessProgrammers.com.

² Internet World Stats (www.internetworldstats.com), Miniwatts Marketing Group.

can include a country code as well—for example, “ca” for Canada, “uk” for the United Kingdom, or “nz” for New Zealand.

For transmission purposes, Internet computers use tables of domain names that translate a text-based domain address such as www.Wiley.com into a numeric **Internet Protocol (IP)** address. IPv4 is version 4 of this standard and uses 32 bits for this. An example might be 207.142.131.248. The elements in this address contain a geographic region (“207”), an organization number (“142”), a computer group (“131”), and a specific computer or web server (“248”). The **Internet Corporation for Assigned Names and Numbers (ICANN)** maintains the official registry of domain names, manages the **domain name system (DNS)** to ensure that all IP addresses are unique, and makes sure that each domain name maps to its correct IP address. In February of 2011, the Internet officially ran out of numbers, and administrators were forced to use workarounds and shared IP addresses to compensate. The new standard is IPv6, which uses 128 bits instead of 32 bits—a version that developers hope will suffice for many years to come.

IP addresses enable Internet computers to deliver a specific message to a specific computer at a specific computer site—for example, when you send an email message to a friend at another university using the standard **Transmission Control Protocol/Internet Protocol (TCP/IP)**. IP addresses are useful to auditors because they identify the sender—an important control in e-commerce applications.

Intranets and Extranets

Because Internet software is so convenient to use, many companies also create their own **intranets** for internal communications purposes. These computer networks use the same software as the Internet but are internal to the organization that created them. Thus, outsiders cannot access the information on intranet networks—a convenient security feature.

One common use of intranets is to allow users to access one or more internal databases. Advanced search engine technology coupled with an intranet can deliver user-defined information when needed. For example, a purchasing agent can access a centralized listing of approved vendors using his or her web browser and a local area network. Another valuable use of an intranet is for gathering and disseminating information to internal users. For example, employees can collaborate with each other by posting messages and data on the internal network, update records, check out job postings, complete forms to request office supplies, and enter travel expenses through their organization’s intranet. Universities offer many of the same services to their employees, as well as a similar variety of services and educational opportunities to students.

Extranets enable selected outside users to access corporate intranets. Users connect to internal web servers via the Internet itself using their assigned passwords. The user can be around the corner or around the world.

Case-in-Point 2.1 Do you access information about your university from a computer at home? If so, there is a good chance you’re using an extranet that allows you to learn about your university’s degree programs, find and register for future classes, pay registration fees remotely, access library resources, look up available scholarships, and even find out your final grades. Pretty convenient, huh?³

³ From the authors.

The World Wide Web, HTML, and IDEA

The multimedia portion of the Internet is commonly called the World Wide Web, or just “the web.” As you probably already know, you view these graphics using a **web browser** such as Microsoft’s Internet Explorer. A typical entity on the web is a web page—i.e., a collection of text, graphics, and links to other web pages stored on Internet-connected computers.

HTML. Developers typically create web pages in an editing language such as **hypertext markup language (HTML)**—see Figure 2-1a). Web designers store these instructions in one or more files and use the Internet to transfer these pages from a source computer to a recipient computer using a communications protocol such as **hypertext transfer protocol (HTTP)**. Your web browser then deciphers the editing language and displays the text, graphics, and other items of the web page on your screen (Figure 2-1b).

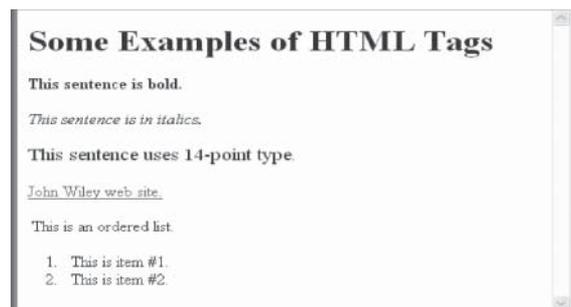
Because HTML is an editing language, many of its instructions are simply pairs of tags that instruct a web browser how to display the information bracketed by these tags. Thus, in Figure 2-1a, note that the entire file begins with an `<html>` tag and ends with a closing `</html>` tag. Similarly, the `` and `` tags bold and unbold text, and the `<i>` and `</i>` tags begin and end italicized text. Using Figure 2-1b, you can probably guess the purpose of anchor tags (beginning with `<a>`), ordered list tags (beginning with ``), and list item tags (beginning with ``). Problem 2-20 is an exercise to help you understand HTML tags.

Groupware, Electronic Conferencing, and Blogs

Groupware allows users to send and receive email, plus perform a wide range of other document-editing tasks. In addition to email support, these network packages allow users to collaborate on work tasks, make revisions to the same document, schedule

```
<html>
<title>Some examples of HTML tags</title>
<body lang=EN-US style='tab-interval:.5in'>
<h1>Some Examples of HTML Tags</h1>
<p><b>This sentence is bold.</b></p>
<p><i>This sentence is in italics.</i></p>
<p><span style=font-size:14.0pt>
This sentence uses 14-point type
</span>
</p>
<p><a href="http://www.wiley.com">John
Wiley web site</a></p>
<p>This is an ordered list.</p>
<ol><li>This is item #1.</li>
<li>This is item #2.</li>
</ol>
</body>
</html>
```

(a) HTML code



(b) What the code in part (a) displays

FIGURE 2-1 An example of HTML code and what that code displays in a web browser. Note the anchor tag `<a>`, which allows you to create a link to another web page—in this case, the Wiley website.

appointments on each other's calendars, share files and databases, conduct electronic meetings, and develop custom applications. Examples of such software include *Exchange* (Microsoft), *Groupwise* (Novell), *Lotus Notes* (Lotus Development Corporation), and *Outlook* (Microsoft).

Instant messaging software enables remote users to communicate with each other in real time via the Internet. You are probably already familiar with such software if you use MSN Messenger, Yahoo Messenger, or Skype to chat with distant friends. Many of these packages also support audio, video, and **electronic conferencing** (enabling several users to join a discussion instead of just two). Accounting applications include the ability to interview job applicants remotely, consult with clients about tax or audit problems, discuss projects from several remote sites, or plan corporate budgets.

Large consulting and accounting firms have access to a wealth of information within their organizations. Groupware is one of the technologies behind **knowledge management** that many professional service firms (such as accounting and consulting firms) use to distribute expertise within the organization (frequently on its intranet). This information includes descriptions of clients' best practices, research findings, links to business websites, and customized news. An employee with a client issue can access the knowledge database to learn how others handled similar issues.

Web logs, or **blogs**, are collaboration tools that allow users with web browsers and easy-to-use software to publish personalized diaries or similar information online. A number of them are published by accountants. For example, some of these blogs explain general accounting concepts, comment on recent pronouncements in the profession, describe recent accounting frauds, or recount interesting CPA experiences. Case 2-29 invites you to view several of them.

Social Media and Its Value to Accountants

You now probably post comments, pictures, or videos using some form of social media—for example, Facebook, YouTube, Pinterest, Twitter, or Baidu to name a few. At present and around the world, more than 1.5 billion people have some type of social media account. In aggregate, the postings logged on such sites create massive amounts of commentary that businesses can also mine for commercial purposes.

One use of social media is to increase organization recognition—for example, when a company seeks to attract followers on Facebook and increase its customer base. This is also useful to accounting firms seeking new clients. A second use is to evaluate customer reactions to new goods or services—a use that applies equally well to CPA firms. A third use is for accounting teams to use social media to communicate with one another on projects at remote sites. Yet a fourth use is to identify and perhaps manage problems caused by corporate actions that anger consumers—before they go viral.

Case-in-Point 2.2 What company operates 6,000 fast food stores in China? Did you guess Yum Brands, the owners of KFC and Pizza Hut? China accounts for half of Yum Brand's revenues—a problem because sales in the last few years have been flat. To boost business, the company plans a social media campaign to assure customers its food is safe, improve its image, and distribute coupons for store discounts.⁴

Businesses can also use social media for recruiting employees—for example, to attract applicants for new jobs or to screen current applicants for undesirable traits. Looking for a new job? Employment counselors say that an online identity is a “must-have.”

⁴Jargon, J. 2013. KFC to reboot in China. *The Wall Street Journal* (December 5): B3.

Finally, a company can use social media for monitoring purposes—for example, to gauge the effectiveness of a new ad campaign or to assess customer feelings about the company itself. Similarly, when accounting firms offer new services, they can now scan social media sites in search of honest reactions to the new offerings. Organizations can also hire outside firms to perform such monitoring for them. In total, experts suggest that businesses are just beginning to tap the value stored in social media commentary.

Case-in-Point 2.3 A recent survey of 4,200 business executives from around the world by the McKinsey Global Institute found that over 70 percent of them were using social media in some way. This same company estimates that social media contains around \$1 trillion in untapped value to businesses.⁵

2.3 XBRL—FINANCIAL REPORTING ON THE INTERNET

While the Internet supports general financial reporting, exchanging financial information between trading partners often requires more detailed specifications. **XML**, or **eXtensible Markup Language**, is similar to HTML in that it also uses tags such as `` and `` to format data (b stands for “bold”). But there are two important differences between HTML and XML. One is that XML tags are “extensible,” allowing users to define their own tags such as `<SalesRevenue>`. The other difference is that the XML tags actually *describe* the data rather than simply indicate how to display it. For example, if a business wants to report sales revenue of \$1 million, it could use the XML tags: `<SalesRevenue>$1,000,000</SalesRevenue>`. Now, this data item has meaning.

A problem with XML tags is a potential lack of consistency among users. For example, one company might use the XML tag `<SalesRevenue>` but another company might choose `<Revenues>`. Without standardized markers (tags), financial information may not be clear and users may not be able to extract data from XML files for comparison purposes. **XBRL**, or **eXtensible Business Reporting Language**, solves this problem by standardizing the tags that describe financial information in documents for both profit and not-for-profit organizations. In short, XBRL is a specialized subset of XML for reporting financial information. Figure 2-2 provides an example of XBRL code and what that code creates.

The XBRL International Consortium (discussed below) creates XBRL standards that anyone can use, license-free. In addition, many accounting software packages are now *XBRL-enabled*, meaning that they can insert appropriate XBRL tags automatically in user financial files. Because of its growing importance, some authorities now suggest that XBRL should become an integral part of the general accounting curriculum—not just a subject for AIS students.

XBRL Instance Documents and Taxonomies

XBRL documents are called **XBRL instance documents** because they are examples (“instances”) of a class of documents defined by a standard or specification. Figure 2-2 shows an example—a portion of a balance sheet in XBRL. In this example, note that XBRL tags follow conventional HTML and XML coding rules that use

⁵ McKinsey Global Institute (July 2012). The social economy: unlocking value and productivity through social technologies, McKinsey & Company.

XBRL code:

```
<ifrs-gp:CashCashEquivalents contextRef="Current_AsOf" unitRef="U-Euros"
  decimals="0">1000000</ifrs-gp: CashCashEquivalents>
<ifrs-gp:OtherAssetsCurrent contextRef="Current_AsOf" unitRef="U-Euros"
  decimals="0">200000</ifrs-gp: OtherAssetsCurrent>
<ifrs-gp:AssetsCurrentTotal contextRef="Current_AsOf" unitRef="U-Euros"
  decimals="0">1200000</ifrs-gp:AssetsCurrentTotal>
```

What the XBRL code displays in a web browser:

Current Assets:	
Cash and Cash Equivalents	1,000,000
Other Assets, Current	200,000
Current Assets, Total:	1,200,000

FIGURE 2-2 An example of XBRL code and what that code creates.

a beginning tag such as `<ifrs-gp:OtherAssetsCurrent>` and an ending tag such as `</ifrs-gp:OtherAssetsCurrent>` to define a value. The number itself sits between these two tags. XBRL tags identify financial values uniquely. For example, the term “Cash-CashEquivalents” within a tag unambiguously defines “cash and cash equivalents.” Finally, you can use optional entries in each tag to identify currency units (e.g., “Euros”) and the number of decimal places (e.g., “0”).

