Accounting, Information Technology, and Business Solutions

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ACCOUNTING, INFORMATION TECHNOLOGY, AND BUSINESS SOLUTIONS

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PREFACE

The Choice: An AIS Encyclopedia or an Introduction?

Because of the lack of standards in accounting systems courses, trying to write a text for such a course is somewhat like trying to rope the wind. In speaking with instructors, we have found that every single class taught is different, even within the same school. The problem for AIS authors is that we are left to either try and create an all-encompassing, encyclopedia text from which instructors pick and choose topics, or we develop a text that is not all encompassing, but lays a foundation for a philosophy of lifelong learning. The problem with the first approach is that the book gets so large that students complain about both its weight and cost. To complicate matters, few instructors have the time to get through the text, so they either pick and choose topics, or rush through an overwhelming amount of material. Students complain that there is no cohesive thread running through the course, because the topics appear too disjointed and varied. After reviewing our options, we have chosen the second approach. We present nine main chapters that "tell our story" and seven supplemental chapters that complement this material.

Our intent is to lay a foundation for students (as future accounting information professionals) to begin thinking innovatively about accounting user support, information technology, and solving business problems. We do not intend for this text to serve as an exhaustive, all-inclusive reference. In an ever-changing world, professionals must continue to learn and gather new information throughout their professional lives.

Although we certainly have some biases regarding the content of an AIS course, we have attempted to leave the door open to those who have certain pet topics or substantial expertise in certain areas. Instructors may well choose to expound or deemphasize certain topics. Hopefully, we do not present too many things with which you disagree. If so, we would love to hear your comments explaining the nature of your disagreement. With your suggestions we will be able to make improvements in future revisions.

The Text Objectives and Content

So much is written today about the need to move accounting education from a technical perspective to a broader business knowledge perspective. Does that imply that we should begin teaching an entirely new set of skills and knowledge? We don't think so.

In this book, we tried to integrate both "traditional" knowledge and "state-of-the-art" knowledge. We have combined knowledge about business, the accounting profession, information customers, information technology, information systems, and accounting to create a framework for the AIS course. Our objective is to instill a philosophy of continual learning in the Information Age accounting professionals of today and tomorrow. This philosophy is based on teaching students how to learn and how to adapt to, or hopefully lead, change. Understanding organizations (their activities, processes, and the information needs of organization stakeholders) is the focus of this book. Information technology is presented as an enabler of organization activities and objectives, rather than as the focus of study.

We try to help instructors accomplish these teaching objectives by presenting a series of modules.

Module 1 (Chapter 1): An Introduction. This module introduces accounting: the objectives, calls for change, challenges, and opportunities. It includes a discussion of information systems and explains the role and purpose of accounting information systems. The module also reviews the accounting and information systems professional relationship (stressing the need to merge knowledge from the two professions to effectively use, design, and evaluate accounting information systems).

The accounting profession is presented as an organization support function. Accountants strive to support the planning, execution, and evaluation activities of organizations and organization stakeholders (both internal and external); thus, they must truly understand the business world. Students are taught that accounting professionals should strive to add value to organizations, and this will require our profession to be associated with less clerical, bookkeeping tasks, and with more real-time business and information support. Specifically, we suggest:

The need for accounting support, and thus AIS design, to be user driven.
The need for a proactive, business support philosophy.
The ability of accountants to impact (rather than simply report) the bottom line.
The ability of accountants to facilitate reengineering efforts.
The opportunity to move from a historical perspective, "bean counter" identity to a valuable, real-time organization support function.

Students are taught that a change in the way accountants use technology can enable change in the profession and in the role accountants play within organizations.

Module 2 (Chapter 2, Supplements A and B): The Evolution of the AIS Architecture. This module reviews the accounting information system architecture (the traditional file-oriented manual design, the traditional file-oriented automated design, and the event-driven design), focusing on the general ledger and the accounting cycle. Understanding the general ledger design provides insights to some of the limitations accounting professionals have in producing the outputs desired by information customers. We objectively review the criticisms of traditional

designs, and stress that these criticisms are feedback from an increasingly demanding, sophisticated user group whose expectations are grounded in the real-time Information Age. These users are concerned with organization efficiency, reengineering, restructuring, downsizing, streamlining, complex financial transactions, and international markets. Their demands are broadening the transaction documentation and boundaries of the accounting system.

This module presents a challenge to accounting information professionals. The challenge is to effectively use IT to build information system architectures that improve the ability of accounting to support organizations. To meet this challenge, accounting professionals need to develop a strategic, conceptual understanding of IT resources, and the ability to understand and model business activities and processes.

