PART ONE

AN INTRODUCTION TO ACCOUNTING INFORMATION SYSTEMS

Part One of this book introduces the subject of **accounting information systems (AISs)**. It defines accounting's principal goal, which is to communicate relevant information to individuals and organizations, and describes the strong influence of information technology on this communication process. Chapter 1 defines accounting information systems and then discusses some current events that impact accountants and the profession. This chapter also examines the impact of information technology on financial accounting, managerial accounting, auditing, and taxation. Finally, Chapter 1 describes a number of career opportunities in AISs.

Chapter 2 provides an overview of information technology that is relevant to accounting professionals. It begins by identifying six reasons that make information technology so important to accountants, and then discusses the current AICPA survey on the Top 10 Information Systems Technologies. Of course, the focus of this chapter is on modern technology and its impact on AISs. Hardware technology, including computer input devices, central processing units, secondary storage devices, and output devices, is discussed in detail. Because communication links are so important to AISs, this chapter discusses various communication and network arrangements, including client/server computer and wireless technology. The chapter concludes with descriptions of various types of computer software.

The term ''documentation'' refers to the paper documents that describe how an accounting information system functions as well as the representative computer inputs, outputs, record formats, and files that store this information. Documenting an AIS is critical. It helps managers, systems analysts, and users understand the basic processes and functions of the system. Also, designers use documentation to create new systems, and auditors use documentation of a system to evaluate the AIS of a client. Chapter 3 describes various tools and techniques for documenting AISs, including document and system flowcharts, data flow diagrams, and computer-assisted software engineering (CASE) tools.

Chapter 1

Accounting Information Systems and the Accountant

After reading this chapter, you will:

1. *Be able to distinguish* between such terms as ''systems,'' ''information systems,'' ''information technology,'' and ''accounting information systems.''
2. *Learn* how information technology (IT) influences accounting systems.
3. *Be familiar with* suspicious activity reporting.
4. *Understand* how financial reporting is changing with advances in IT, such as XBRL.
5. *Appreciate* how IT allows management accountants to use business intelligence to create dashboards and scorecards.
6. *Know* why auditors provide a variety of assurance services.
7. *Be more aware of* what is new in the area of accounting information systems.
8. *Be familiar with* career opportunities that combine accounting and IT knowledge and skills.

"The accounting industry has always been paper-driven. Now, it is becoming technology driven."

Maureen Link, ''3G Technology Will Change the Way You Work''
Pennsylvania CPA Journal (Spring 2003), p. 19.

INTRODUCTION

The study of **accounting information systems (AISs)** is, in large part, the study of the application of information technology (IT) to accounting systems. This chapter describes the ways that information technology affects financial accounting, managerial accounting, auditing, and taxation. We begin by answering the question ''what are accounting information systems'' and then look at some new developments in the field. Following this, we will examine some traditional roles of AISs in commerce.

Why should you study accounting information systems? There are many reasons, which we will review briefly in this chapter, 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 literate. In addition, a large number of specialized employment opportunities are available to those students who possess a deeper understanding of computer subjects and can bring advanced computer skills to accounting jobs. The last part of this chapter describes a number of special career opportunities for those with an interest in AISs.

WHAT ARE ACCOUNTING INFORMATION SYSTEMS?

What do the following have in common: (1) a shoebox filled with a lawyer's expense receipts, (2) the monthly payroll spreadsheet in the computer of an auto-repair shop, (3) the *Peachtree* accounting system for a small chain of dry-cleaning stores, and (4) the ERP (Enterprise Resource Planning) system of a large manufacturer? The answer is that they are all examples of accounting information systems. How can such a wide range of accounting applications each qualify as an accounting information system? The answer is that this is the essence of what AISs are—collections of raw and stored data (that together typically serve as inputs), processing methods (usually called ''procedures''), and information (outputs) that serve useful accounting purposes. Do such systems have to be computerized? The first example—the shoebox—suggests that they do not. *Can* they be complicated? The last example—an ERP system—illustrates one that is.

Accounting Information Systems—A Definition

Figure 1-1 suggests that accounting information systems (AISs) stand at the crossroads of two disciplines: ''accounting'' and ''information systems.'' Thus, the study of AISs is often viewed as the study of computerized accounting systems. But because we cannot define

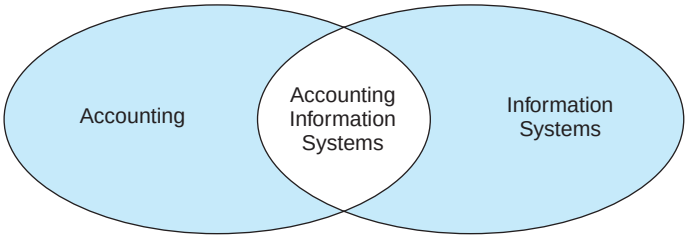

FIGURE 1-1 Accounting information systems exists at the intersection of two important disciplines: (1) accounting and (2) information systems.

an AIS by its size; it is better to define it by what it *does*. This latter approach leads us to the following definition that we will use as a model in this book:

> ***Definition:*** *An* ***accounting information system*** *is 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.

Accounting. You probably have a pretty good understanding of accounting subjects because you have already taken one or more courses in the area. Thus, you know that the accounting field includes financial accounting, managerial accounting, and taxation. 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. Indeed, it is difficult to think of an accounting task that is not integrated, in some way, with an accounting information system.

The challenge for accountants is to determine how best to provide the information required to support business and government processes. For example, in making a decision to buy office equipment, an office manager may require information about the sources of such equipment, the costs of alternate choices, and the purchasing terms for each choice. Where can the manager obtain this information? That's the job of the accounting information system.

AISs don't just support accounting and finance business processes. They often create information that is useful to non-accountants—for example, individuals working in marketing, production, or human relations. Figure 1-2 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 also for many non-accounting majors.

Information (versus Data). Although the terms **data** and **information** are often used interchangeably, it is useful to distinguish between them. *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*—for example, by sorting, manipulating, aggregating, or

Finance—cash forecasts and actual payment and receipt information
Marketing—sales, summary analyses, cost information, and sales forecasts
Human Resources—payroll analyses (including employee benefit information) and projections of future personnel costs
Production—inventory summaries and product cost analyses.