To create an XBRL instance document, you need to know: (1) the standard tags that define such familiar items as net revenues and operating expenses and (2) the rules that govern how to use these tags. XBRL Specification 2.1 currently defines the rules and syntax for XBRL taxonomies and XBRL documents. XBRL taxonomies define the tags that represent accounting and financial terms used in XBRL instance documents. With standard tags for each piece of common financial data, accounting software can create instance documents for income statements, balance sheets, and similar financial statements in a straightforward manner. Figure 2-3 lists a number of ways that XBRL affects accountants.

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- Due to corporate scandals, shareholders, analysts, and reporters are demanding more transparent reporting. XBRL allows readers to quickly access the information they need.
 - XBRL permits the automatic and reliable exchange of financial information across all software formats and technologies, including the Internet.
 - XBRL does not require a change to existing accounting standards of corporate disclosure policies.
 - XBRL improves access to financial information because data is in a digital, reusable form.
 - XBRL eliminates the need to reenter financial data for different users, which reduces risks associated with data entry and lowers the cost to prepare and distribute financial statements.
 - XBRL improves investor and analyst access to information.
 - XBRL allows accountants to more quickly and easily consolidate and scrutinize internal data for use in financial reports.
 - XBRL allows CEOs and CFOs to deliver more transparent information to investors and analysts, and allows a vehicle for control within the firm.
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FIGURE 2-3 How does XBRL affect accounts? Source: Charles Hoffman and Carolyn Strand, *XBRL Essentials* (New York: AICPA), 2001; and www.xbrl.org.

The Benefits and Drawbacks of XBRL

Perhaps the most obvious benefit of XBRL is the ability to transmit financial information in a standard format. This facilitates communications between suppliers and their buyers, companies and their shippers, and even retailers and their customers. The same standardization applies to financial filings. For example, the Securities and Exchange Commission (SEC) now requires XBRL-formatted financial statement reports such as 10-Q and 10-K reports of all US publicly traded companies.

Another important advantage of XBRL is that it defines data items uniquely. Consider, for example, how a spreadsheet stores financial information. The only way we know that a particular number *in* a spreadsheet is, say, “net revenue” is because we also see a label that identifies it as such. Move the number somewhere else in the spreadsheet and you also lose its meaning. In contrast, a “net revenue” figure remains “net revenue” no matter where it appears in XBRL instance documents as long as it remains within its tags. It is for this reason that some experts predict that some accounting systems will begin *collecting and storing* their data in XBRL formats, redefining XBRL as a *formatting* language as much as a *reporting* language.

XBRL’s standardized tags also make searching for items in XBRL financial documents relatively easy. If you know the standard tag for an item of interest, you can unambiguously find and extract the information from those documents. One repository of such financial information is the Security and Exchange Commission’s **interactive data and electronic applications (IDEA)**, which the agency unveiled in 2008, and now contains XBRL data for over 10,000 companies—a valuable source of financial information and an important reason why standardized reporting is useful.

In business environments, the term *semantic meaning* refers to the fact that the financial data are related to one another through such formulas as “Assets = Liabilities + Equity.” An additional advantage of XBRL is its ability to express such relationships in formulas, thereby making the data self-checking. This is important because organizations often need to transmit financial data to others, and XBRL provides a means of internal control.

Case-in-Point 2.4 The Federal Deposit Insurance Corporation (FDIC) insures banks and similar financial institutions throughout the United States. The FDIC exchanges financial information with member institutions all the time, and uses a set of 1,800 rules to validate such data. The FDIC was an early adopter of XBRL in part because this language has the ability to perform data-validation tasks automatically.⁶

Companies using XBRL-enabled software can save their financial information in standard XBRL format, thus avoiding the errors that may come from reentering data multiple times from multiple sources. Companies can then directly upload their business information in this format onto their websites, avoiding costly rekeying costs. Another advantage is that XBRL permits the automatic and reliable exchange of financial information across all software platforms and technologies, including the Internet. Thus, anyone interested in comparing the cash and cash equivalents of several companies can search for the data and export it to a spreadsheet for analysis purposes.

⁶ BLOG: Digital Financial Reporting. “Benefits of financial integrity,” accessed from xbrl.squarespace.com in March 2014.

Finally, it is important to note that XBRL does not constrain companies to a particular *format* for their financial reports. To the contrary, the language is flexible and therefore intentionally constructed to support financial reporting by companies in different industries or from different countries. The hope is that both the extensible capabilities of the language as well as this flexibility are great enough to meet business and governmental needs at all levels. Problem 2-22 invites you to explore the benefits of XBRL in further detail.

XBRL also has several disadvantages. Perhaps the most important is the fact that a common reporting language requires its users to learn, and conform to, the standards of that language. Usually, accountants achieve this task by acquiring software that can output data in XBRL formats. Another problem is that evolving XBRL standards require users to conform to changing specifications—a drawback, for example, that may require organizations to update their accounting software more often. A third concern is that, at present, there is no requirement for auditors to provide assurance on the XBRL filings. Finally, the transition to XBRL reporting is not without costs.

Case-in-Point 2.5 A survey by the SEC of XBRL filers revealed that the additional costs of the requirement averaged between \$30,000 and \$40,000, but in some cases ran as high as \$82,000. However, these costs tended to diminish over time as organizations gained experience with the language and were able to reuse their software.⁷

The Current Status of XBRL

The **XBRL International Consortium** has about 600 members and is in charge of developing XBRL standards. Many US accounting firms are members of this consortium, as is the American Institute of Certified Public Accountants and parallel accounting organizations around the world. The specifications for version 2.1 of XBRL were issued in July 2008. The website at www.xbrl.org provides additional information on both current and proposed standards, as well as recent articles about XBRL and best practices.

As you might imagine, developing global standards for financial reporting is a massive undertaking. The language specifications require classification systems for different countries, different reporting segments (e.g., different industries), and even different organizational standards such as US generally accepted accounting standards (GAAP). For example, oil and gas companies require specialized tags to identify reserve balances, casinos require specialized tags to identify allowances for unclaimed gambling chips, and so forth. Then too, the language requires standard tags for formulas (e.g., a price/earnings ratio) and different functions. For this reason, XBRL is best viewed as a dynamic language still in continuous development.

Most accounting software vendors now support XBRL in their software packages, and the worldwide adoption of XBRL is moving along quickly. For example, in Germany, XBRL is already built into a software package used by 80 percent of the accountants in that country. The XBRL International consortium publishes a progress report three times a year, available on its website (www.XBRL.org), that contains current information about XBRL.

⁷ Gray, G. and D. Miller. 2009. XBRL: Solving real-world problems. *International Journal of Disclosure & Governance* 6(3): 207–223.

2.4 ELECTRONIC BUSINESS

The term **electronic business, or e-business**, refers to conducting business with computers and data communications. Most companies perform e-business over the Internet, but businesses can also use virtual private networks (VPNs) or proprietary data transmission lines. Recent surveys estimate the total annual revenues for e-commerce in the United States exceeds \$1 trillion, and the FBI estimates that the banking industry transfers over \$1 trillion *each week* by electronic means. Some general categories of electronic business are (1) e-accounting, (2) retail sales, (3) e-payments and e-wallets, (4) electronic data interchange, and (5) a variety of cloud-computing services, each of which we examine briefly in the paragraphs that follow.

e-Accounting

The term **e-accounting** means performing accounting functions on the Internet. This includes normal accounting tasks such as processing payroll or accounts receivable data, as well as preparing financial reports or completing income tax returns using online software. Often the web server is not even in the same country as the user but in Ireland or India instead of the United States or Canada.

At the personal level, e-accounting allows users to perform familiar accounting tasks such as preparing budgets or writing reports that others can see and modify as desired. The application moves online, allowing users to share files that formerly had to be emailed. Hybrid versions of such processes are also possible, in which users retain complete control of sensitive data, but who use the newest and most robust versions of online software for processing tasks.

An additional accounting use of the Internet is as a medium for publishing accounting documents such as financial statements. Posting financial information on the web is relatively fast and inexpensive, compared to printing and mailing them. Such information can also be revised, replaced, or deleted easily and quickly.

Case-in-Point 2.6 When IBM first began posting its financial reports on its website, its online version was an exact copy of its printed version, no more and no less. This quickly changed as the company realized it could post adjusted or unaudited reports online as well, expand product or services information from what it had previously published in hard copy reports, or create more extensive footnotes or addendums that provided previously unavailable or more-current information to interested viewers.⁸

Many e-accounting applications use software as a service (described below)—for example, when an accountant files a tax return using online software tools. Other Internet possibilities include online search tools for performing accounting research or video clips for training personnel. Such services enable businesses to avoid the costs of acquiring, installing, upgrading, or reformatting the data files required by traditional accounting software. Backup and disaster recovery also become the responsibility of the vendor organization instead of the user organization.

⁸ Kogan, A., F. Sudit, and M. Vasarhelyi. 2009. The future of accounting and electronic commerce on the Internet. *Texas CPA*: 1–6. Accessed at raw.rutgers.edu.

Retail Sales

The World Wide Web offers businesses the opportunity to create virtual stores (“shopping cart applications”) for selling merchandise directly to customers. At the retail level, it is clear that such websites are really automated AISs that allow customers to create their own order forms, shipping forms, and payment documents. Testimony to the success of such retail e-commerce abounds. The number of online shoppers has increased steadily over the past decade. More than 90 percent of the US population is now connected to the Internet, many of whom now purchase items over the Internet on a regular basis. For example, consumers now reserve most of their domestic airline tickets, rental cars, and hotel rooms over the Internet. Figure 2-4 lists some of the advantages of virtual stores. Note how many of these advantages relate directly to AISs.

Internet retail sales also introduce special issues. One problem is that customers usually cannot determine whether a retail website is legitimate. Similarly, consumers must usually rely on emails to voice their complaints (rather than speaking to someone in person), and returns are sometimes problematic. A third problem is that online stores frequently rely on suppliers rather than their own shelves for merchandise to satisfy orders, creating the potential for stock-out and backorder problems.

Finally, a growing e-commerce problem is **click fraud**. Many businesses are willing to sign pay-per-click contracts in which they pay a fee every time a customer clicks on a link to its own website from another site (such as a search engine site). Click fraud occurs when dishonest managers or even a company’s own competitors inflate the number of clicks on an advertising link, and therefore bill (or cost) the company for more referrals than actually occurred.

Internet sales also provide retailers with a wealth of data *about* their customers, raising issues about privacy. For example, you might be concerned about the fact that your web purchase also means that a retailer now has (1) your email address, which it can use to send additional, annoying emails or sell to others, (2) your credit

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1. Web pages are much cheaper to create than creating and mailing catalogs.
 2. Distribution is global.
 3. Sales can occur around the clock.
 4. Customers can search for specific products or services electronically, either within a particular website or as a hit from another site.
 5. A business can easily outsource its web business to others, enabling it to focus on core processes.
 6. The websites themselves can use automated tools to verify customer credit cards.
 7. Businesses can send emails to confirm orders or advise customers about shipping dates.
 8. Businesses can update product descriptions, sales prices, and information on merchandise availability immediately.
 9. Customers create their own sales orders online.
 10. Customers can track their own orders, freeing business personnel for other tasks.
 11. The sales and customer-relations personnel required for virtual stores is minimal, thus reducing labor costs per dollar of sales.
-

FIGURE 2-4 Some advantages of virtual stores on the Internet.

card information, which it may or may not protect as well as you would like, and (3) sensitive information about your purchase patterns—for example, prescription drugs. A later section of this chapter addresses these privacy and security issues in greater detail.