Module 3 (Chapters 3, 4, and Supplement C): Developing an Understanding of Organizations as a Basis for Modeling IT Applications. Chapter 3 helps students develop an understanding of business processes, which includes the ability to identify and model both business events and processes. These models serve as the basis for planning an IT architecture. Chapter 4 teaches students how to use their model (developed in Chapter 3) to plan an event-driven architecture and develop a prototype to test their process model. The objective is to build an IT application that supports business processes in real time. The event-driven design is an integrated, data-oriented/business process design based on a semantic *REAL* model. This model was chosen because it is not specific to relational databases; it is equally applicable to object-oriented implementations.

We offer semantic modeling as a tool to communicate organization understanding. We highlight the need to learn important elements of organization understanding that will enable professionals to better design, use, and evaluate information systems designs, including:

Organization processes and the activities that comprise those processes.
The sequence of activities in an organization process.
Relationships between organization activities and processes.
Complete documentation of organization activities and stakeholders.
The activity that triggers business activities.
Business rules relating to activities and participants.
The roles of organization participants (authorization, custody, control/info support).

We feel this approach of developing a semantic mental model of an organization helps students establish a system standard that can be used to critique and analyze a variety of system designs. When the concepts are used to determine the requirements of an IT application, the result is an architecture where IT supports those managing the organization, rather than IT imposing a structure and an agenda on the organization.

Module 4 (Chapter 5 and Supplement D): Developing an Understanding of and Philosophy for Controlling Organization Risk. This module includes a discussion of traditional efforts to identify and control business and information process risk and ways to improve control strategies. We emphasize the control component of organization

understanding. Our approach includes training students to first identify both business and information risk exposures, then develop control strategies. Control strategies lead to implementing specific control procedures. Due to the changing nature of organizations and systems, students learn that to implement control strategies, they may need to review existing control procedures and update or revise them. This helps students understand recent calls for reengineering traditional accounting controls, and the risks of applying traditional control procedures to transformed environments.

Increasingly, organizations are embedding information processes into business processes. This provides accountants with a strategic opportunity to help management use IT as a resource to effectively control the execution of business activities, while capturing accurate and complete data about business activities in real time. We emphasize the need (and the ability, using technology) to control organizations at each point in a business process, the ability to implement more proactive control, the ability to use technology as a control resource, and the opportunity to create more complete, per transaction audit trails, rather than separate-process, batch audit trails.

Module 5 (Chapters 6-8 and Supplement E): Business Processes and AIS Designs for Supporting These Processes. The most significant module (in terms of suggested class and project time) is the business process module. It incorporates systems analysis and design knowledge, and it builds on and applies the knowledge learned in Chapters 1 through 5. Using the framework established in the previous module, we discuss the processes from a business perspective. We try to refrain from focusing student attention on memorizing a series of process sequences or tasks, or a series of control procedures. We want to train students to be adaptable to a changing world by basing their evaluation of systems design or organization controls on a (system or control) objective, rather than whether a system uses a familiar design or familiar set of control procedures.

We first examine each process in business, rather than information, terms. We discuss the objectives of each process, the relationships between processes, the roles of process participants, and the decision and business information needs relating to each process activity. We examine the variations of processes (e.g., retailing, manufacturing, and credit versus cash sales) and the effects of EDI and trading partner alliances on the processes. The input, processing, output, and risk exposure of each activity is examined from a business perspective (e.g., an order request from a customer leads to a need to review the order to see if the customer and business can complete a sales transaction—the customer is creditworthy and the business can provide the goods or services; if so, this results in an authorization from sales to continue the process). Finally, we discuss the management and information activities, including the recording, maintaining, and reporting activities (including queries, reports, and documents) relating to each process and process activity.

Next, each process is analyzed in the context of various AIS designs. We feel it is important to teach both traditional and nontraditional designs (the traditional file-oriented manual design, the traditional file-oriented automated design, and the event-driven design). Each design is evaluated for its ability to meet user information needs and support organization

objectives. We examine how controls are implemented in each design (and when controls are triggered); the audit trails of each design; the physical and logical data structures of each design; and the specific input, process, and output steps required for each design. We also compare the timing and flexibility of the reporting and document generation capabilities of each.

Surprisingly, we have found that the event-driven design perspective is a great tool for ensuring that accounting students understand and can explain concepts normally associated with only traditional designs (e.g., understanding and applying GAAP and explaining the meaning of financial statement outputs). This alternative model also helps students understand duality and other economic concepts represented in the traditional accounting model.