FIGURE 1-2 Examples of useful information that an AIS can generate for selected non-accounting functions of a business.

classifying them. An example might be by taking the raw scores of a class examination and computing the class average.

Do raw data *have* to be processed in order to be meaningful? The answer is ''not at all.'' 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**—i.e., the path that data follow as they flow through an AIS. In a payroll system, for example, an employee's time card for a given pay period indicates how many hours he worked, and therefore (when combined with his hourly pay rate), his gross pay. An auditor can verify the information on a paycheck by following the audit trail backwards—for example, to make sure that the final value reflects the correct payment for the number of hours worked.

Case-in-Point 1.1 At one American university, an employee in the payroll department was able to steal thousands of dollars by manipulating the payroll records of student workers. When students quit their jobs, she would delay inputting their termination dates in her computer, continue to submit time cards in their behalf, and cash the subsequent payroll checks generated by the system. She was caught when one student complained that his W-2 tax form showed he had earned more money than he had in fact been paid. Auditors then examined his payroll records and were able to uncover the fraud.[1]

Despite the potential usefulness of some unprocessed data, most end users need financial totals, summary statistics, or exception values—i.e., processed data—for decision-making purposes. Figure 1-3 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. Modern AISs, of

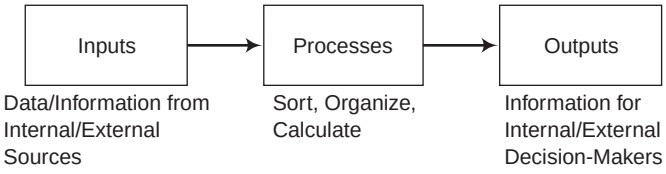

FIGURE 1-3 An information system's components. Data or information is input, processed, and output as information for planning, decision-making, and control purposes.

[1]Source: from the authors.

course, harness information technology to perform the necessary tasks in each step of the process. For example, a catalog retailer might use some web pages on the Internet to gather customer purchase data, then use central file servers and disk 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.

Although computers are wonderfully efficient and useful tools, they also create problems. One is their ability to output vast amounts of information quickly. Too much information, and especially too much trivial information, can overwhelm its users, possibly causing relevant information to be lost or overlooked. This situation is known as **information overload**. It is up to the accounting profession to determine the nature and timing of the outputs created and distributed by an AIS to its end users.

Another problem with computerized data processing is that computers do not automatically catch the simple input errors that humans make. For example, if *you* were performing payroll processing, you would probably know that a value of ''-40'' hours for the number of hours worked was probably 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 problems.

Yet a third 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, not recorded on paper. 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, of which audit trails are important elements. Chapters 11, 12, and 14 discuss these topics in detail.

In addition to collecting and distributing large amounts of data and information, modern 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 one of the reasons why this book contains three chapters on the subject (see Chapters 4, 5, and 6).

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—e.g. finance, marketing, human resources, and production. A problem with this 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 will 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 today 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 (and 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 enterprise-wide information system—i.e., a system that focuses on the *business processes* of the organization as a whole. (We discuss these systems in Chapter 9.)

Case-in-Point 1.2 Accountants and other managers are using **predictive analytics**, a technique that takes advantage of data stored in data warehouses, to create systems that allow them to use their data to improve performance. FedEx uses these tools to determine how customers will react to proposed price changes or changes in service. The police force in Richmond, Virginia uses predictive analysis tools and a database of police calls and crime incident data to predict where and when crimes are most likely. Their system even includes information about weather and local events.[2]

Systems. Within the accounting profession, the term ''systems'' usually refers to ''computer systems.'' As you probably know, IT advances are changing the way we do just about everything. Just a few years ago, the authors never imagined that people could someday purchase a book from a ''virtual bookstore'' on the Internet using a wireless laptop, while sipping on 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. In fact, as suggested by the quote at the beginning of this chapter, IT is a vital part of what accountants must now 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 most modern 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—e.g., 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.

Accounting Information Systems and Their Role 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—for example, when we use digital cameras to take pictures, access the Internet to make a purchase or learn about something, or make phone calls to friends and family. It is perhaps less clear that computer technology has also had profound influences on commerce. In this **information age**, for example, fewer workers actually make products, and 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 is often dependent on the uses or misuses of the information that knowledge workers manage.

Case-in-Point 1.3 The United States has lost over 3 million jobs to overseas competition—many of them in the manufacturing sector. Yet, Air Products and Chemicals (a supplier of industrial gases to the steel industry) has not only managed to survive, but to

[2]Source: Rick Whiting, ''Predict the Future—Or Try, Anyway,'' *InformationWeek*, May 29, 2006, Issue 1091, pp. 38–43.

thrive, in the face of this trend. Over the last 30 years, in fact, sales have increased tenfold (from $600 million to $6 billion) and the company's work force has more than doubled (to 18,500 employees). What's its secret? The answer was to follow steel production to offshore manufacturing sites, and to become a *local supplier* in each of the developing countries in which the new business developed. Says John Jones, its CEO: "The competitive weapon is speed, moving knowledge around the world as rapidly as possible." Jones' attitude reflects the modern thinking of others: a knowledgeable worker is often a company's most valuable asset.[3]

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. The information age also 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 transactions.

In many ways, accounting is itself an information system—i.e., 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 and such other reports as *accounts receivable aging analyses* for internal managers. 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 non-financial 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. The definition also considers the AIS as *process focused*. This matches the contemporary perspective that accounting systems are not only financial systems.

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.

Suspicious Activity Reporting

A number of **suspicious activity reporting (SAR)** laws now require accountants to report questionable financial transactions to the U.S. 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

[3]Source: Jyoti Thottam, ''Inside Business: What Can America Make'' *Time Magazine* (January 12, 2004), pp. 77 ff.

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 over 1.6 million of them in 2008.

Case-in-Point 1.4 In 2005, a cooperating witness indicated that a pharmaceutical network was selling controlled drugs through affiliated websites to customers without authorized prescriptions. To evade U.S. 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.[4]

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 conduct criminal activities. A corollary to this fact is that AISs document financial activities in the course of daily transaction processing, and therefore become important sources of SAR evidence and subsequent legal action. Finally, SAR can act as a deterrent to criminal or terrorist activities—and therefore an important control for AISs.

Figure 1-4 contains a classification of SAR reports for ten years of filings from banks and other depository institutions—one of the most important sources of these filings. In this figure, note the importance of money laundering and check frauds.