E-Payments, E-Wallets, and Virtual Currencies

Most customers pay for the merchandise they order over the Internet with a credit card, requiring vendors to use third-party affiliates to authenticate user credit card numbers. This is a problem because such credit card verification systems only indicate that a card is valid, not that the online customer is authorized to use it. A related problem with online payments is that, while online customers might not mind giving their credit card numbers to trusted merchants, they may not wish to share this information with unfamiliar businesses or unknown sellers on mass auction sites.

E-Payments. Some merchants and auction sites solve these problems with **electronic payments (e-payments)**, which proponents claim is a faster, easier, and safer way for both customers and sellers to handle online transactions. The e-payment service acts as a trusted intermediary because it collects payment from a buyer and pays that amount to the seller.

Case-in-Point 2.7 If you start your own web-based retailing company, one of your problems will be “how to handle customer payments.” This is what Stripe, Braintree, and Square do—process the credit- and debit-card transactions of web and mobile-phone customers. Processing fees charged by these companies are as low as 2.75 percent, and setup time can be “minutes,” giving you more time to focus on your core business needs. Stripe is less than 3 years old, but already processes billions of dollars’ worth of business.⁹

Businesses are not the only entities that can enjoy the convenience of e-payments—many state and local governments also have websites for e-payments. For example, the US government enables contractors to conduct financial transactions online at Pay.Gov (Figure 2-5)—a site allowing both businesses and individuals to make payments to the US government electronically. Developed by the US Treasury Department’s Financial Management Services (FMS), Pay.gov is a central location through which businesses and individuals can make payments, submit forms, and send bills to federal agencies. This portal provides authentication services for secure transactions. FMS expects Pay.gov to handle approximately 80 million transactions worth over \$125 billion a year, reduce paperwork, and save agencies over 5 percent in processing costs.¹⁰

E-Wallets. Another Internet payment option is an **e-wallet**. E-wallets are software applications that store a consumer’s personal information, including credit card numbers, email addresses, and shipping addresses. Shoppers pay for online purchases by providing their e-wallet account numbers to online vendors that also subscribe to the system.

One advantage of an e-wallet is that you can use it whenever you visit subscriber websites. These systems spare you the trouble of entering your personal information

⁹ Helft, M. (2014). The new power player in online payments. *Fortune Magazine* 168(9): 42–48.

¹⁰ To learn more about this program, log onto its website at www.fiscal.treasury.gov.

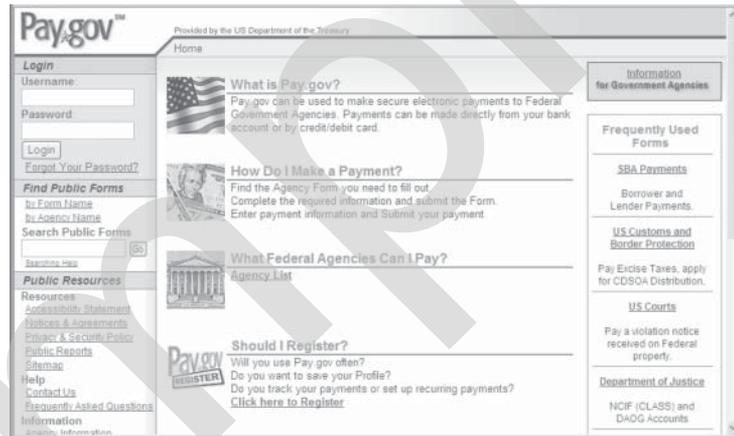


FIGURE 2-5 The home page for Pay.gov—an e-payment system supported by the US, government.

each time you make an online purchase. Also, because your e-wallet information is usually stored on your own hard drive, you control it. This maintains your email privacy as well. E-wallets may be as important for retailers as they are for consumers because many consumers cancel e-commerce transactions before they complete them, often because of frustration with online forms.

Case-in-Point 2.8 Consumers who buy products on E-bay or other online auction sites may be familiar with PayPal (www.paypal.com), an e-payment system that operates via the Internet. Customers who want to bid for items in online auctions, but who don't wish to share their credit card number with unknown sellers, may open an account with PayPal. Account holders can deposit funds in their PayPal account using credit cards, debit cards, or bank checks. When consumers purchase items, PayPal acts as an intermediary bank, withdrawing money from the purchaser's account and depositing similar funds into the seller's account (or sending a check).¹¹

Virtual Currency. Imagine an international currency that eliminates the need to exchange one type of money for another, involves no extra transaction fees, escapes government scrutiny, and is widely accepted on the Internet. This is the idea behind a **virtual currency**—a medium of exchange that operates beyond the restrictions of a particular country or its monetary policies. An example at the time this book was published is bitcoin, which allows you set up an e-wallet at www.bitcoin.com.

Retailers have several reasons why they might accept a virtual currency when selling merchandise online, including (1) the ability to do more business, (2) the ease with which transactions can take place electronically, (3) no need for credit-card middlemen or check clearing houses, (4) near-instantaneous credit of transactions to corporate accounts (like debit cards), (5) consumer wallets cannot be frozen, and (6) no transaction fees charged the retailer. But virtual currencies also operate beyond the realm of any central bank. This exposes businesses to risks, including (1) the potential devaluation of the currency in response to market forces, (2) the fact that transactions are not independently auditable, as they would be at a bank, (3) the observation that all seven

¹¹ To learn more about PayPal, log onto its website at paypal.com.

earlier virtual currencies have failed, and (4) the unwillingness of others to accept it—the ultimate test of any currency.

Case-in-Point 2.9 Virtual currencies are speculative and can therefore vary widely relative to other monies. In four years, the trading value of one bitcoin had appreciated to \$1,250. But in November, 2013, Baidu.com, the Chinese web services company, and the Chinese central bank both announced that they would not accept bitcoins for transactions. As a result, the exchange rate dropped to under \$600.¹²

Virtual currencies also present challenges to accountants. Assets purchased with such currencies have floating cost bases, for example, and (in the case of bitcoins) no central institution keeps records. At this time, it is also unclear whether funds held in a virtual currency are reportable to the IRS as “offshore funds.” Finally, there is the question of whether the appreciation in the value of a virtual currency qualifies as a long-term asset that is subject to capital gains taxes, or a short-term currency swing and therefore subject to ordinary income taxes.¹³

Business-to-Business E-Commerce

While there has been tremendous growth in retail e-commerce, it is dwarfed by **business-to-business (or B2B) e-commerce**—i.e., businesses buying and selling goods and services to each other over the Internet. Buying materials online shortens the time from purchase to delivery and also allows businesses to shop from vendors all over the world. Like retail consumers, corporate purchasing agents using B2B e-commerce tools can select items from online catalogs, confirm purchases, track shipments, and pay bills electronically. E-commerce software can also expedite internal paperwork by first sending purchase orders to the appropriate managers for approvals and then forwarding them to the vendor, thus reducing the costs of processing purchase requisitions.

Case-in-Point 2.10 BASF is one of the world’s largest chemical, plastics, and energy companies, with sales of €74 billion in 2013 and 112,000 employees on five continents. Company managers credit much of its recent growth in revenues to its new e-commerce initiatives. According to Herbert Fisch, head of global e-commerce, “In addition to order management, e-commerce provides our customers with information and service tools. Customers benefit from greater transparency and we gain valuable time to better serve them.”¹⁴

Further back in the supply chain, the Internet affects accounting activities just as strongly. Another feature of B2B e-commerce is the wider availability of real-time data that allows managers to view up-to-the-minute information. Take, for instance, a distributor whose business customers in turn sell products to end users. With current data about its customers’ retail sales, the supplier can quickly increase or decrease its operations as required. Similar online information can determine the location of specific trucks (using GPS systems), check the estimated arrival date of incoming cargo

¹² Wesbury, B. How much does that burger cost in bitcoins? *Wall Street Journal* (December 16, 2013), A13.

¹³ See, for example, Sanders, L. Another bitcoin mystery: How will the IRS tax it? *Wall Street Journal*, (December 21–22, 2013), B1.

¹⁴ Burrige, E. 2005. E-Commerce revenues boost achieved by BASF. *European Chemical News* 83(2174): 2.

ships, or determine the current status of finished products, parts inventories, or even working assembly lines.

Even vendors of inexpensive accounting software now include an e-commerce interface with their products. An example is *Peachblink*—a feature of Peachtree (now *Sage*) software that enables users to create a shopping-cart website and accept Internet orders. Similarly, software from such companies as Time Capital allows vendors and customers to view purchase and shipping documents so that they can resolve discrepancies quickly and cut checks or make electronic payments as needed.

Electronic Data Interchange (EDI)

According to a recent survey, over 80 percent of companies continue to use at least some manual documents—for example, purchase orders, invoices, payment remittance forms, credit memos, bills of lading, or shipping notices. **Electronic Data Interchange (EDI)** enables companies to save money by transmitting the information contained in such documents electronically. Thus, EDI automates the exchange of business information and permits organizations to conduct many forms of commerce electronically. Government agencies also depend heavily on EDI. One example is the US Customs Service, which uses it to identify and streamline the processing of import merchandise and customs declarations.

Case-in-Point 2.11 Pratt and Whitney is a large-engine manufacturer that buys over 26,000 parts from more than 700 suppliers. This company now transmits over 50,000 EDI documents per month, including purchase orders, procurement schedules, and sales invoices. The company estimates savings between \$10 and \$20 on every purchase order—over \$6 million per year.

One potential advantage of EDI compared to Internet e-commerce is that many business documents are simply faxed over telephone lines, avoiding computers completely. This does not mean that EDI documents are not delivered via the Internet. Many businesses now have telephone systems that use Internet lines for both voice and digital transmissions. Another advantage is that many EDI documents include handwritten signatures, providing assurance of their authenticity. A third advantage is that EDI includes the exchange of graphic and photographic documents—media that *can* be scanned and captured electronically.

Cloud Computing

As explained in Chapter 1, cloud computing refers to purchasing services from vendors over the Internet. The term derives its name from the cloudlike symbol often used to depict the Internet in networking diagrams. A host of activities fall into this category, including web hosting, payroll processing, backup provisioning, emailing, and even outsourcing business phone systems. Here, we briefly discuss some examples of these services.

Processing Services. Companies that access specialized software (e.g., tax-preparation applications) on the Internet purchase **software as a service (SaaS)**. In contrast, web hosting is an example of **platform as a service (PaaS)**. Examples of cloud vendors include Amazon.com (data storage), Oracle (database software), and Intuit (both tax and payroll processing).

Cloud computing closely resembles other forms of outsourcing and therefore enjoys the same advantages. For example, when a hospital contracts with a second company to do its payroll, it can then focus on its core mission and shift the burdensome details of payroll processing (e.g., how much taxes to withhold for out-of-state employees) to the contractor. But cloud computing also differs from traditional forms of outsourcing. For example, the data communications in cloud computing takes place over the Internet and are therefore instantaneous. Another important difference is that transaction volumes are usually charged by the day, hour, or even minute—and are billed accordingly.