Module 6 (Chapter 9): Developing and Implementing Business Solutions: The Need for Lifelong Learning. The final module includes discussion of application planning and development (the need for solutions, not just more software), reengineering efforts, managing change, and the opportunity for accounting and IT professionals to play a significant role in the development of business solutions. It reminds students that our text is not all inclusive, and encourages them to integrate concepts in this text with other business classes and topics. Our study concludes by discussing the types of skills needed to be a valuable member of a solution development team, and the need to continue learning and experimenting throughout one's professional life. We finish on the same note that we started. This is a time of great opportunity for the profession. All we need to do is *seize the day!*

Module 7 (Supplements F and G): Information Technology: Resources Available to Build AIS. This module examines the effects of technology. It includes an introduction to various types of IT components and their development as well as assesses their business value. The resource module examines hardware/software concepts and trends. The objective is a strategic, conceptual understanding of information technology as a resource to enable organization objectives. As these technologies change and become more user friendly and advanced, the opportunity to more effectively and efficiently support organizations is enhanced. Due to continual change, students are taught that it is their responsibility to improve their understanding of technology, and to remain informed over time. We suggest references, sources, and techniques for obtaining additional information. Students are taught that an ill-prepared professional will quickly learn that improperly managed technology is a risk or problem, rather than a useful resource. The professional should control the technology, rather than vice versa.

Students are challenged to consider how we, as accounting information support professionals, can effectively use today's more complete, timely documentation of business activities to support the decision making of organization stakeholders. However, technology is not presented as a panacea. Students are reminded that technology is only useful and effective if properly implemented and used. Before designing or implementing a system, a professional must understand the system domain and system objectives.

Applied Learning

To help students apply their knowledge, the end-of-chapter material includes review and discussion questions and problems; sample cases and vignettes; and suggestions for individual and group projects, presentations, written papers, and other active learning exercises.

Like the business world and the field of systems, we are sure this approach will require maintenance and periodic review and updating to keep it applicable for preparing accounting information professionals. We hope you enjoy reading our attempt at a new breed of AIS text. We look forward to hearing your comments.

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CONTENTS

CHAPTER 1

An Introduction to Accounting, Information Technology, and Business Solutions

CHAPTER OBJECTIVE

The objective of this chapter is to enhance your understanding of the dynamic profession you have chosen to enter. After studying this chapter, you should be able to:

- Describe how organizations create value for customers.
- Describe the historical relationship between accounting and IT professionals.
- Describe three ways that accounting professionals can increase their value.
- Identify the justifications/reasons for changing the nature of accounting and how the use of information technology (IT) can enable such change.

INTRODUCTION

The world in which we live is changing faster and in increasingly profound ways. As a result, the accounting profession is in a mode of serious introspection, evaluating all facets of what is does. This requires us to objectively examine criticisms about the profession and challenge ourselves to find new ways of improving the quality of our information products and services.

Like accounting professionals, today's accounting students need to learn about the history of traditional accounting as performed during the Industrial Age, as well as acquire the skills and knowledge necessary to excel as accounting professionals in the Information Age. This text is written to educate future professionals who will face the challenges of the information revolution. Our objective is to prepare you to become an active participant in the evolution of accounting information systems. Probably the most important contribution this book makes is to propose a different philosophy underlying the design, use, and evaluation of accounting information systems.

Obviously, no one textbook can incorporate all there is to know about this complex topic. Often, we will refer you to other sources to learn more about specific concepts or

issues. However, we think this book can provide students with a good foundation during this period of monumental change in the business world and in the accounting profession.

A CHANGING WORLD

Since the early days of modern information technology (IT), many people have suggested that IT will have a profound effect on the accounting profession. One of the more outspoken accounting futurists is Bob Elliott, national partner with the accounting firm of KPMG/Peat Marwick. In his 1992 *Accounting Horizons* article, Elliott begins, "Information technology (IT) is changing everything."[1] Drawing on the work of Alvin Toffler,[2] Elliott uses the imagery of the "third wave" to predict impending and significant changes in accounting practice, education, and research. Elliott concludes his article:

> IT is creating a wave of change that is crashing over accounting's shoreline. It crashed across industry in the 1970s. Then it crashed across the services in the 1980s. And it will crash across accounting in the 1990s. It is changing the way business is done and the problems faced by managers. Managers now need new types of information in order to make decisions, so internal and external accounting must be changed. Higher education can simply react to these changes, or it can take a more active role, embracing the future, adapting rapidly, and facilitating the adaptations of others. The challenge to academic accountants is to invent the third-wave accounting paradigm and produce the graduates who can function effectively in the third-wave organizations they will be joining. The challenge to nonacademic accountants is to make the organizational and political changes to implement the new accounting paradigm.