Countering Terrorism

On September 11, 2001, terrorist agents commandeered four separate commercial U.S. jetliners, crashing two of them into the twin towers of the Word Trade Center in New York City and a third into a side of the Pentagon building in Washington, DC. Over 3,000 lives were lost in this one event, and the economic, social, and political impacts of these events are still being felt today. You have probably seen many of their effects first hand, including the creation of a new Presidential cabinet position entitled ''Homeland Security,'' increased security at major airports, and stricter controls over immigration and visitor passages into the United States (and many other countries as well).

Case-in-Point 1.5 Operation Safe Commerce (OSC) is an initiative by the federal government to thwart terrorists wishing to use innocent commercial cargo to transport weapons or dangerous chemicals through West Coast ports. The major thrust of OSC is to enhance security along the entire supply chain of a ship's cargo. Besides using ''smart seals'' to guard against tampering with shipping containers while in transit, OSC also focuses on standardizing computerized documentation such as bills of lading that will help government officials identify pallets from ''countries of interest.''[5]

Although countering terrorism might seem like a governmental matter having little to do with accounting, just the opposite is true. One example of the use of accounting

[4]Source: FinCen website at www.fincen.gov/law_enforcement/ss/html/Issue14-story5.html.
[5]Source: Lara L. Sowinski, ''Port Security Is a Sink or Swim Proposition'' *World Trade* (January 2004), pp. 20–24.

Rank	Suspicious Activity Type	Filings (Overall)	Percentage (Overall)
1	BSA/Structuring/Money Laundering	1,503,003	48.28%
2	Check Fraud	333,862	10.72%
3	Other	270,152	8.68%
4	Counterfeit Check	155,141	4.98%
5	Credit Card Fraud	154,506	4.96%
6	Mortgage Loan Fraud	113,071	3.63%
7	Check Kiting	101,107	3.25%
8	Identity Theft	69,325	2.23%
9	False Statement	67,902	2.18%
10	Defalcation/Embezzlement	63,392	2.04%
11	Unknown/Blank	63,069	2.03%
12	Consumer Loan Fraud	53,588	1.72%
13	Misuse of Position or Self Dealing	30,899	0.99%
14	Wire Transfer Fraud	29,574	0.95%
15	Mysterious Disappearance	26,465	0.85%
16	Debit Card Fraud	17,480	0.56%
17	Commercial Loan Fraud	16,524	0.53%
18	Counterfeit Instrument (Other)	13,542	0.43%
19	Computer Intrusions	12,307	0.40%
20	Counterfeit Credit/Debit Card	12,177	0.39%
21	Terrorist Financing	3,178	0.10%
22	Bribery/Gratuity	2,932	0.09%
	Total:	3,113,196	100.00%

FIGURE 1-4 A classification of suspicious activity report filings using Form TD F 90-22.47 from depository institutions, April 1, 1996–December 31, 2006. Source: Website of the U.S. Treasury Department (2008).

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.

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. Figure 1-5 provides a list of some examples. Sadly, this list is neither complete nor particularly current, as new discoveries involving the misrepresentation of assets and incomes continue to surface.

Of particular note on this list 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 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

Company Date fraud became public Industry	Event	Names of Primary Executives
Adelphia 2002 Cable television provider	Adelphia, led by the controlling Rigas family, used off–balance sheet financing to hide $2.3 billion in debt from the eyes of shareholders and creditors. The company also fraudulently increased earnings by exaggerating cable subscriptions. The SEC charged Adelphia and various members of the Rigas family with violating federal antifraud regulations.	John Rigas—Company founder, former chairman and CEO Timothy, Michael and James Rigas—Sons of John Rigas, Members of the Board and also held executive positions with Adelphia
Arthur Andersen 2001 Accounting firm	As Enron's auditor, Andersen aided and abetted Enron's use of off–balance sheet financing arrangements. When it became clear that Andersen would be investigated by the SEC, employees shredded evidence of Andersen's involvement. Andersen, once a huge accounting firm, was ordered to cease operations by a Texas court in June 2002.	David Duncan—Senior audit partner for Enron
Bernard Madoff 2008 Investments	In late 2008, Madoff confesses to running an elaborate Ponzi scheme involving between $50 and $65 billion.	Bernard Madoff and perhaps members of his family
Enron 2001 Energy trader	Enron, once a star performer in the ''new economy,'' used off–balance sheet financing to hide large amounts of debt from investors and creditors. The company's implosion resulted in many lost jobs and evaporation of workers' and investors' pensions. Enron's downfall spurred demand for accounting reform.	Andrew Fastow—Former CFO Kenneth Lay—Former Chairman of the Board Jeff Skilling—Former CEO Arthur Andersen—Enron's auditor
Global Crossing 2002 Telecom networks	In 2002, the company filed for bankruptcy. Following this filing, allegations were directed toward the company that executives artificially increased revenues, shredded accounting documents, and took part in insider trading. To date, no charges have been filed against Global Crossing or its employees.	Gary Winnick—Former Chairman of the Board Arthur Andersen—WorldCom's auditor
HealthSouth 2003 Health care service provider	The company defrauded investors by artificially increasing earnings and assets to the tune of $1.4 billion over a 5-year period. Numerous company insiders were charged with selling stock while they knew that the company's stock value was artificially high.	Richard Scrushy—Chairman of the Board
ImClone 2001 Biopharmaceutical company	CEO Waksal learned *privately* that ImClone's main product, a cancer drug, would soon be rejected by the FDA. Before this information became public, he sold most of his shares and convinced family members to sell their shares of ImClone. Martha Stewart learned of these sales from her broker and subsequently sold her shares in the company prior to the FDA's official announcement. All were charged with insider trading.	Samuel Waksal—CEO Aliza Waksal—CEO's daughter and major shareholder Martha Stewart—Television celebrity as well as founder and CEO of Martha Stewart Living, Inc.
Merrill Lynch 2002 Investment brokerage	Analysts at the firm recommended the stock of Merrill Lynch clients to individual investors that the analysts disparaged privately. The firm was also implicated for producing biased, rather than objective, research reports on companies.	David Komansky—CEO Stanley O'Neal—President Henry Blodget—Former analyst
New York Stock Exchange (NYSE) 2003 Stock exchange	Following frequent calls for corporate reform in the post-Enron era, it came to light that Grasso, CEO of the NYSE, was being compensated very handsomely for his work at the exchange. Once news of his $180 million retirement package became public knowledge, Grasso was forced to resign from his post.	Dick Grasso—Former CEO
Parmalat 2003 Dairy foods producer	Considered by some to be the ''Enron of Europe,'' the Italian company Parmalat used massive financial fraud to hide its true financial position. Executives inflated assets by around $13 billion, and CEO Tanzi redirected $640 million of company funds for private use in Tanzi's other businesses.	Calisto Tanzi—Founder and former CEO Fausto Tonna—Former CFO
Tyco 2002 Diversified manufacturing	Tyco executives used funds from company loan programs for inappropriate personal use. These loans were not disclosed to shareholders. Also, executives misused company funds as evidenced by the scandalous birthday party former CEO Kozlowski threw for his wife in the amount of $2 million.	Dennis Kozlowski—Former CEO and Chairman of the Board Mark Swartz—Former CEO Mark Belnick—Former Chief Legal Officer
WorldCom 2003 Telecommunications	On the heels of Enron's downfall, it came to light that the company had systematically overstated its revenues by $9 billion to meet Wall Street earnings expectations. Investors lost huge amounts of capital and thousands of workers were laid off.	Bernard Ebbers—Former CEO Scott Sullivan—Former CFO David Myers—Former Controller