Case-in-Point 2.12 The heaviest demands on the websites of most textbook publishers are in the weeks just before final examinations—not uniformly distributed over a semester or quarter (as you might expect). This is the main reason why publishers such as John Wiley & Sons, Inc., the publisher of this textbook, might contract with a cloud computing company like Amazon.com to host its web services. This allows Wiley to not worry about such peak demands, who simply pays the cloud vendor for only the resources used.¹⁵

Cloud computing offers many advantages to companies, which explains why so many organizations now contract with cloud vendors. Figure 2-6 outlines some of these advantages. Cloud computing also has several disadvantages. Perhaps the most important is the loss of control that client firms experience when another company assumes responsibility for their data and data processing—a security concern at the very least. Language barriers, quality control, and time differentials are additional potential concerns when contracting with overseas vendors. A third concern is that backup service providers typically require large bandwidths, and the timing of automatic backups is not always convenient to individual subscribers. Finally, cloud computing often promises cost savings but does not guarantee them. Performing the

Advantage	Example
Access to specialized expertise	In a payroll application, the vendor keeps up to date with the most recent tax-withholding requirements.
Cost savings	The contracting company avoids the hardware, software, and training costs involved in performing the service in house, and pays only for the services actually consumed.
Speed	In a tax-preparation application, all communications take place electronically and therefore nearly instantaneously, thereby avoiding the data-transfer delays in, say, post-office options.
Access to distant vendors	In an email application, the least costly vendor might be thousands of miles away—a factor of no consequence to the contracting company.
Avoiding peak loading problems	Sales often spike during the Christmas season. The retailer offloads these volume problems to the vendor.
Virtual remote backup	A company makes a copy of its critical data at the same time it updates the initial database. This increases security because the backup copy is by definition off-premises.
Pay as you go	The outsourcing company avoids the initial investments in hardware, software, or personnel. This can be similar to the difference between owning a car and renting a taxi.

FIGURE 2-6 Some advantages of cloud computing.

¹⁵ Kroenke, D. 2011. *Using MIS* (Boston, MA: Prentice Hall), p. 432.

same work within the organization and dealing with all of its attendant problems may be the cheaper option.

Storage and Backup Services. One of the most important types of cloud computing is creating and maintaining copies of critical data and files for both individuals and organizations. Vendors include Amazon, Backblaze, Carbonite, Drop Box, SkyDrive, JungleDisk, and Mozy. Most of these vendors provide low cost, and even free, backup services for individual customers. In commercial, fee-for-service settings, most backups are synchronized and therefore occur at the same time a computerized system gathers and stores the original data, thereby creating mirror, off-site copies of vital accounting data. Additional, and usually optional, services for home computing applications include encryption, fixed-time backup schedules, expandable storage options, and Mac computer support.

Case-in-Point 2.13 This was the first year the authors used Dropbox to share, store, and secure the word-processing files for this textbook online. The advantages became obvious to us as we were able to see, modify, and reference each other's work. No one had to worry about maintaining backup copies for the other authors either ... Dropbox did that for us!

Educational Services. You probably already use such web search engines as Google or Bing to answer personal questions of interest. Professional accountants do the same thing, using these same engines to answer asset classification, depreciation, or tax questions. In addition, the Internet provides a host of specialized educational services. One category is “software tutorials.” For example, you can find explanations and videos explaining how to perform a wide variety of spreadsheet tasks by searching the term “Excel Tutorials.” Similar tutorials also explain how to use Microsoft Access, complete specific tax forms, or create PowerPoint presentations.

Another category of online educational services is complete degree programs—i.e., institutions of higher education that offer online courses of study leading to accounting degrees. You can earn an associate's degree, bachelor's degree, and even a master's of science degree in accounting through such “distance-learning” offerings. A partial listing of them may be found at eLearners.com.

2.5 PRIVACY AND SECURITY ON THE INTERNET

The most important advantage of the Internet and World Wide Web—*accessibility*—is also its greatest weakness—*vulnerability*. This means that someone who *poses* as an authorized user may be able to access any email, web page, or computer file that an authorized user can access on the Internet. This section of the chapter discusses Internet privacy and security in detail.

Identity Theft and Privacy

Identity theft refers to crimes in which someone uses another person's personal identification (credit card, social security card, or similar identifier) in some way that involves fraud or deception (usually for economic benefit).¹⁶ In 2013, Javelin Strategy

¹⁶ Identify Theft and Identify Fraud, accessed at the US Department of Justice website (justice.gov).

and Research reported that 12.6 million people were victims of identity theft in the United States—a rate of one such crime every 3 seconds.¹⁷ The report also indicated that this translates to \$21 billion in personal losses, and that Social Security card frauds were among the most damaging.

The most common complaint related to identity theft is credit card fraud. The Department of Justice prosecutes ID theft violations under the **Identity Theft and Assumption Deterrence Act (ITADA)** of 1998. The punishment can be a prison term of 15 years, a fine, and forfeiture of any personal property used to commit the crime.

A related issue is personal privacy. Businesses need to protect the payroll data they send to service providers electronically. Online shoppers want to know that their privacy is protected. None of us wants our emails read by hackers. But all these needs often conflict with other objectives. For example, managers feel they have the right to view all the email messages of employees who use company computers during working hours, and companies doing business on the web are sometimes hard pressed not to use the wealth of data that online shoppers provide them.

Most websites accessed by online users collect personal information. What they collect and how they use it are dictated by their privacy policies. Because businesses vary widely in the amount of privacy protection for customers, it is important to read a company's policy statements carefully. State governments, prompted by concerns over consumer privacy rights, particularly in the financial and health care industries, are introducing a variety of privacy legislation. Groups such as the Electronic Frontier Foundation and the Online Privacy Alliance are also working to protect the privacy of data transmitted over the Internet.

While companies need strong preventive controls to help protect customer information, individuals should also exercise reasonable caution in protecting their personal information. Unscrupulous individuals, posing as a company or bank employee, might call or send email messages to solicit personal information. To protect yourself, be skeptical. If you are uncertain about the authenticity of a request for personal information, ask the person to send the request in writing on company letterhead. If you question the authenticity of a particular website, do more research on the company before purchasing goods or services through it—especially if you must give your credit card number. Figure 2-7 outlines some additional steps that you can take to better protect your personal information—almost all of them accounting related.

Social media also pose interesting privacy concerns because what you post online is neither private nor retractable. Moreover, employers often check postings on social networking sites in search of “red flags”—for example, substance abuse, large amounts of debt, criminal activity, or membership in fanatical groups. Organizations use all this information to help them evaluate employees or disqualify job applicants.

Like it or not, managers regularly screen the postings of their subordinates, and more than one person has lost his or her job by accidentally posting candid and offensive materials that the boss could see. This is more common than you might think—a Google search by one of the authors on the terms “social networking” and “lost jobs” yielded 20 million hits! Even if you allow for duplications, that's a big incentive to be cautious about what you post!

¹⁷ Javelin Strategy and Research, 2013. Identity fraud report: data breaches becoming a treasure trove for fraudsters. Accessed at www.javelinstrategy.com/brochure/276.

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1. Only give personal information such as Social Security numbers and dates of birth to those absolutely needing it.
 2. Mail checks, credit applications, and similar materials directly in locked outgoing mail boxes, not in front-yard mail boxes with red, “steal me” flags on their sides.
 3. Do not leave purses, wallets, or similar carrying cases unattended—for example, in unlocked gym lockers.
 4. When asked by a legitimate business person such as a bank teller for your personal information, write it down for them—do not recite it verbally.
 5. Be wary of unsolicited calls from individuals claiming to be bank representatives, credit card issuers, or others, especially if they ask for personal information. A similar rule applies to emails from unknown agents.
 6. Do not “lend” personal information to others—for example, a password.
 7. Do not simply toss sensitive information in trash cans where others can retrieve it. Shred or burn it first.
 8. Be wary of relatives in financial difficulties. Sadly, family members who are well known by the victims account for a high percentage of identity theft.
 9. Phishing describes a website that appears to be from a well-known company but that gathers personal data for illegal purposes. Don’t fall for them.
 10. Key-logging software is software that captures your keystrokes—usually for illicit purposes. Use security software to guard against it.
-

FIGURE 2-7 Steps that you can take to safeguard your personal data from identity theft.

Case-in-Point 2.14 One new employee forgot that she had accepted her boss’s invitation to add him as a friend on Facebook. She later posted a note saying that she hated her job and added several additional, unflattering comments about him. He fired her on the spot.¹⁸

Security

Security policies and procedures safeguard an organization’s electronic resources and limit their access to authorized users. For this reason, **information security** has been a high-ranking technology in each of the last five years in the AICPA’s survey of the “Top 10 Technologies” expected to have a powerful influence over business.

Case-in-Point 2.15 Richard Farina of AirTight Networks was traveling on an American Airlines flight in October of 2008 that supported Internet access for its passengers. As an experiment, he used some of his company’s intrusion protection software and found that he could view all his fellow passenger’s Internet activities due to the airline’s poor security.¹⁹

Of special importance to AISs is **access security**—for example, restricting access to bona fide users. *Access authentication* requires individuals to prove they are who they say they are. The three types of authentication are based on: (1) what you *have*, (2) what you *know*, and (3) who you *are*. What you *have* may be a plastic card that provides you physical access to information or a restricted area. Examples are your ATM card, debit card, or employee card that gives you access to certain premises.

¹⁸ Social Networking 101: How to Lose Your Job on Facebook, accessed at Open Salon (open.salon.com), August 18, 2009.

¹⁹ Buley, T. 2008. Phishing at Gate B22. *Forbes* 182(12): 52.

What you *know* refers to unique information you possess, such as a password or your mother's maiden name. You can authenticate who you are with a unique physical characteristic such as your fingerprint or the pattern of the retina in your eye. As you might guess, using security that forces a user to prove who they are is the highest level of authentication. **Two-factor authentication (TFA)** systems require a combination of authentication techniques—for example, requiring both your debit card and your password to withdraw cash from an ATM.

Spam and Phishing

A current Internet problem is the increasing amount of **spam**—those annoying, unsolicited email messages that clog your email inbox. However, spam is more than a simple bother—it is distracting, often illegal, and increasingly costly to organizations. AOL and Microsoft, two of the biggest Internet service providers, estimate that they each block over 2 billion spam emails per day.

Case-in-Point 2.16 Do you receive a lot of spam messages in your email inbox? You're not alone. According to a recent report by Commtouch, worldwide spam now exceeds 100 billion emails per day. A recent report also estimates that almost 1 billion of these emails contain malware. The estimated electrical energy required for such emails exceeds 33 billion kilowatt hours—the amount of energy equivalent to that stored in 2 billion gallons of gasoline. At present, about one in every five emails is spam.²⁰

Although about 35 percent of spam messages are harmless advertising, a greater percentage contains pornographic solicitations, attempts to steal identities, or fictitious stories asking recipients for money. Clicking on the “unsubscribe button” in such messages usually accomplishes the exact opposite effect because it tells the sender that you are a legitimate user who actually reads such emails. Spammers sell lists of such prized, active email accounts to one another, furthering the problem.

Case-in-Point 2.17 The Radicati Group has 21 Exchange email servers, of which five handle nothing but junk mail. The company estimates that it spends almost half a million dollars annually on such server capacity to process spam transmissions.²¹

Although some spam email contains legitimate sales offers, many more are bogus. In some cases, the spammers advertise products at “too-good-to-believe prices,” take credit-card orders, collect the money, and then quickly fold up shop before consumers realize they've been victimized.

Phishing means tricking users into providing valuable information such as Social Security numbers, debit card PIN numbers, passwords, or similar personal information—for example, by requesting this information on bogus websites. Other examples are emails that request personal information for “routine security purposes” or even “because we believe your account has been compromised.” Phishing activity is growing. According to a survey by Kaspersky Labs, such attacks have increased from nearly 20 million in 2012 to over 37 million in 2013.²²

²⁰ Jeff Goldman. 2013. Almost 100 Billion Spam Emails Sent Daily in Q1 2013. (May 3). Accessed online at: <http://www.esecurityplanet.com>.

²¹ The Radicati Group, Inc., Press Release, including statistics for email, instant messaging, and wireless email, accessed at www.radicati.com, May 6, 2009.

²² Kaspersky Lab Report: 37.3 Million Users Experienced Phishing Attacks in the Last Year. Accessed from Kaspersky Lab website (usa.kaspersky.com), June 20, 2013.

Firewalls, Intrusion Detection Systems, Value-Added Networks, and Proxy Servers

To gain access to a company's files, a computer hacker must first obtain access to that company's computers. The firewalls, intrusion detection systems, and proxy servers discussed here protect against unwarranted intrusions from external parties.