Elliott's predictions have stimulated a great deal of discussion about the likelihood and degree of impending changes in accounting practice and education. Many people are beginning to speculate about the role IT will play in enabling such changes.

Elliott is not the first, nor will he be the last, to suggest the need for, and likelihood of, change in the accounting profession. Nor is he the only person predicting that IT will have a profound impact on accounting. Al Pipkin, controller[3] for Coors Brewing Company, observes that IT is:

> . . . bringing about a total transformation of the controller's [accounting] staff, and a re-definition of the overall financial system. Technology is changing the culture of the controller's organization just as it is impacting the entire business. In the 21st century, there will be fewer accountants on the controller's staff, but they will perform in totally new and exciting ways.

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[1]B. Elliott, "The Third Wave Breaks the Shores of Accounting," *Accounting Horizons*, June 1992, p. 61.

[2]A. Toffler, *The Third Wave* (New York: Bantam Books, 1990), p. 2.

[3]The individual or function responsible for the use, design, and evaluation of an organization's financial information system. The controller is typically an accounting executive responsible for developing and maintaining an organization's financial records.

> You can pick up dozens of newspapers and magazines today that proclaim "the age of no paper is no longer a pipe dream." The drudgery of shuffling paper and doing routine manipulations of data soon will be gone. From now on, the controller's staff will add value to the business or it won't exist.[4]

Although we agree with Elliott's and Pipkin's predictions regarding the future, to this point the expectations of information users have primarily highlighted the need for accountants to improve the relevance and usefulness of accounting information services. We do not believe the profession has yet used IT resources to significantly affect the nature of accounting practice, education, or research. IT will not fundamentally change the nature of accounting until we rethink the traditional accounting process and effectively utilize IT to enhance the process. Innovative uses of IT can enable significant changes in accounting, but the question of how to effectively use IT to bring about desired changes is still an unanswered, yet critical, question for the accounting profession.

This book is written to encourage and enable your exploration of IT's potential effect on accounting and business (both private and public, for-profit and not-for-profit businesses). We admit at the outset that our objective is a bit ambitious. Typically, accounting texts present material as though the nature of the accounting profession is rather stable. This text differs in that we want to spark your imagination and creativity. By having you focus your attention on what *can* happen, we believe you can play a significant role in defining what *will* happen. As Pipkin points out, professionals who can create and add value will have a profound impact on shaping the future.

THE NATURE AND PURPOSE OF AN ORGANIZATION: CREATING VALUE

In his book *Competitive Advantage*, Michael Porter[5] explains that ideally everything an organization does should contribute to the creation of value for its customers. Creating value, however, incurs costs for the organization. For example, assembling an automobile creates value but it also requires the organization to pay for various costs (e.g., materials, supplies, and time of employees). Porter computes an organization's "margin" as the difference between value and costs. This is a much broader definition of *margin* than the typical accounting definition because Porter's calculation includes all value and costs, much of which is difficult to measure financially.

The concept of creating value applies to both for-profit and not-for-profit organizations. For-profit organizations try to maximize their margins, while not-for-profit organizations such as charitable or governmental entities seek to provide the most goods and services within the constraints of resources (funds) received. In other words, over the long-run, charitable or governmental organizations seek to optimize their service efforts while matching

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[4]A. Pipkin, "The 21st Century Controller," *Management Accounting*, February 1989, p. 24.

[5]M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: The Free Press, 1985), p. 12.

outflows to inflows. Whether for-profit or not-for-profit, viable organizations provide goods and services that customers value in a cost effective way.

Every organization seeks to create value by providing goods and services that customers need or demand. For example:

- A grocery store creates value by providing food in a clean and convenient location for customers to select and buy.
- An airline company creates value by safely transporting passengers and cargo to various locations in a timely manner.
- An automobile manufacturer creates value by manufacturing safe, reliable vehicles for transporting people and cargo.
- A municipality creates value by providing essential community services (e.g., police protection, fire protection, emergency services, and utilities) to its citizens.