FIGURE 1-5 Examples of recent accounting frauds and problems.

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—i.e., have ''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. Just as some accountants have been guilty of criminal and unethical behavior, there are also others who 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. Some questioned whether there was enough regulation and others whether perhaps there was too much. There was controversy about fair value accounting rules and some questioned the strength of Securities and Exchange Commission oversight, particularly as one of the biggest financial frauds of all time came to light. This was the *Ponzi scheme* constructed by Bernard Madoff, a well-known investment fund manager. Ponzi schemes are named for Charles Ponzi, a scam artist who created a pyramid fraud in which the perpetrator uses new investment funds 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 the new money stops flowing, the pyramid collapses.

Bernard Madoff appears to have taken this common fraud technique to a new high, creating a house of cards in excess of $50 billion. The SEC was tipped to the questionability of Madoff's investments many times over a period of years, but never investigated enough to discover the fraud. You would expect that investment funds of the size managed by Madoff would be overseen by an army of highly-trained and experienced accountants and auditors. Rather, Madoff employed a little known three-person firm, Friehling & Horowitz. At the time of this writing, the American Institute of Certified Public Accountants, among other organizations, was investigating the auditor.

The Sarbanes-Oxley and Patriot Acts

In response to the corporate frauds discussed above, the U.S. Congress passed the **Sarbanes-Oxley Act of 2002**. Highly publicized and hurriedly passed, the SOX act has many requirements that affect accounting information systems. One section, for example, forbids corporations from making personal loans to executives—a requirement that outlaws the former practice of transferring funds to officers who never pay back the money. Another section requires the chief executive officers (CEOs) of companies to personally vouch for the accuracy and completeness of its financial statements. Yet a third section requires public companies to hire independent, *new* auditors to review their internal controls and determine their compliance with other financial regulations.

Perhaps the most important part of SOX to accountants is Section 404, which requires managers to implement and assess internal controls and auditors to evaluate those assessments. This portion of the bill has created the most work for accountants and information systems auditors. We discuss the details of this act in several chapters of this book.

Case-in-Point 1.6 In order to make sure they are fully compliant with the requirements of the Sarbanes-Oxley Act, many companies are acquiring specialized software packages that collect financial information and help auditors verify that they are fully compliant with the data-gathering and retention requirements of the law. The Sarbanes-Oxley Act has thus been a boon to the developers of such software—i.e., Interwoven, PeopleSoft, and Oracle. The estimated market for such products: between $1 and $4 billion.[6]

The **U.S. Patriot Act—** an acronym for ''Providing Appropriate Tools Required to Intercept and Obstruct Terrorism''—was signed into law shortly after the terrorist attacks of September 11, 2001. Although those sections of the law permitting search, wire-tapping, and seizure actions without legal warrants have attracted the most attention, a number of less-publicized articles directly affect accounting systems. Section 352 of the Act, for example, requires auditors to verify that their organizations have adequate risk assessment and prevention systems. Other sections of the law require financial institutions to have an anti-money laundering officer, professional training for employees, and independent audits of financial programs. Of special interest: the requirement that banks monitor their accounts in foreign institutions for possible fraudulent uses, and perform due diligence in high-risk (but unnamed) countries known for corruption, money laundering, or terrorist activities. The Act also includes penalties for those organizations that do not comply with these requirements.

ACCOUNTING AND IT

Information technology strongly influences the way most accountants work. Instantaneous access to the Internet via mobile communication devices such as cell phones, for example, enables managerial accountants to complete important work tasks while traveling in the field, auditors to communicate with each other from remote job sites (but auditing the same client), staff accountants to text message one another from alternate locations, and tax experts to download information on tax rulings that are even more current than their latest CDs.

Figure 1-6 provides an overview of the major areas within the general field of accounting. This section of the chapter considers the impact of IT on each of them.

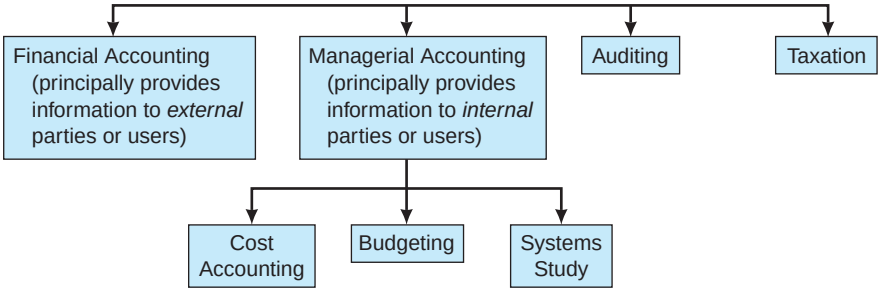

FIGURE 1-6 An overview of systems. The financial and managerial accounting components are not mutually exclusive: information from the financial accounting component is used within the managerial accounting component, and vice versa.

[6]Source: Jim Kerstetter, ''Sarbanes-Oxley Sparks a Software Boom'' *Business Week* (January 12, 2004), p. 94.