Firewalls. A **firewall** (Figure 2-8) guards against unauthorized access to sensitive file information from external Internet users. On networked systems, firewalls are often stand-alone devices with built-in, protective software. On mainframe or host systems, firewalls are usually software.

The two primary methods of firewall protection are *by inclusion* or *by exclusion*. When firewalls protect internal systems by inclusion, the software examines packets of incoming messages and limits entry to authorized ("included") users. To do this, the software maintains an **access control list (ACL)** of bonafide IP addresses that network administrators create for this purpose. If the software does not recognize the IP address of an external user, it refuses that user access to the files he or she requested. When firewalls protect internal systems by exclusion, the software compares the incoming packet IP address to a list of known threat addresses, rejecting messages from these sources but accepting all others.

Firewalls are useful Internet security controls, but (like most security features) are not foolproof. One problem is that they cannot protect against **denial-of-service attacks**, which overwhelm system resources with a volume of service requests. Another problem is **spoofing** (i.e., masquerading as an authorized user with a recognizable IP address). A similar, but less obvious, problem is the ability of a determined hacker to alter the contents of the access control list itself—a security breach that is especially difficult to overcome. A final problem is that most firewalls can only protect against external attacks, not internal (authorized) users bent on mischief.

Intrusion Detection Systems. Whereas firewalls simply reject unauthorized users from access, **intrusion detection systems (IDSs)** create records of such events. *Passive IDSs* create logs of potential intrusions and alert network administrators to them either

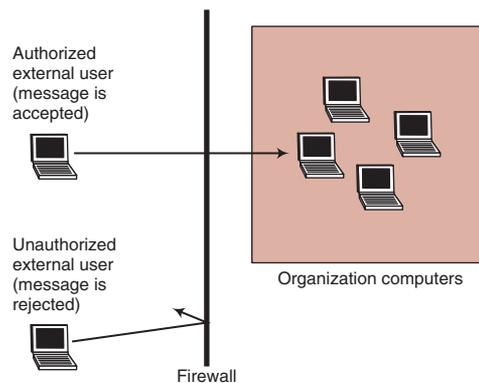


FIGURE 2-8 A firewall acts as a barrier between unauthorized external users and organizational (internal) computers and files. Firewalls accept messages from bona fide users but reject messages from unauthorized users.

via console messages, alarms, or beepers. *Reactive IDSs* have the ability to detect potential intrusions dynamically (e.g., by examining traffic flows), log off potentially malicious users, and even reprogram a firewall to block further messages from the suspected source.

Perhaps the most important advantage of an IDS is its ability to both prevent unauthorized accesses to sensitive information and to alert system administrators to potential violations. This may also increase the perceived risk of discovery, dissuading would-be hackers. IDSs may also be able to detect preambles to attacks, forestalling their effectiveness. Finally, an IDS is an important tool for *documenting* an attack, thereby generating invaluable information to both network administrators and investigators.

Value-Added Networks. Message-routing is important to accountants because the security of a data transmission partially rests on the security of all the intermediate computers along a given communications pathway. Thus, the greater the distance between the sending station and the destination computer, the more intermediary routing computers there are and the more vulnerable a message becomes to interception and abuse. This is one reason why businesses sometimes prefer to create their own (proprietary) networks to transmit data electronically.

Value-Added Networks (VANs) are private, point-to-point communication channels that large organizations create for themselves—usually for security reasons (Figure 2-9). When it first implements a VAN, the business assigns each user a unique account code that simultaneously identifies the external entity and authenticates the organization's subsequent electronic transactions.

There are at least three ways to create secure networks. One way is to start with a blank slate and create everything from scratch—an approach first used by the military and later by Wal-Mart. A second way is to lease secure, dedicated transmission lines from conventional long-distance carriers such as AT&T—the approach used by IGT's Megabucks system (see Chapter 4).

A third alternative is to create a **virtual private network (VPN)** on the Internet. As the name suggests, a VPN mimics a VAN in many of its security features, but enjoys the benefit of transmitting messages cheaply over existing Internet connections. A VPN creates secure data transmissions by (1) using “tunneling” security protocols embedded in the message frames sent to, and received by, the organization, (2) encrypting all transmitted data, and (3) authenticating the remote computer, and perhaps also the individual sender as well, before permitting further data transmissions. Most AIS VANs use this approach.

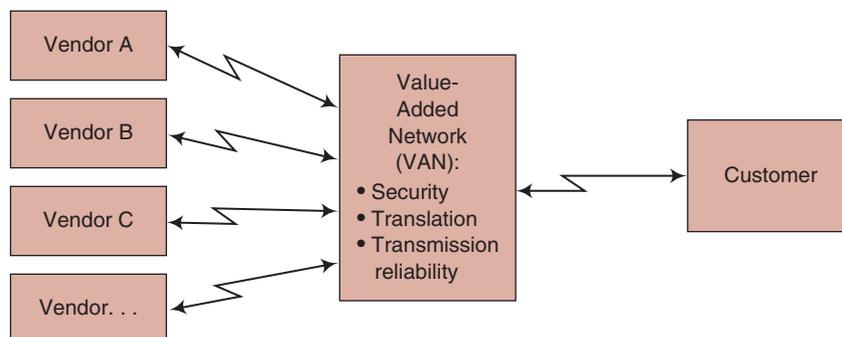


FIGURE 2-9 A VAN-based EDI system.

Proxy Servers. Given the large amount of information now available on the web, some organizations seek to limit the number of sites that employees can access—for example, to ensure that employees do not use web-access privileges for frivolous or counterproductive purposes. A **proxy server** is a network server and related software that creates a transparent gateway to and from the Internet and controls web access. In a typical application, users log onto their familiar file server as before. But when they attempt to access a web page, the initial network server contacts the proxy server to perform the requested task.

One advantage of using a proxy server is the ability to funnel all incoming and outgoing Internet requests through a single server. This can make web access more efficient because the proxy server is specifically designed to handle requests for Internet information. A second advantage is the proxy server's ability to examine all incoming requests for information and test them for authenticity (i.e., the ability to act as a firewall). A third advantage is that a proxy server can limit employee Internet access to approved websites (i.e., to only those IP addresses contained in an **access control list**). This enables an organization to deny employees access to gambling, pornographic, or game-playing websites that are unlikely to have any productive benefits.

A fourth advantage is the ability to limit the information that is stored on the proxy server to information that the company can afford to lose. If this server fails or is compromised by hackers, the organization is only marginally inconvenienced because its main servers remain functional. To recover, the company can simply restart the system and reinitialize the server with backup data.

A final advantage of proxy servers is the ability to store (“cache”) frequently accessed web pages on its hard drive—for example, the web pages of preferred vendors. This enables the server to respond quickly to user requests for information because the web page data are available locally. This feature also enables managers to obtain some idea of what information employees need most and perhaps take steps to provide it internally (rather than through web sources). Netscape Communications estimates that between 30 percent and 60 percent of Internet requests are redundant.

Data Encryption

To safeguard transmitted data, businesses often use **data encryption** techniques that transform plaintext messages into unintelligible cyphertext ones. The receiving station then decodes the encrypted messages back into plaintext for use. There are many encryption techniques and standards. The simple method shown in Figure 2-10 uses

Encryption Scheme:											
Letters of the alphabet:	A	B	C	D	E	F	G	H	I	J	...
Numerical equivalent:	1	2	3	4	5	6	7	8	9	10	...
Plus displacement key:	5	5	5	5	5	5	5	5	5	5	
New values:	6	7	8	9	10	11	12	13	14	15	
Letters to use in code:	F	G	H	I	J	K	L	M	N	O	...
Example:											
Plaintext message:	HI, ABE!										
Cyphertext message:	MN, FGJ!										

FIGURE 2-10 A simple data encryption method.

a *cyclic substitution* of the alphabet with a displacement value of “5” to transform the letters of a plaintext message into alternate letters of the alphabet. To decode the message, the recipient’s computer performs the encryption process in reverse, decrypting the coded message back into readable text. To make things more secure, the sender can use a different displacement value for each coded message.

The method that computers use to transform plaintext into cyphertext is called the **encryption key**. This is typically a mathematical function that depends on a large prime number. The **data encryption standard (DES)** system used by the US government to encode documents employs such a system. DES uses a number with 56 binary digits to encode information, a value equal to approximately 72 quadrillion. Thus, to crack the code, a hacker must guess which of 72 quadrillion values was used to encrypt the message.

The data encryption method illustrated in Figure 2-10 uses a single cryptographic key that is shared by the two communicating parties and is called **secret key cryptography**. This system derives its name from the fact that its users must keep the key secret and not share the key with other parties. The most common encryption methods today use **public key encryption**, a technique that requires each party to use a pair of public/private encryption keys. Two examples are Secure Socket Layer (SSL) and Secure Hypertext Transfer Protocol (HTTP).

To employ public key encryption, the sending party uses a public key to encode the message and the receiving party uses a second, private key to decode it. A major advantage of public key encryption is that the same public key cannot both encode and decode a message. Data transmissions using public key encryption are likely to be secure because the transmitted message itself is scrambled and because neither party knows the other’s key. This is the main reason why most web applications use public key encryption systems.

Digital Signatures and Digital Time Stamping

Many businesses want proof that the accounting documents they transmit or receive over the Internet are authentic. Examples include purchase orders, bids for contracts, and acceptance letters. To authenticate such documents, a company can transmit a complete document in plaintext and then also include a portion of that same message or some other standard text in an encrypted format—a **digital signature**.

In 1994, the National Institute of Standards and Technology adopted Federal Information Processing Standard 186—the **digital signature standard (DSS)**. The presence of the digital signature authenticates a document. The reasoning is straightforward: if a company’s private key decodes a message, then an authentic sender must have created the message. For this reason, some experts consider digital signatures even more secure than written signatures (which can be forged). Further, if the sender includes a complete message in both plaintext and cyphertext, the encrypted message provides assurance that no one has altered the readable copy. If someone has altered the plaintext, the two copies will not match.

Another authentication technique is a **digital certificate**—an authenticating document issued by an independent third party called a **certificate authority** (e.g., Thawte or VeriSign). The certificates themselves are signed documents with sender names and public key information. Certificates are generally encoded, possibly in a certificate standard such as the X.509 certificate format. Customers can also use digital certificates to assure themselves that a website is real.

Case-in-Point 2.18 In the future, each US citizen may have a taxpayer's digital certificate within a smart card. Citizens could use the smart card for all their transactions with the federal government. The government program responsible for developing this card is called Access Certificates for Electronics Services project, or ACES. While the intent of ACES is to ensure secure communications, privacy advocates are afraid that maybe the cards are *too* smart because they contain *all* your personal information in one place. ACES is available only to a federal or authorized agency but those concerned with privacy worry that the existence of the card will prove tempting for unintended uses.

Many important business documents are time sensitive. Examples include bidding documents that must be submitted by a deadline, deposit slips that must be presented to banks before the close of business, buy orders for stock purchases that depend on the date and time of issue, and legal documents that must be filed in a timely fashion. Then, too, most businesses also want to know when customers made particular purchases, when they paid particular bills, or when specific employees entered or modified data items in important databases. Finally, a good way to protect intellectual property such as computer software is to clearly establish the date and time it was first created or distributed.

What these items have in common is the need for a time stamp that unambiguously indicates the date and time of transmission, filing, or data entry. PGP Digital Time Stamping Service and Verisign are two of several **digital time-stamping services (DTSSs)** that attach digital time stamps to documents either for a small fee or for free. In a typical application, the user sends the document to the service's email address along with the Internet address of the final recipient. When the service receives the document, it performs its time-stamping task and then forwards the document as required.

Digital time stamping performs the same task electronically that official seals and other time stamps perform manually—it authenticates the date, time, and perhaps place of a business transaction. This can be important over the Internet. Although most documents are transmitted almost instantaneously, time delays can occur when file servers temporarily falter or power failures disrupt wide area networks. DTSSs enable businesses to overcome these problems.