In the long-run, organizations and individuals who provide goods and services that customers value will survive and grow; others will shrink and die. Due to competition for scarce resources, each organization or individual must provide value in a cost-effective manner. Although some organizations manage to defer their demise through deceit, disguise, or political influences, ultimately every organization has to answer to the final arbiter of value—the customer.

CASE IN POINT

The demise of governments throughout history has been affected in part by the failure of these governments to provide value to its citizenry (customers). Although sustained artificially for many years, it appears communist governments are being replaced by alternative forms of government. If the need to create value persists, we should expect changes to continue until every government throughout the world provides the value desired by its citizenry.

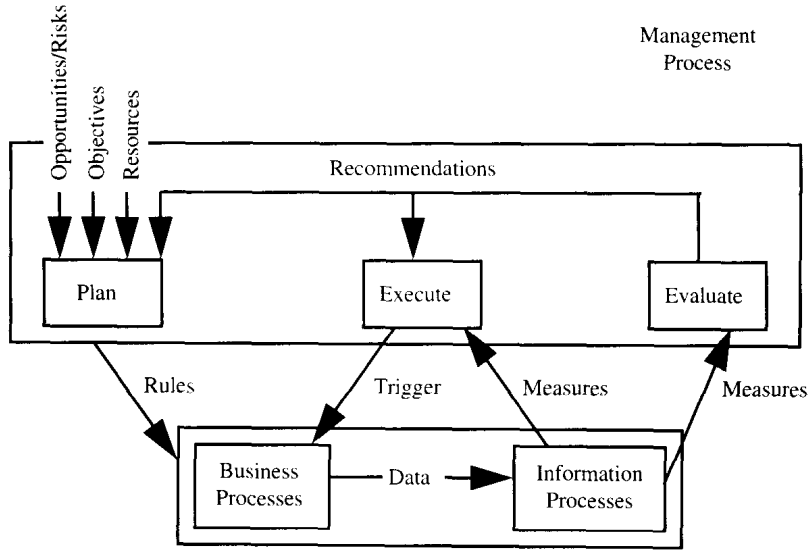
Organizations create value through managing, or making decisions about, business[6] and information processes. Exhibit 1-1 illustrates this concept.

At the heart of *managing* is the decision making involved in planning, executing, and evaluating an organization's business and information processes.[7] By defining and prioritizing its business processes, planning decisions set a direction for the organization and provide a blueprint for achieving the objectives. Meanwhile, execution decisions focus on implementing and controlling the business processes. A clearly defined plan increases the likelihood of proper execution. Once execution is under way, evaluation decisions focus on

[6]In this text, the term *business* is used to describe all types of organizations: for-profit, not-for-profit, and governmental. Our discussions of systems and organizations are all-inclusive.

[7]Planning, evaluating, and executing are at the heart of managing business processes. Throughout the remainder of this text we will use the term *managing* in place of *planning*, *evaluating*, and *executing*.

EXHIBIT 1-1 Managing Business and Information Processes



answering the question "How are we doing?" Evaluation requires useful information to determine whether business processes are achieving the organization's objectives. Evaluation results in either modifying business processes or modifying the rules that govern how business processes are performed.

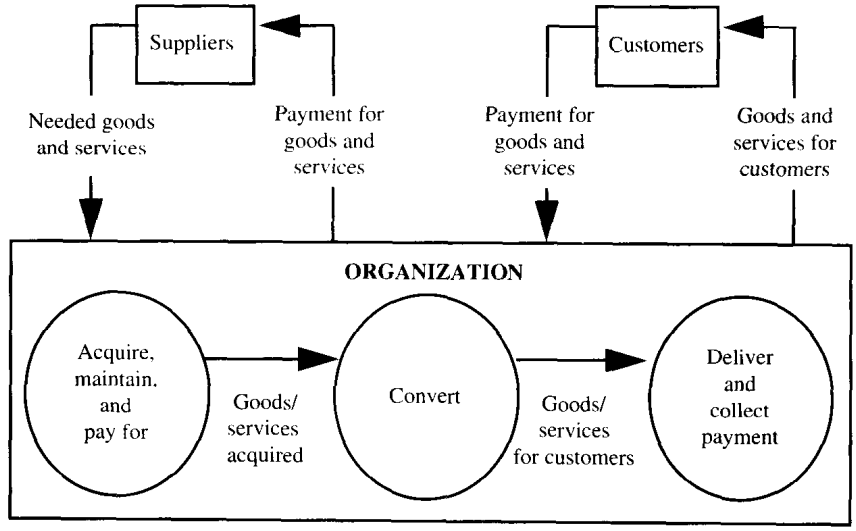
Business processes define how an organization creates value.[8] Regardless of the type of goods or services provided, each organization has three types of business processes (see Exhibit 1-2):

1. Acquisition/payment process—acquiring, maintaining, and paying for resources needed by the organization (e.g., human resources, financing, property, plant, equipment, materials, and supplies) to provide goods and services.
2. Conversion process—converting the acquired resources into goods and services for customers.
3. Sales/collection process—delivering goods and services to customers and collecting payment.