Financial Accounting

The major objective of **financial accounting information systems** is to provide relevant information to individuals and groups *outside* an organization's boundaries—e.g., investors, federal and state tax agencies, and creditors. Accountants achieve these informational objectives by preparing such financial statements as income statements, balance sheets, and cash flow statements. Of course, many managers *within* a company can also use financial reports for planning, decision-making, and control activities. For example, a manager in charge of a particular division could use such profitability information to make decisions about future investments or to control expenses.

Figure 1-7 is an example of a financial accounting audit trail. This trail traces an organization's financial **accounting cycle**, which begins with transaction data (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, which 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.

Non-Financial 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 non-monetary 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 non-financial 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 4.

Case-in-Point 1.7 A friend of one of the authors of this book recently received a call from the local hospital's accounting office, urgently requesting to speak to his wife. The clerk was very insistent because the wife had thousands of dollars in unpaid bills and the hospital was anxious to settle the account. It took the friend several minutes to get a word in. Finally, he

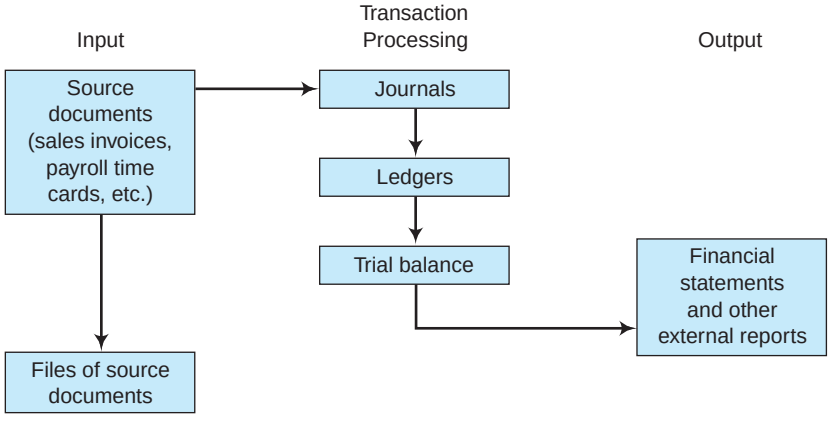

FIGURE 1-7 A financial accounting audit trail.

was able to reveal the one piece of information lacking in the hospital's financial computer records: *his wife had died at the hospital*.[7]

Several professional associations now formally recognize that non-financial 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, 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 non-financial performance measures.

Real-Time Reporting. Another impact of IT on financial accounting concerns 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.

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 applied everywhere needed.

Interactive data require a language for standardization that ''tags'' the data at its most basic level. (For total assets, this would be at the detail level for each asset.) **Extensible business reporting language (XBRL)** is emerging as the language of choice for this purpose. At present, the SEC has a voluntary filing program whereby public companies may file their financial reports in XBRL format. Many companies, software programs, and industries are beginning to incorporate XBRL for creating, transforming, and communicating financial information. The case-in-point below provides an example of its benefits. We discuss XBRL in some detail in Chapter 15 and you can learn about its status at www.xbrl.org.

Case-in-Point 1.8 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.

[7]Source: from the authors.

The tagged data the FDIC received from the banks now has improved accuracy and can be published and made available to users much more quickly than before.

Managerial Accounting

The principal objective of **managerial accounting** is to provide relevant information to organizational managers—i.e., users who are internal to a company or government agency. Figure 1-8 summarizes some of the most important features of this accounting area. As suggested by Figure 1-8, 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 are facing increased competition. The result is that companies must be more efficient and better control 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.

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, increasing 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 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 over 20 years, they are more common now that computerized systems track costs. Moreover, these systems can move an organization in new strategic directions, allowing corporate executives to

- Managerial accounting focuses on providing accounting information for internal parties, such as management, rather than for external investors and creditors.
- Managerial accounting information is mostly forward-looking.
- Managerial accounting information is not regulated by generally accepted accounting principles, nor is it mandatory to prepare it.
- Managerial accounting reports include both non-monetary and financial data.
- Managerial accounting is influenced by many business and non-business disciplines, such as economics, behavioral science, and quantitative methods.
- Managerial accounting information is flexible and frequently involves non-routine reporting.

FIGURE 1-8 A summary of features characterizing managerial accounting.

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 1.9 Art.com, with its collection of prints, posters, and photographs, combined with its custom framing service, offers consumers unlimited opportunities to find "just the right piece of artwork." It's a dot-com success story. When the start-up company turned to professionals to help it build a long-term successful business, the consultants used ABC to identify 12 key activities. By focusing on the most costly activities, company executives find that they can do a better job of managing resources.[8]

Corporate Performance Measurement and Business Intelligence. Another example of an AIS used in the area of cost accounting is in **corporate performance measurement (CPM)**. 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 non-financial 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 value. 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 aren't 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.

Also new is the use of **dashboards** (Figure 1-9) 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 1.10 Health care entities, such as St. Luke's Episcopal Health System, are using scorecards and dashboards to monitor financial and operational performance. By using a balanced scorecard, and channeling data through a single portal, St. Luke's managers can look at KPIs such as supply expenses and patient waiting times on several visual dashboards. Hospitals and other health care organizations are monitoring metrics such

[8]Source: T. Zeller, D. Kublank, and P. Makris, "Art.com Uses ABC to Succeed" *Strategic Finance* (March 2001), pp. 24–31.