AIS AT WORK

The Benefits of Online Accounting Outsourcing²³

The advantages of outsourcing such accounting functions as payroll or tax preparation are well known, but outsourcing additional accounting tasks to online providers is a different matter. Can a cloud provider, perhaps located offshore, perform general ledger or depreciation computations as well? A growing number of businesses say “yes!”

The most common reason why organizations outsource a given business process is to reduce costs, and this applies to accounting applications as well. Additional benefits include faster turnaround, improved quality, enhanced access to expertise, improved ability to handle peak processing volumes, and reduced capital expenditures (e.g., realized savings in computer hardware and software). Experts note that outsourcing also enables clients to reduce in-house labor costs, pay only for the services they need, and focus on only their core businesses.

²³ Ferber, K. 2008. Why outsourcing accounting is a good idea for you! accessed at www.articlesbase.com.

Perhaps the most commonly cited objection to outsourcing is a loss of control. In a recent survey of over 800 businesses by Accenture, however, over 85 percent of the respondents said that outsourcing actually gave them more control—especially in the ability to plan. In addition, over 55 percent thought that accounting outsourcing enabled them to implement strategic changes faster and at more controlled rates. But the biggest benefit of outsourcing may be the increased business for those accounting companies providing these services—yet one more opportunity made possible by the Internet.



SUMMARY

- ✓ The Internet is a collection of local, wide area, and international networks that accountants can use for communication, research, and business purposes. Most accountants also use the World Wide Web—the multimedia portion of the Internet—for similar purposes.
- ✓ Intranets are private networks that businesses create for such internal purposes as distributing email. Extranets are similar to intranets, except that they allow external parties to access internal network files and databases.
- ✓ Groupware is software that supports email on business networks, plus allows users to share computer files, schedule appointments, video conference, and develop custom applications.
- ✓ Social media contains information of value to accountants. For example, it can help them recruit new employees, screen applicants for red flags, and help them communicate with one another.
- ✓ To exchange financial information on the Internet, businesses can use XBRL—a standardized form of XML that provides a common format for financial data and allows searches of the data and extraction for comparison purposes. The XBRL International Consortium develops XBRL standards.
- ✓ The term e-accounting means the ability to perform accounting tasks on the Internet—for example, preparing budgets, posting financial statements, or training employees.
- ✓ E-payment systems, e-wallets, and virtual currencies allow Internet users to pay for Internet purchases without using their credit cards. For various reasons, such alternatives can benefit both the Internet seller and the online buyer.
- ✓ Electronic business includes retail sales on the Internet, electronic data interchange (EDI), and business-to-business (B2B) applications.
- ✓ Accountants can use cloud computing services to outsource selected data processing, to store copies of important files for both backup and file-sharing, and to access vital educational services.
- ✓ For security reasons, some businesses prefer to use private, value-added networks (VANs) rather than the Internet to support e-commerce applications.
- ✓ Internet privacy and security concerns include hacking, identity theft, spam, and phishing, all of which impact AISs. These concerns prompt many businesses to use firewalls, intrusion detection systems, proxy servers, data encryption techniques, digital signatures, and digital time stamping to achieve control objectives.
- ✓ Authentication requires users to prove they are who they say they are. Privacy concerns also include the need to protect users' private information and the growing threat of identity theft.

KEY TERMS YOU SHOULD KNOW

access control list (ACL)	electronic payments (e-payments)	Internet Protocol (IP)
access security	encryption key	intranets
business-to-business (B2B)	Extensible Business Reporting Language (XBRL)	intrusion detection system (IDS)
e-commerce	Extensible Markup Language (XML)	phishing
certificate authority	extranets	platform as a service (PaaS)
click fraud	firewall	proxy server
data encryption	Groupware	public key encryption
data encryption standard (DES)	hypertext markup language (HTML)	secret key cryptography
denial of service attack	hypertext transfer protocol (HTTP)	software as a service (SaaS)
digital certificate	IDEA	spam
digital signature	identity theft	spoofing
digital signature standard (DSS)	Identity Theft and Assumption Deterrence Act (ITADA)	TCP/IP
digital time stamping service (DTSS)	information security	two-factor authentication (TFA)
domain address	Instant messaging	uniform resource locator (URL)
domain name system (DNS)	Internet Corporation for Assigned Names and Numbers (ICANN)	value-added networks (VANs)
e-accounting		virtual currency
e-business		virtual private network (VPN)
e-wallet		web browser
electronic conferencing		XBRL instance documents
electronic data interchange (EDI)		XBRL International consortium

TEST YOURSELF

- Q2-1.** Which of the following is most likely to contain only numbers?
- domain address
 - URL address
 - IP address
 - postal address
- Q2-2.** Which of the following enables users to view data with a web browser?
- intranet
 - extranet
 - Internet
 - all of these
- Q2-3.** All of the following are protocols for transmitting data over the Internet except:
- IP
 - HTTP
 - XML
 - all of these are protocols
- Q2-4.** All of the following are markup languages (that use edit tags) except:
- HTML
 - IP
 - XML
 - XBRL
- Q2-5.** Which of these is *not* an acronym?
- HTML
 - blog
 - IDS
 - Internet
- Q2-6.** Which of the following is true?
- XBRL is a subset of XML
 - XML is a subset of TCP

- c. PBX is a subset of HTML
 - d. none of these is true
- Q2-7.** A document file containing XBRL tags is a(n):
- a. extranet document
 - b. intranet document
 - c. instance document
 - d. URL
- Q2-8.** Which of these identifies a private, point-to-point network?
- a. EDI
 - b. DES
 - c. IP
 - d. VAN
- Q2-9.** Which of these statements is correct?
- a. a VPN is a type of private network
 - b. DES stands for “data entry system”
 - c. an IDS is the same as a firewall
 - d. all of these statements are correct
- Q2-10.** Spoofing means:
- a. kidding someone about their computer
 - b. simulating a disaster to test the effectiveness of a disaster recovery system
 - c. posing as an authentic user to gain access to a computer system
 - d. encrypting data for security purposes

DISCUSSION QUESTIONS

- 2-1.** What are intranets? What are extranets? Why are intranets and extranets important to accountants?
- 2-2.** What are blogs? How are they used? Who is using them?
- 2-3.** Is bitcoin still a viable currency? Use an Internet search engine to find out. If so, what is the exchange rate for one bitcoin in the currency of your country? Would you buy a bitcoin? If so, why? If not, why not?
- 2-4.** How are the comments on social media sites useful to businesses? How are these sites useful to accountants?
- 2-5.** What is hypertext markup language? How does it differ from XML and XBRL? (Note: for a more comprehensive description of the differences, you may want to search the Internet.)
- 2-6.** How does XBRL compare to the IDEA database?
- 2-7.** Describe some important uses of electronic commerce and explain why electronic commerce is important to accountants.
- 2-8.** What are electronic payments? How are they different from credit card payments?
- 2-9.** What is electronic data interchange? Why do companies use EDI?
- 2-10.** Most retail sales websites require customers to use their credit cards to make purchases online. How comfortable are you in providing your credit card number in such applications? Why do you feel this way?
- 2-11.** What is click fraud? Who benefits and who loses when click fraud occurs?
- 2-12.** What is spamming? How is spam related to accounting information systems? Should all spamming be illegal? Why or why not?
- 2-13.** What are Internet firewalls and proxy servers? How are they created? How do businesses use them for Internet security?
- 2-14.** What is data encryption? What techniques are used for data encryption?
- 2-15.** Describe and contrast the three types of authentication. Can you think of a business situation where someone would need to use a combination of all three levels to gain access to information?
- 2-16.** What are digital signatures? Why do businesses use them? How can businesses use a digital certificate for Internet security?
- 2-17.** Analysts claim that businesses can increase sales on the Internet, but not profits. What evidence does this chapter provide to support or refute this claim? Discuss.

PROBLEMS

- 2-18.** The Internet uses many acronyms. Within the context of the present chapter, what words were used to form each of the following?
- | | | |
|----------|---------------|----------|
| a. EC | g. IP address | m. XBRL |
| b. EDI | h. ISP | n. XML |
| c. email | i. URL | o. IDEA |
| d. HTTP | j. VAN | p. SaaS |
| e. IDS | k. VPN | q. ICANN |
| f. IETF | l. WWW | r. DNS |
- 2-19.** In Discussion Question 2-1 above, you discussed intranets and extranets, and identified the importance of each to accountants. Now, assume that you are a partner in a medium-sized, local CPA firm. Your firm has 4 partners, 10 staff accountants, 1 research assistant, and an administrative assistant. Your firm is considered a technology leader in the local area, and this is considered a competitive advantage for your firm. At the weekly staff meeting next Friday you want to discuss the topic of developing an intranet for the firm. To be sure everyone is prepared to discuss this topic, you want to develop a “talking paper,” which is a one-page summary of salient points that you want to be sure you cover in your presentation to everyone. What would you include in this one-page discussion aid?
- 2-20.** Create an HTML document of your own, using the example in Figure 2-1 to guide you. Put the name of this assignment in the <h1> tag for the heading. Put your name in bold. Include at least one hyperlink to a favorite web page using the anchor <a> tag. Finally, include an ordered list in your web page with at least three items—for example, a list of your favorite books, favorite restaurants, or the courses you’re taking this semester. You will find it easiest to work in Notepad for this problem, but you can also use a word processor—as long as you save your document as “text.” Also, be sure to add the extension “html” to the end of your file name. View your completed document in your web browser—for example, by selecting File/Open in Microsoft Internet Explorer—and screen capture your work.
- 2-21.** At the time this book was written, the US Securities and Exchange Commission still supported Edgar—a depository of corporate accounting filings. Log onto Edgar at www.sec.gov/edgar.shtml, click on “Search for Company Filings,” click on “Companies and Other Filers,” and finally, select two companies in the same industry (either your instructor’s choice or your choice) so that you can compare various financial data. Note that you can select either “text” or “html” formats. Compare these formats to Figure 2-1. Are they similar? Looking at either image, can you download the financial information into a spreadsheet? Can you easily do financial comparisons such as ratio analysis? What do you have to do if you want to make financial comparisons?
- 2-22.** Visit the XBRL home page at www.XBRL.org, and read the section entitled “What is XBRL.” Then, do each of the following:
- Select the option “Knowledge Centre” and then “Articles,” which lists several articles that describe recent developments. Choose one of these and write a one-page summary of your findings.
 - Select “Benefits and uses for Business” at www.xbrl.org/xbrl-and-business. This site contains a set of articles describing the various benefits of XBRL to different types of businesses. Select one article from this list and write a one-page summary of it.
- 2-23.** Write a one-page paper on each of the following topics as they relate to XBRL:
- What is the history of XBRL? What professional accounting organization helped in the early stages of this concept?
 - What is an XBRL specification, and what is the latest version? When was it released? By whom?
 - How could XBRL help a company engage in “continuous reporting?” Find a website or an e-journal article that discusses XBRL and continuous reporting. What are the main points of the article?
 - Find at least two other companies (other than Microsoft) that are publishing their financial statements on the Internet using XBRL. What business are they in (what industry)?
- 2-24.** Why did we run out of addresses for the Internet? In the problems that follow, the number of different IP addresses that you can create with n bits is 2^n .

- a. An IP address using IPv4 uses 32 bits. Approximately how many different addresses can be represented by this standard? Given the large number of such addresses, why do you think the Internet ran out of them?
- b. An IP address using IPv6 uses 128 bits. How many different addresses can be represented by this new standard? Do you think this is enough?
- c. Telephone numbers in the United States or Canada use 10 digits. Why do you suppose we have not run out of telephone numbers yet?
- 2-25.** Examine the data encryption technique illustrated in Figure 2-10. Use a displacement value of “8” to encrypt the following message. Hint: This task becomes easy if you use an Excel spreadsheet and VLookup formulas that reference a table of letters and their numeric equivalencies.