We will spend a great deal of time discussing the nature of business processes in Chapter 3. For most organizations, the acquisition/payment and sales/collection processes are quite similar—there are not very many alternatives for buying and selling goods and services.

[8]The terms *business process* and *business cycle* are frequently used interchangeably. In this text we use the term *business process*.

EXHIBIT 1-2 Types of Business Processes



However, the methods organizations use to convert resources into goods and services for sale to customers can differ significantly.

Information processes are shaped by an organization's business and management processes. Information processes include recording data that describe an organization's business processes, maintaining or keeping the data about an organization relevant and up to date, and reporting useful information to those who execute and evaluate the business processes. Organizations can record data about organization activities in a variety of ways ranging from writing it down on a pad of paper, to filling out multicopy business forms, to using state-of-the-art IT applications.

As an organization's business and management processes change, so must its information processes. When business, information, and management processes are integrated, they greatly enhance the likelihood of the organization achieving its objectives—providing value to its customers. When they are not well integrated or well aligned, the organization can sputter and limp along just like an automobile that is out of tune—a frustrating and unfulfilling condition.

THE CALLS FOR CHANGE

Creating value for customers in today's world is particularly challenging. The steady, somewhat predictable world of years past has been replaced by fast-paced, profound change. Instead of being insulated, organizations are facing more and more opportunities and threats due to changes in competition, regulations, customer demands, operating risks, employee demands, globalization, laws, and so forth. This list continues to grow. *Futurist Alvin* Toffler suggests that this new world

> . . . challenges all our old assumptions. Old ways of thinking, old formulas, dogmas, and ideologies, no matter how cherished or how useful in the past, no longer fit the facts. The world that is fast emerging from the clash of new values and technologies, new geopolitical relationships, new life-styles and modes of communication, demands wholly new ideas and analogies, classifications and concepts. We cannot cram the embryonic world of tomorrow into yesterday's conventional cubbyholes.[9]

This new world is causing many organizations to reconsider how they operate and create value. Some organizations are implementing change by *reengineering* business processes. *Reengineering* is often an over used (and sometimes misused) term. Reengineering requires an organization to rethink how it provides greater value to its customers. The concept was initially popularized by Michael Hammer, a well-known business consultant:

> Despite a decade or more of restructuring and downsizing, many U.S. companies are still unprepared to operate in the 1990s. In a time of rapidly changing technologies and ever shorter product life cycles, product development often proceeds at a glacial pace. In an age of the customer, order fulfillment has high error rates and customer inquiries go unanswered for weeks. In a period when asset utilization is critical, inventory levels exceed many months of demand.
>
> . . . heavy investments in information technology have delivered disappointing results—largely because companies tend to use technology to mechanize old ways of doing business. They leave the existing processes intact and use computers simply to speed them up.
>
> It is time to stop paving the cow paths. Instead of embedding outdated processes in silicon and software, we should obliterate them and start over. We should "reengineer" our businesses: use the power of modern information technology to radically redesign our business processes in order to achieve dramatic improvements in their performance.[10]

These radical changes in organizations and the increased availability of information technology are resulting in increased pressure on the accounting profession to do things differently. Some of the more significant challenges facing the accounting profession include the following:

- Much of what we do in accounting was developed using "precomputer thinking." Many people are concerned that if the accounting profession does not reinvent itself in light of IT capabilities it will be pushed to the sidelines and perhaps even replaced by a profession that has yet to emerge; a profession with an entirely different vision of how information is gathered, stored, and provided to users.[11]
- A large majority of the revenues generated by public accounting firms in the U.S. (approximately 70%) has traditionally come from audit and tax services. The need for an audit was created by the Securities Act of 1933 and the Securities and Exchange Act

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[9]A. Toffler, *The Third Wave* (New York: Bantam Books, 1990), p. 2.

[10]M. Hammer, "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review*, July-August, 1990, pp. 104-12.

[11]See R. Mednick, "Our Profession in the Year 2000: A Blueprint of the Future," *Journal of Accountancy*, August 1988, pp. 54-58.