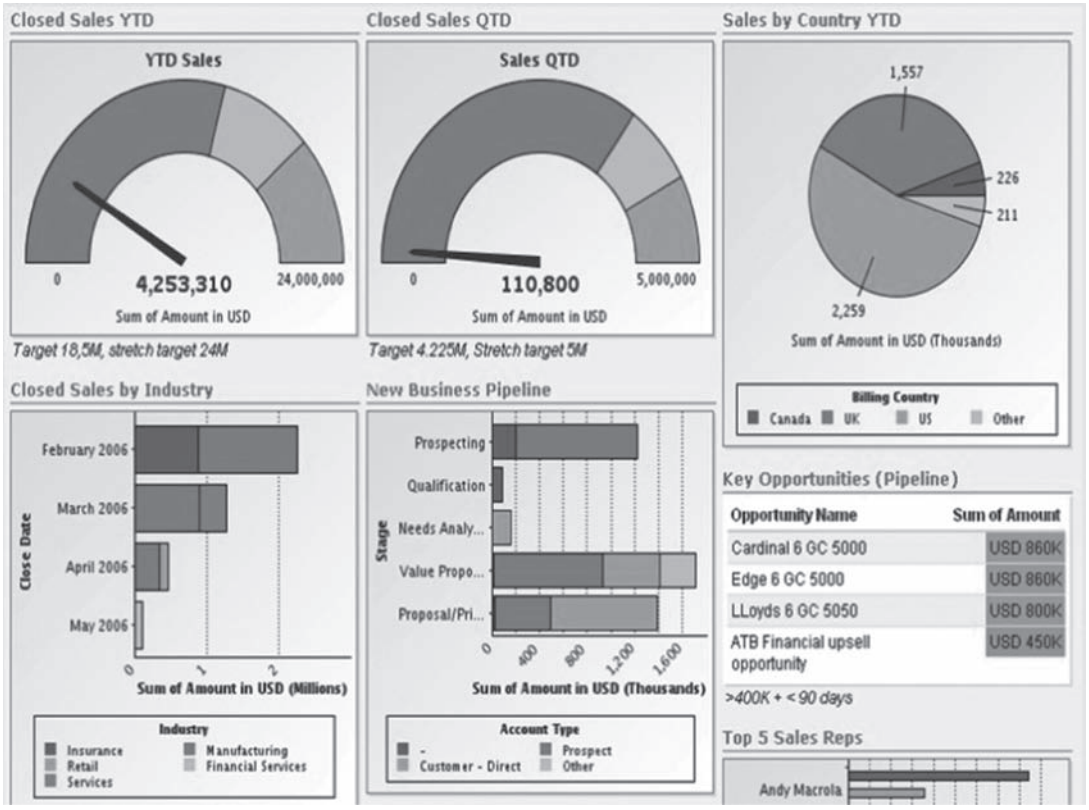

FIGURE 1-9 An example of an executive dashboard courtesy of Salesforce.com Corporation.

as numbers of surgical cases, inpatient and outpatient revenues, departmental margins, and bed occupancy rates with dashboards that managers can regularly access through Internet browsers.[9]

Budgeting. A budget is a financial projection for the future and is thus a valuable managerial planning aid. Managerial accountants 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.

A good budgetary system is also a useful *managerial control* mechanism. Because budgets attempt to predict future financial expectations, a company's managers can compare the causes of significant variations between *actual* and *budgeted* results during the budget period. Through timely performance reports that compare actual operating results with prescribed norms, mangers are able to identify and investigate significant negative variations. Similarly, favorable budget variations enable managers to reward outstanding performance or make investment decisions on specific activities that promise to benefit future operating performance.

[9]Source: Jamie Wyatt, ''Scorecards, Dashboards, and KPIs Keys to Integrated Performance Measurement,'' *Healthcare Financial Management*. Westchester: February 2004, Vol. 58, Iss.2, p. 76–80.

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—i.e., the business of providing third-party testimony that a client complies with a given statue, 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 1-10 describes the first six areas identified by the committee.

Today, there are several new areas in which auditors now perform assurance work, many involving accounting information systems. One example is to vouch for a client's compliance with the new HIPAA laws—e.g., 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, testing the integrity of information processing systems, assessing availability of IT services, and systems confidentiality testing.

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 14 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—e.g., helping clients acquire, install, and use new information systems. The AIS at Work feature at the end of this chapter describes one

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 1-10 Assurance services identified by the American Institute of Certified Public Accountants Special Committee on Assurance Services.

such consulting area. However, the corporate accounting scandals mentioned earlier have led members of the Securities and Exchange Commission and the U.S. 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 documented such doubts. Thus, the Sarbanes-Oxley Act of 2002 expressly forbids such potential conflicts of interest by disallowing 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. Like spreadsheets, 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 alternate tax strategies, print specific portions of a return, and even transmit complete copies of a state or federal tax return to the appropriate government agency.

Information technology can also help tax professionals research challenging tax questions—for example, by providing access to electronic tax libraries on CDs or online that cost less and that can provide more up-to-date tax information than traditional paper-based libraries. Thus, a tax professional may subscribe to an online tax service by paying a fee for the right to access databases of tax information stored at centralized computer locations. Online services or CD-ROMs can provide tax researchers with databases of federal and state tax laws, tax court rulings, court decisions, and technical advice.

CAREERS IN ACCOUNTING INFORMATION SYSTEMS

Our introductory remarks to this chapter suggest a variety of reasons why you should study accounting information systems. Of them, perhaps the most interesting to new students in AIS courses is the employment opportunities available within the discipline. Career opportunities abound for those with a solid foundation in AIS, including traditional accounting vocations in financial and managerial accounting, as well as careers in consulting and information systems auditing and security.

Traditional Accounting

Certainly a number of traditional accounting jobs are also available to those who choose to major in accounting information systems. After all, what accounting system is not also an accounting information system? Also, because technology now plays such a strong role in accounting, 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 AICPA recently developed a new designation: **Certified Information Technology Professional (CITP)**, which accountants can earn with business experience and by passing an examination.

Systems Consulting

A consultant is an outside expert who helps an organization solve problems or 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 reengineering business processes (so that they operate more effectively).

One of the most important assets a consultant brings to his or her job is an objective view of the client organization and its processes and goals. AIS students who are skilled in both accounting and information systems make 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 line of software products and provide consulting services to companies, such as help with their software installation, training, and customization. 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 1.11 Martin and Associates is a regional consulting firm in the Midwest, started by Kevin Martin in 1983. Kevin, a CPA, left a job with a large accounting firm to open an accounting business that would help companies implement AISs. Today the company describes itself as a "firm dedicated to delivering accounting, ERP, and CRM solutions to our clients and alliances." The staff at Martin and Associates are professionals with CPA and IT experience—many have dual degrees or double majors.[10]

Information Technology Auditing and Security

Information technology (IT) auditors concern themselves with analyzing 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 so many 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

[10]See www.martinandassociates.com.

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 it—or the opposite.

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. (See Figure 1-11 for a partial listing of the types of services offered by Ernst & Young.)

IT auditors might be CPAs or 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 are in more demand than ever today, in part because of the Sarbanes-Oxley legislation, specifically Section 404, which requires documenting and evaluating IT controls.