“Those who ignore history are forced to repeat it.”

- 2-26.** The messages below were encrypted using the technique illustrated in Figure 2-10 (using displacement keys other than 5). Using trial and error, decode them. Hint: This task becomes easy if you use an Excel spreadsheet and VLookup formulas that reference a table of letters and their numeric equivalencies.

Message 1 OZ OY TUZ CNGZ CK JUTZ
QTUC ZNGZ NAXZY AY OZ OY
CNGZ CK JU QTUC ZNGZ PAYZ
GOTZ YU

Message 2 QBZAPJL KLSHFLK PZ QBZA-
PJL KLUPLK

Message 3 FAA YMZK OAAWE EBAUX FTQ
NDAFT

- 2-27.** A number of accounting journals now post back issues or even publish their entire journals, online. Access the *Journal of Accountancy*

website at www.aicpa.org (or another website selected by your instructor). Select an article that pertains to a topic in this chapter and write a one-page report on it. Be careful to correctly cite any information that you use from this article!

- 2-28.** The following stated policies pertain to the e-commerce website for Small Computers, Inc., a personal and handheld computer manufacturer and seller.

Privacy Statement

- We will only use information collected on this website for legitimate business purposes. We do not give away or rent any information to third parties.
- We will only contact you for legitimate business purposes, possibly from time to time, as needed. Please be 100 percent assured that we hold all transactions between you and our company in the strictest confidence.

Disclosure of Business Practices, Shipping, and Billing

- We will ship all items at the earliest possible date.
- We will not require you to accept items that you did not order.
- We will accept any returns from you of damaged or defective merchandise.
- In the event that we should accidentally bill you more than once for the same item, we will immediately issue you a refund.

Evaluate these stated policies in terms of how well they promote customer trust and confidence in Small Computers, Inc.’s electronic business operations.

CASE ANALYSES

2-29. Accounting Is Mind Blogging (Accounting Blogs on the Internet)

There are many accounting blogs on the Internet. Here are some examples.

Education

Accounting Coach (www.blog.accountingcoach.com)
 The Accounting Onion (www.accountingonion.com)
 Sleep on CPA (www.sleeponCPA.com)

Fraud

The Forensic Accounting File (www.bbforensic.com/blog)
 The Fraud Files Blog (www.sequenceinc.com/fraudfiles)

Motivational

CPA Success (www.macpa.org/blog)
 The Lighter Side of Accountancy and Tax (marksaccjokes.blogspot.com)

Industry Specific

Not-for-Profit (nonprofit.belfint.com)
 Farm CPA Today (www.farmcpatoday.com)
 Home School CPA (homeschoolcpa.com/blog)
 Dental CPAs (dentalcpas.blogspot.com)

Requirement

1. Pick one of these blogs, a site recommended by your instructor, or one of your own, and write a one-page report on it. Your report should describe what the site contains, provide some examples of the articles it contains, and include your reactions to it—that is, an explanation of why you did or did not like the site.

2-30. Me, Inc. (The Dos, Don'ts, and Ethics of Social Networking Sites)

Even if you are now only a student with limited or no work experience, it is not too early to begin building a professional identity and your own company—Me, Inc. This is an identity that you'll want to post and carefully cultivate on some of the popular social networking sites and that will establish you as a serious, desirable employee.

Obviously, Me, Inc., has only one, part-time employee (you) and probably hasn't been in business very long. But, given the discussions about social networking in this chapter, there is much you can do to enhance your identity as time goes on—and also some things you can also do to avoid mistakes.

Requirements

1. Identify at least four strengths that you think would make you a desirable employee. Is “education” one of them?
2. Identify at least four mistakes that individuals make to hurt their employment chances. Do you think you would ever make such mistakes?

3. Which social networks or other websites would you use to market Me, Inc.? Name at least three of them.
4. Suppose that you ultimately land an entry-level job at a large company with several levels of management. After working four months on the job, a senior manager several levels above you notices your account on Facebook and requests to be added as a friend. Would you approve him or her? Do you think such a request is appropriate? Why or why not?
5. Continuing Question 4, suppose the probationary period for your job is six months. Until now, you've received monthly job evaluations of "satisfactory" or "exceeds work requirements." However, you post a comment on a social networking site indicating that you don't like the job and hate your boss. At your next job evaluation, your boss mentions that posting and terminates you "for cause." Do you think this is ethical? Why or why not?

2-31. Anderson Manufacturing (XBRL-enabled Software)

The Anderson Manufacturing Company (AMC) is located in Las Vegas, Nevada, and manufactures specialty parts for high-end sports cars. The company currently has an accounting information system, but over time, has found that it would like its system to do more. For example, the finance department finds an increasing need for reporting financial data about the company in alternate report formats that the current system cannot perform. Rather than revise its existing accounting system piecemeal, the company's managers have begun to think about acquiring a new one. But which one? There are many packages available with various degrees of capability.

To help it make a decision, AMC hires Kuechler Associates, a consulting firm that specializes in software acquisitions and implementation. One of KA's areas of expertise is implementing ERPs. One of its suggestions is that AMC consider selecting XBRL-enabled software to help it with its financial reporting needs.

Requirements

1. What does it mean when software is "XBRL-enabled?"
2. Identify at least five advantages that KA might discuss with the company regarding an XBRL-enabled software solution. Identify any disadvantages that might also be relevant for AMC.
3. Assume that you are KA's research assistant. Draft a memo to AMC that explains how XBRL works. Remember to keep in mind your audience. This should be an executive-level piece of correspondence.
4. As the research assistant, develop a PowerPoint presentation for AMC explaining exactly what benefits it could realize with an XBRL-enabled software solution. Be creative, and use diagrams and examples where appropriate.

2-32. Barra Concrete (XOR Encryption)

Barra Concrete specializes in creating driveways and curbs for the residential market. Its accounting software uses exclusive OR (XOR) operations to convert the individual bits of a plaintext message into cyphertext. The rules are as follows:

	Exclusive OR rules			
	Rule 1	Rule 2	Rule 3	Rule 4
Plaintext bit	0	0	1	1
Bit in key	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>
Cyphertext result	0	1	1	0

In other words, exactly one of the bits must be a “1” and the other a “0” for the result of an exclusive OR operation to be a “1.” To illustrate, suppose that the bits representing a single plaintext character were 1010 0101 and the secret key used just the four bits 1110. Here are the results of the XOR operation, using this key:

Plaintext bits	1010	0101
Key (repeated):	1110	1110
Cyphertext result:	0100	1011

The encrypted bits are the cyphertext, or 0100 1011 as shown. These (encrypted) bits are what the software would transmit to the final recipient.

Requirements

1. Decrypting the cyphertext created by an XOR operation is easy—just use the same XOR operation on the encrypted bits! Demonstrate this for the example above.
2. Suppose the secret key were longer—the eight bits 1100 0011. Using this key and an exclusive OR, what is the cyphertext for the plaintext message “Go, team” if the bit configuration for these letters is as shown below. (Hint: the final answer consists of seven sets of data, each containing 8 bits.)

Message:	G	O	,	T	E	A	M
Binary:	0100 0111	0100 1111	0010 1100	0101 0100	0100 0101	0100 0001	0100 1101

READINGS AND OTHER RESOURCES

- Bizarro, P., and A. Garcia. 2010. XBRL—Beyond the basics. *CPA Journal* 80(5): 62–71.
- Debreceeny, R., and S. Farewell. 2010. XBRL in the accounting curriculum. *Issues in Accounting Education* 25(3): 379–403.
- Gray, G., and D. Miller. 2009. XBRL: Solving real-world problems. *International Journal of Disclosure & Governance* 6(3): 207–223.
- Kay, R. 2008. Quick study: Cloud computing. *Computerworld* (May 8): 1–2.
- Lahey, D., and T. MacDonald. 2010. Three flavors of cloud. *Accounting Today* 24(10): 22.
- Walper, G., and C. McBreen. 2008. Identity thieves target the affluent. *On Wall Street* 18(10): 66–70.



Go to www.wiley.com/go/simkin/videos to access videos on the following topics:

- How XBRL Works
- Intro to Identity Theft
- E-Wallet Demo Video (click on the High Res choice)
- What Is a Bitcoin?

Social Media Tips for Professional Service Firms
Why Use Cloud Accounting Software
Digital Signature Video Demos

ANSWERS TO TEST YOURSELF

1. c 2. d 3. c 4. b 5. d 6. a 7. c 8. d 9. a 10. c

Chapter 3

Cybercrime, Fraud, and Ethics

After reading this chapter, you will:

1. *Understand* the differences between cybercrime and fraud.
2. *Know* why there is an absence of good data on the amount of cybercrime.
3. *Be able to provide reasons* why cybercrime might be growing.
4. *Be familiar with* examples of cybercrime and fraud and the proper controls and procedures for preventing them.
5. *Be able to describe* a profile of cyber criminals.
6. *Understand* the importance of ethical behavior within AIS environments.

“The major lesson all companies should learn is that it’s critical to have a functioning and effective program in place to assure proper oversight and effective monitoring of full compliance with the ethical framework that has been established, and the tone at the top must permeate operations throughout the organization.”

Verschoor, C. 2014. Johnson and Johnson’s \$2.2 billion settlement.
Strategic Finance, February, p. 49.

3.1 INTRODUCTION

Managers, accountants, and investors use computerized information to control valuable resources, sell products, authenticate accounting transactions, and make investment decisions. But the effectiveness of these activities is compromised when the underlying information is incorrect, incomplete, or falsified. This is why digital information is a valuable asset that must be protected. The more managers and accountants know about cybercrime and fraud, the better they are able to assess risks and implement controls to protect organizational assets.

Fraud is estimated to cost US businesses nearly \$1 trillion each year, and understanding how to leverage accounting systems to detect and prevent fraud and cybercrime is valuable and essential for today’s accounting and auditing practitioners. Compared to manual accounting systems, the widespread use of complex technology and networks allows fraud perpetrators to steal more, in much less time, with much less effort, and leave less evidence of their actions. Consequently, cyber fraud is often more difficult to detect than other types of fraud. AISs help control financial resources and are often the favored targets of computer abusers and criminals. Also, AISs are prized targets for disgruntled employees seeking to compromise computer systems for revenge. Today’s accountants are responsible for designing, selecting,

and/or implementing the control procedures that protect AISs and use the data collected by AISs to detect and prevent fraud.

This chapter describes common cybercrimes, frauds, and other irregularities in order to inform readers of the important threats to AISs and firm resources. In the first section, we take a closer look at cybercrime and fraud and explain the differences between them. In the second section, we examine three specific cases involving cybercrime and fraud. The third section of this chapter identifies actions organizations can undertake to protect themselves from cybercrime and fraud—that is, what they can do to recognize potential problems and what they can do to control them.

Not all computer-related offenses are illegal—some are just unethical. Because of the importance of ethical behavior within the environment of computerized AISs, we also discuss key issues related to the intersections of AISs and ethics. Finally, the last section of our chapter addresses the importance of privacy and identity theft. The dramatic increase in the number of individuals, companies, and organizations using the Internet draws our attention to the question of privacy. What information is collected about us and how much of it is authorized? Also, how much of it is freely provided by individuals who do not realize that others will store and use the information for purposes other than what was intended? Accordingly, we focus on the issue of collection and protection of information.

3.2 CYBERCRIME AND FRAUD

Articles in *Fortune*, *BusinessWeek*, *Wall Street Journal*, *Computerworld*, *Security Focus*, and *WIRED* all testify to the high level of public interest in computer crime. At least three reputable organizations conduct surveys that help us understand the breadth and depth of cybercrime. First, the **Computer Security Institute (CSI)** conducts an annual survey to help determine the scope of cybercrime in the United States. The respondents to this survey are computer security practitioners in US corporations, government agencies, financial institutions, medical institutions, and universities.