Case-in-Point 1.12 While efficiencies in compliance with requirements of the Sarbanes-Oxley Act of 2002 will help in the future, the numbers of hours necessary to document and evaluate internal controls, including IT controls, means more work for those with IT audit skills. According to 2004 and 2005 surveys by the Controllers' Leadership Roundtable research, audit fee increases for the Big Four, in complying with Section 404, ranged from 78% for Deloitte and Touche to 134% for PricewaterhouseCoopers. Complying with SOX costs the average large company $7.8 million and 70,000 hours of employee time[11]

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 system's security audit, in 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.

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 1-11 A sample of the many types of services offered by Ernst and Young LLP, one of the largest international professional service organizations.

[11]Source: John Goff, ''Fractured Fraternity,'' *CFO Magazine*, September 01, 2005, pp. 1, and Sarah Lacey, ''The Sarbantes-Oxley Software Race'' *Business Week Online* (7/12/2005), no page number.

AIS AT WORK
Consulting Work for CPAs

Businesses and government entities have always been concerned about disaster recovery or continuity planning. However, the events of September 11, 2001, and Hurricane Katrina made everyone even more aware of the necessity of preparing for disaster. Auditors can help. Continuity planning is an internal control devised to ensure that operations, including IT functions, can continue in the event of a natural or man-made disaster, including terrorism and acts of nature. IT—especially Internet technologies—is vulnerable to man-made attacks, such as viruses and worms. An online retailer, for example, can not afford to compromise system availability. The absence of a continuity plan is a reportable condition under Statement on Auditing Standards No. 60, *Communication of Internal Control Related Matters Noted in an Audit*.

A CPA can help a business to draw up a business continuity plan. As noted in a recent article in *New Accountant*, some Fortune 500 companies will pay $40,000 or more for such a disaster recovery planning engagement.[12] These plans include sections on backup and recovery procedures for all IT, offsite locations for data storage, and information about hot (fully equipped for immediate use) or cold (leased facilities that do not include hardware and software) sites available for use should current physical facilities become inaccessible or damaged. The plans also include contact information for the management recovery team. Copies of the plan, of course, must be stored off-site themselves. Ideally, each member of the management recovery team has at least one copy at their home or in another easily-accessible location off-site.

A disaster recovery plan is of no use if it is not tested regularly. Such testing is vital to learn where there may be weaknesses. As an example, during an early Internet worm crisis, many managers found that they were actually storing information regarding who to contact in a systems emergency on their own computers! Naturally, when the computers went down, so did this vital information. Full-blown testing of a disaster recovery plan is expensive and time consuming. Sometimes it is difficult for managers to understand the importance of it because they can't see a direct link to enhancing their income. The auditor may need to make the case. Unfortunately, there are many, many examples available to use for this purpose.

SUMMARY

- Computerized information systems collect, process, store, transform, and distribute financial and non-financial information for planning, decision-making, and control purposes.
- Data are raw facts; information refers to data that are meaningful and useful.
- 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.
- Accounting information systems can help to thwart terrorism.
- Some of the recent corporate scandals involved manipulation of accounting data, which has led to the passage of legislation to protect investors.

[12]Reed, Randy M., ''Enhancing Consulting Revenues with Disaster Recovery Planning,'' *New Accountant*, 2006, p. 13.

- The Sarbanes-Oxley Act of 2002 is a sweeping piece of financial legislation with implications for auditors as it requires management to develop and assess internal control systems.
- The U.S. Patriot Act contains a number of provisions that directly affect AISs, including sections that focus on money laundering, auditing, and conducting business with correspondent banks abroad.
- 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, specifically with development of activity-based costing systems and corporate performance measures (CPM) based on the balanced scorecard.
- 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.
- There are many reasons to study accounting information systems, and one of the most important is the availability of many exciting career opportunities. These include traditional accounting careers as well as jobs in consulting and information systems auditing and security.

KEY TERMS YOU SHOULD KNOW

accounting cycle
accounting information system (AIS)
activity-based costing systems
audit trail
balanced scorecard
business entity
business intelligence
Certified Information Systems Auditors (CISAs)
Certified Information Technology Professionals (CITP)
computer-based information systems
cost accounting
CPA Trust Services
dashboards
data
e-business
e-commerce
enterprise resource planning (ERP) system
extensible business reporting language (XBRL)
financial accounting information system
information
information age
information overload
Information Systems Audit and Control Association (ISACA)
information technology (IT)
information technology (IT) auditors
interactive data
key performance indicators (KPIs)
knowledge workers
managerial accounting
performance measurement
predictive analytics
REA accounting
responsibility accounting system
Sarbanes-Oxley Act of 2002
systems consultant
suspicious activity reporting (SAR)
value-added resellers (VARs)

TEST YOURSELF

Q1-1. Which of the following is NOT true about accounting information systems (AISs)?

a. All AISs are computerized

b. AIS may report both financial and non-financial information

c. AIS, in addition to collecting and distributing large amounts of data and information, also organize and store data for future uses

d. 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?

a. Sales price

b. Customer number

c. Net profit

d. Employee name

Q1-3. With respect to computerized AIS, computers:

a. Turn data into information in all cases

b. Make audit trails easier to follow

c. Cannot catch mistakes as well as humans

d. Do not generally process information more quickly than humans

Q1-4. A dashboard is:

a. A computer screen used by data entry clerks for input tasks

b. A physical device dedicated to AIS processing tasks

c. A summary screen typically used by managers

d. A type of blackboard used by managers to present useful information to others

Q1-5. The Sarbanes-Oxley Act of 2002:

a. Enables U.S. officers to wire tap corporate phones if required

b. Has lead to a decrease in the amount of work done by auditors and accountants

c. Forbids corporations from making personal loans to executives

d. 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:

a. Simple accounting receipts

b. Suspicious accounting revenue

c. Suspicious activity reporting

d. Standard accounts receivable

Q1-7. Which of the following is NOT true regarding assurance services?

a. 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

b. Assurance services include online privacy evaluations

c. Activity-based costing is not a type of assurance service

d. 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:

a. Activity-based costing (ABC)

b. Budgeting

c. Cost-plus accounting

d. Financial, rather than managerial, accounting

Q1-9. Which of these acronyms represents a law involving health assurance and privacy?

a. ABC **b**. HIPAA **c**. CPA
d. SOX **e**. XBRL

Q1-10. Which of these acronyms stands for a computer language used for reporting business activities?

a. ABC **b**. HIPAA **c**. CPA
d. SOX **e**. XBRL

Q1-11. Which of these acronyms is a certification for information professionals?

a. ABC **b**. HIPAA **c**. CBA
d. CITP **e**. XBRL

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 AIS. 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 emerging as the language that will be used 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 they mostly false alarms?