Second, KPMG, a global network of professional firms providing audit, tax, and advisory services, conducts surveys on fraud and business integrity. Survey participants are business professionals who work for one of the top 2,000 companies listed in Dun and Bradstreet. Third, the **Association of Certified Fraud Examiners (ACFE)**—an international professional organization committed to detecting, deterring, and preventing fraud and white-collar crime—conducts a biannual survey and publishes the results in its *Report to the Nation on Occupational Fraud and Abuse*. The participants in this survey are its members, each of whom provides detailed information on one occupational fraud case he or she had personally investigated within the past two years.

Distinguishing between Cybercrime and Fraud

Cybercrime is a general term that refers to any criminal activity that involves computers or networks. This criminal activity is also known by other names, such as e-crime or computer crime. Cybercrime can involve direct attacks on computers or networks, using such methods as viruses or denial of service attacks, or cybercrime can involve the use computers or networks to commit a crime. Computers may be used, for example, to steal identities, harass an individual, or commit fraud.

Computer fraud refers specifically to the use of computers or networks to commit a fraudulent act. To be defined as fraud, the activity must involve:

1. the use of a computer to create an intentional, dishonest misrepresentation of fact, and
2. the intentional attempt to cause another person or business to do or refrain from doing something which causes loss.

Thus, computer fraud is a specific form of cybercrime involving misrepresentation that causes a loss to a person or business. Some examples of fraud involving computers are larceny, skimming, and financial reporting fraud.

Statement on Auditing Standards No. 99 identifies two types of accounting-related fraud: (1) fraudulent financial reporting and (2) misappropriation of assets.¹ *Fraudulent financial reporting* (sometimes called “cooking the books”) occurs when corporate officials such as senior-ranking executives intentionally falsify accounting records to mislead analysts, creditors, or investors. As a result, the annual financial statements do not fairly represent the true financial condition of the firm. Corporate scandals discussed in Chapter 1 are examples of this type of fraud.

Misappropriation of assets involves stealing assets from a company and is usually committed by employees within an organization or through collusion of employees and outside conspirators. The ACFE calls this type of crime *occupational fraud* and has developed a “fraud tree” to describe the many ways that employees can misappropriate assets from an organization. Examples include skimming, larceny, payroll tampering, and check tampering. Figure 3-1 gives several examples of asset misappropriation. Many of these activities directly involve accounting information systems.

Individuals can also use computers and networks to conduct unethical activities that do not violate criminal law or involve fraud. **Computer abuse** means that someone, who does not have permission, uses or accesses someone else’s computer or causes

Asset Class	Type of Fraud	Example
Cash	Larceny	Direct theft or removal from bank deposit
	Skimming	Nonreporting or underreporting of sales Write-offs of legitimate receivables as bad debts Lapping schemes
	Fraudulent disbursements	Payments to ghost companies or employees
		Payments for fictitious goods or services
		Multiple payments for the same bill
		Forged checks
		Altered payee on legitimate check
		False refunds
Inventory and all other assets	Misuse	Use of corporate limousine or jet for personal travel
	Larceny	Theft of raw materials or finished goods
		Fictitious inventory adjustments
		Nonreporting or underreporting of received goods

FIGURE 3-1 Examples of asset misappropriation.

¹ AICPA. 2003. Statement on Auditing Standards No. 99, *Consideration of Fraud in a Financial Statement Audit*.

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1. A graduate student infected a campus computer network with a virus that eventually disrupted over 10,000 different systems. The student did not realize how quickly the virus would get out of control.
 2. In a fit of resentment and anger, a data entry clerk shattered the screen of her computer with her shoe.
 3. Some employees of a credit bureau sent notices to individuals listed in its files as “bad credit risks.” For a fee, the employees would withhold damaging information, thereby improving the credit-worthiness of the individuals who paid the fee.
 4. A programmer changed a program that calculated dividends paid to shareholders such that the dividends of selected stockholders were reduced and the remaining dividends were paid into an account owned by the programmer. The programmer was able to pay himself over \$100,000 using this scheme.
-

FIGURE 3-2 Examples of computer crimes.

damage without intention to harm. Computer abusers can be considered mischievous pests with motives such as “revenge” or “challenge.” Of course, individuals seeking revenge or challenge through computer abuse can violate criminal laws, and their actions then become cybercrimes.

Case-in-Point 3.1 At age 22, Adrian Lamo was well-known for exposing security holes at large corporations and voluntarily helping the companies fix the vulnerabilities he exploited. At the *New York Times* site, Lamo obtained access to the names and Social Security numbers of employees. Although Lamo described this vulnerability to the *NY Times*, the publisher’s managers were not grateful and initiated an investigation. More recently, Lamo reported to federal authorities that it was Bradley Manning who leaked the sensitive US government documents to WikiLeaks.²

Figure 3-2 provides several examples of cybercrime, fraud, or abuse. Consider the examples in the figure and see if you can classify each before reading further.

In the first example, the primary objective was to disrupt a computer network, but there is no clear evidence of misrepresentation that creates a loss. Thus, this example would be a cybercrime, but not fraud. In the second case, a computer screen was damaged, and there is clear abuse, but the loss would likely not be considered a criminal offense. In the third example, the attempt to sell credit information would be a criminal offense, but it would not constitute fraud because there is no misrepresentation of fact. Finally, the fourth case involved a misrepresentation and losses to stockholders, and this is an example of a crime that is classified as fraud.

Cybercrime Legislation

Formal definitions of cybercrime and fraud can be found in law. Such definitions are important because they determine what law enforcement officials can prosecute as well as how statistics on crimes are accumulated. Both federal and state statutes govern cybercrime.

Federal Legislation. Figure 3-3 lists some important federal legislation governing activities involving computers. Of these acts, the most important is probably the **Computer Fraud and Abuse Act of 1986 (CFAA)**, which was amended in 1994 and 1996. This act defines cybercrime as any illegal act for which knowledge of

² Poulsen, K. “Ex-Hacker Adrian Lamo Institutionalized, Diagnosed with Asperger’s,” accessed at Wired (wired.com), May 20, 2010.

Fair Credit Reporting Act of 1970. This act requires that an individual be informed why he or she is denied credit. The act also entitles the individual to challenge information maintained by the credit-rating company and to add information if desired. Seven years after this law was put into effect, the annual number of complaints filed under it exceeded 200,000.

Freedom of Information Act of 1970. This is a federal “sunshine law” guaranteeing individuals the right to see any information gathered about them by federal agencies.

Federal Privacy Act of 1974. This act goes further than the Freedom of Information Act of 1970 by requiring that individuals be able to correct federal information about themselves, by requiring that agency information not be used for alternate purposes without the individual’s consent, and by making the collecting agency responsible for the accuracy and use of the information. Under this act, an individual may ask a federal judge to order the correction of errors if the federal agency does not do so.

Small Business Computer Security and Education Act of 1984. This act created an educational council that meets annually to advise the Small Business Administration on a variety of computer crime and security issues affecting small businesses.

Computer Fraud and Abuse Act of 1986. This act makes it a federal crime to intentionally access a computer for purposes such as (1) obtaining top-secret military information or personal financial or credit information; (2) committing a fraud; or (3) altering or destroying federal information.

Computer Fraud and Abuse Act (1996 amendment). This act prohibits unauthorized access to a protected computer and illegal possession of stolen “access devices,” which includes passwords and credit card numbers.

Computer Security Act of 1987. This act requires more than 550 federal agencies to develop computer security plans for each computer system that processes sensitive information. The plans are reviewed by the National Institute of Standards and Technology (NIST).

USA Patriot Act of 2001. This act gives federal authorities much wider latitude in monitoring Internet usage and expands the way such data is shared among different agencies. However, a judge must oversee the FBI’s use of an email wiretap, and the FBI must disclose what was collected, by whom, and who had access to the information that was collected.

Cyber Security Enhancement Act of 2002. This act permits the United States Sentencing Commission to review and, if appropriate, amend guidelines and policy statements applicable to persons convicted of a computer crime to reflect the serious nature of (1) the growing incidence of computer crimes, (2) the need for an effective deterrent, and (3) appropriate punishment to help prevent such offenses.

CAN-SPAM Act of 2003. This act requires unsolicited commercial email messages to be labeled, to include opt-out instructions, and to include the sender’s physical address. It prohibits the use of deceptive subject lines and false headers in messages. This law took effect on January 1, 2004.

FIGURE 3-3 Federal legislation affecting the use of computers.

computer technology is essential for its perpetration, investigation, or prosecution. The following paragraphs identify the criminal acts found in the Computer Fraud and Abuse Act and give examples of each type of crime. The act is currently being evaluated for revision, and there are fierce debates about its effectiveness because much of its language was developed before the Internet boom and the creation of modern communications devices. Many worry that the act is outdated and classifies noncriminal activities as serious crimes.

1. **Unauthorized Theft, Use, Access, Modification, Copying, or Destruction of Software or Data.** The PC manager at a King Soopers supermarket in Colorado was called repeatedly to correct computer errors that were thought to be responsible for a large number of sales voids and other accounting errors. Eventually, the company discovered that this manager was in fact the cause of these problems. Over the course of five or more years, officials estimate that he and two head clerks used a number of simple methods to steal more than \$2 million from the company—for example, by voiding sales transactions and pocketing the customers’ cash payments.

2. ***Theft of Money by Altering Computer Records or the Theft of Computer Time.*** To commit an inventory fraud, several employees at an East Coast railroad entered data into their company's computer system to show that more than 200 railroad cars were scrapped or destroyed. These employees then removed the cars from the railroad system, repainted them, and sold them.
3. ***Intent to Illegally Obtain Information or Tangible Property through the Use of Computers.*** One case of industrial espionage involved Reuters Analytics, whose employees were accused of breaking into the computers of their competitor, Bloomberg, and stealing lines of programming code. These instructions were supposedly used in software that provides financial institutions with the capability to analyze historical data on the stock market.
4. ***Use or the Conspiracy to Use Computer Resources to Commit a Felony.*** Paul Sjiem-Fat used desktop publishing technology to perpetrate one of the first cases of computer forgery. Sjiem-Fat created bogus cashier's checks and used these checks to buy computer equipment, which he subsequently sold in the Caribbean. He was caught while trying to steal \$20,000 from the Bank of Boston. The bank called in the Secret Service, which raided his apartment and found nine bogus checks totaling almost \$150,000. Sjiem-Fat was prosecuted and sent to prison.
5. ***Theft, Vandalism, or Destruction of Computer Hardware.*** A disgruntled taxpayer became enraged over his tax bill. He was arrested for shooting at an IRS computer through an open window of the building.
6. ***Trafficking in Passwords or Other Login Information for Accessing a Computer.*** Two former software developers of Interactive Connection (now known as Screaming Media) were arrested for breaking into Interactive's computer system one night. They allegedly stayed on the system for about four hours and copied proprietary files and software.
7. ***Extortion That Uses a Computer System as a Target.*** A disgruntled employee of a European company removed all of the company's tape files from the computer room. He then drove to an off-site storage location and demanded half a million dollars for their return. He was arrested while trying to exchange the data files for the ransom money.

State Legislation. Every state now has at least one computer crime law. Most of the laws have provisions that (1) define computer terms (many of which vary from state to state), (2) define some acts as misdemeanors (minor crimes), and (3) declare other acts as felonies (major crimes). These laws require willful intent for criminal convictions. Thus, words like *maliciously*, *intentionally*, or *recklessly* often appear in the wording of the computer-crime laws, and willful intent must be established for a successful prosecution.

Cybercrime Statistics

No one really knows how much is lost each year as the result of cybercrime. One reason for this is the fact that a large proportion of cybercrime takes place in private companies, where it is handled as an internal matter. We have no laws that