1-6. Managerial accounting is impacted by IT in many ways, including enhancing corporate performance measurement (CPM). 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 1-10. Can you think of other assurance services that CPAs could offer that 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 information technology 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.

PROBLEMS

1-11. What words were used to form each of the following acronyms? (Hint: each of them can be found in the chapter.)

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

1-12. The accounting profession publishes many journals such as the *Journal of Accountancy, Internal Auditor, Strategic Finance*, and *Management Accounting*. Choose three or four issues of each of these journals and count the number of articles that are related to information technology. In addition, make a list of the specific technology discussed in each article (where possible). When you are finished, decide whether you believe information technology is influencing the field of accounting.

1-13. Nehru Gupta is the controller at the Acme Shoe Company, a large manufacturing company located in Franklin, Pennsylvania. Acme has many divisions, and the performance of each division has typically been evaluated using a return on investment (ROI) formula. The return on investment is calculated by dividing profit by the book value of total assets.

In a meeting yesterday with Bob Burn, the company president, Nehru warned that this return on investment measure might not be accurately reflecting how well the divisions are doing. Nehru is concerned that by using profits and the book value of assets, division managers might be engaging in some short-term finagling to show the highest possible return. Bob concurred and asked what other numbers they could use to evaluate division performance.

Nehru said, ''I'm not sure, Bob. Net income isn't a good number for evaluation purposes. Because we allocate a lot of overhead costs to the divisions on what some managers consider an arbitrary basis, net income won't work as a performance measure in place of return on investment.''

Bob told Nehru to give some thought to this problem and report back to him.

Requirements

1. Explain what managers can do in the short run to maximize return on investment as calculated at Acme. What other accounting measures could Acme use to evaluate the performance of its divisional managers?
2. Describe other instances in which accounting numbers might lead to dysfunctional behavior in an organization.
3. Search the Internet and find at least one company that offers an information system (or software) that might help Nehru evaluate his company's performance.

1-14. 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.''[13] Discuss this comment from the viewpoint of each of the following:

a. A music company executive

[13]Tim Arango, ''Digital Sales Exceed CDs at Atlantic'' *New York Times* (November 26, 2008), p. B7.

b. A consumer

c. A TV executive

1-15. What's new in the field of accounting information systems today? Select one new trend 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.

1-16. 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 club activities as well as 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?

1-17. 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?

b. Now select an online brokerage website such as E*Trade 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 invest in the stock? If not, why not?''

d. What do these comparisons tell you about the difference between ''data'' and ''information?''

1-18. The website of FinCen—the Financial Center Crimes Enforcement Center Network (a department of the U.S. Treasury)—can be found 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—i.e., 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.''

CASE ANALYSES

1-19. The Annual Report (Communicating Accounting Information)

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 futures of most companies depend 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 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 that result from the diversity its users.
2. 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.
3. Discuss at least two advantages and two disadvantages of stating well-defined corporate strategies in the annual report.
4. 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.
5. Annual reports are public and accessible to anyone, including competitors. Discuss how this affects decisions about what information should be provided in annual reports.

1-20. Universal Concrete Products (Information for Performance Evaluation)

Jack Merritt is the controller for Universal Concrete Products (UCP), a manufacturing company with headquarters in Columbus, Ohio. UCP has seven concrete product plants located throughout the Midwest region of the United States. The company has recently

switched to a decentralized organizational structure. In the past, the company did not try to measure profitability at each plant. Rather, all revenues and expenses were consolidated to produce just one income statement.

Under the new organizational structure, each concrete manufacturing plant is headed by a general manager, who has responsibility for operating the plant like a separate company. Jack has 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 one specific plant and is encouraged to interact with management and staff in that plant in order to become familiar with operations.

After a few months, the controller began receiving complaints from the general managers at several of the plants. Common to many of these complaints is the observation that Scott's staff members are interfering with operations and, in general, are ''getting in the way.'' In addition, the managers worry that someone is constantly ''looking over their shoulders'' to see if they are operating in line with budget. Two plant managers have pointed out that the work the performance analysis staff is trying to do should be done by them (i.e., explain the variances). As Andrew Boord, one of the most vocal plant managers, stated, ''How can these accountants explain the variances when they don't know anything about the industry? They don't know what's happening with our suppliers or our labor unions, and they haven't got a clue about our relationships with our customers.''

The president of Universal Concrete Products, Hector Eschenbrenner, has 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 irrelevant!''

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. Eschenbrenner?

1-21. Ross, Sells, and Young, LLP (Information Technology and Auditing)

Carrie Ross is the Managing Partner of Ross, Sells, and Young, LLP, a mid-sized CPA firm. She has just finished reviewing the firm's detailed income statement for the previous quarter. The statement showed that auditing revenues were about 4% below last year's value and tax revenues were about the same. Carrie also noted that the income from financial auditing was 10% less than that of the same quarter for the previous year. She is dismayed, but not surprised, by the figures. During the past few years, competition for new audit clients has been intense and Ross, Sells, and Young has cut its hourly billing rates. The client base of the organization consists mostly of small- and medium-sized retailers and wholesalers besides several midsize property management companies.

Carrie and the other partners have been discussing ways to expand the revenue base of the organization. Knowing that information technology is a tool that the firm can use to develop new lines of business, Ross, Sells, and Young hired several college graduates during the past few years with dual majors in accounting and information systems or computer science. Given the recent financial results, Carrie thinks now is the time to begin offering other professional services.

Requirements

1. Would it make the most sense for Carrie to consider developing new clients or to consider offering different types of services to existing clients?
2. Carrie knows that the AICPA has 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 organization. (*Hint:* Visit the AICPA's web page or a website of a large accounting firm for a listing of assurance services.)
3. How can Ross, Sells, and Young capitalize on its new hires' combined strengths in accounting and information systems/computer science?

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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**