Part One

Fundamentals of the Internal Auditing Function

Chapter 1

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1.1 INTRODUCTION

It is the goal of this manual to provide a broad scope of information in assisting you in developing your auditing function into a well-respected contributor to the company's mission and a world-class audit department.

This manual will serve to document approved departmental procedures. It will be the basis for establishing methods to ensure the highest level of performance and quality in the department. These procedures should be evaluated and updated on an ongoing basis to keep pace with changing conditions.

This book has been set up in the format of a procedures manual. Beginning with Chapter 2, each page has a heading consisting of the company name, the title of the manual (Corporate Audit Department Procedures Manual, if appropriate), the section number, the revision number (if you choose to keep track of the number of changes made in a particular section), and the date of the revision. Much of the text has been written so that it can be considered boilerplate and be used with your modifications to easily create your own manual.

The manual is based on a methodology employed very successfully at Phelps Dodge Corporation. Subsequently, the methodology was used as a basis for audit management workshops and consulting projects. Through these processes, the material contained in the methodology was analyzed and improved over a 10-year period. The methodology is broken down into four main components: Part One: Fundamentals of the Internal Auditing Function (Chapter 1, "Background"; Chapter 2, "Auditing Standards and Responsibilities"; Chapter 3, "Internal Control System"), Part Two: Management and Administration (Chapter 4, "Department Organization"; Chapter 5, "Personnel Administration and Recruiting"), Part Three: Technical Procedures (Chapter 6, "Audit Planning"; Chapter 7, "Audit Performance"; Chapter 8, "Audit Reporting"), and Part Four: Long-Term Effectiveness (Chapter 9, "Managing the Effectiveness of the Audit Department"). Other programs can be added to your manual. The technical chapters all begin with a matrix that outlines the various tasks or functions addressed in that chapter.

In order to achieve the above goals, a brief overview of historical events affecting the audit is beneficial. Thus this chapter is written to familiarize auditors with historical events that directly relate to audits, audit planning, and in particular the management of a world-class audit function. This section will review the history of auditing before information systems (IS), the history of IS auditing, the history of federal regulations related to auditing, and professional organizations related to auditing. An understanding of these events and organizations should provide substantial benefits in managing your auditing function.

1.2 History of Auditing[1]

The ancient history of accounting and auditing left sparse documentation, but possibly did predate the invention of writing, circa 8,500 B.C. The earliest surviving records in double-entry form are those of the Medici family of Florence, Italy, from 1397.

The "modern" era of accounting dates from the year 1494, when a monk named Luca Pacioli published the first book on accounting. He became known as the "Father of Accounting" because of the widespread dissemination of his book and its information. However, Pacioli was a typical monk of the fifteenth century—educated in a wide variety of disciplines, and served as tutor and mentor to the wealthy. In fact, the book itself contains more than accounting, including arithmetic. All Pacioli really did was to explain existing accounting principles.

Auditing, too, is one of the oldest professions. Writing was invented in part to satisfy the need for audits. Zenon papyri record the application of audits on the Egyptian estate of the Greek ruler Ptolemy Philadelphus II as early as 2,500 years ago. Early Greek and Roman writers such as Aristophanes, Caesar, and Cicero make mention of accountants, auditors, and auditing accounts and audit rooms. As early as the Middle Ages, a form of internal auditing existed among the manor houses of England where the lord served as manager of the audit function.

The earliest external audit by an independent public accountant was in 1720 by Charles Snell as a result of the South Sea Bubble scandal in England. The total market value of the South Sea Company, chartered in 1710, eventually exceeded the value of all money in England. Thus when the company crashed, it was an extremely significant public event in the English economy. Fictitious entries were discovered in the books. This event set a precedent in the history of auditing. In fact, many, if not most, major auditing events, improvements, and standards tend to follow public exposure of scandals and/or fraud.

Later, the industrial revolution in England resulted in factory systems that were financed by stockholders. This situation necessitated the need for auditors, both internal and external. To protect the public, the British Companies Act of 1844 provided for mandatory audits. Soon afterward, in 1853, organizations of chartered accountants were formed in Scotland. Then in 1880, five organizations were melded into the unified Institute of Chartered Accountants in England and Wales. By 1881, it had a membership of more than 1,000 members.

The same industrial revolution was occurring across the Atlantic in the United States. By the late nineteenth century, British auditors were being sent to audit American companies. For example, the British firm Price Waterhouse was sending over auditors as early as 1873. Soon, New York offices existed for British firms Price Waterhouse, Peat Marwick & Company, and Arthur Young & Company. Thus it was the British who built the infrastructure for professional auditing in the United States.

One of the first key events in the history of the U.S. audit profession was the establishment of what was the forerunner of the American Institute of Certified Public Accountants (AICPA) in 1887. In 1896, New York law provided for the issuance of CPA certificates to those who could pass a qualifying examination. Initially, experienced practitioners were "grandfathered" in by being granted CPA certificates without having to take the examination. Eventually, all states passed CPA laws. At first, each state prepared its own CPA examination, but in 1917 the American Institute of Accountants began preparing a uniform CPA examination that could be used by all states.

Another early event of note is the 1913 passage of the Sixteenth Amendment legalizing income taxes.[2] One provision of the law required all companies to maintain adequate accounting records. Thus, even small firms that did not need accounting for management control purposes suddenly had to have accounting records.

The audits of the late 1800s and early 1900s were largely devoted to the accuracy of bookkeeping detail. In most cases, all vouchers were examined and all footings verified. Hence, items omitted from the records were overlooked by the auditors, and the result was an auditing profession that was viewed by outsiders as more clerical than professional.

This view was to change between 1900 and 1917, because bankers became more important as sources of financing and because practice began to catch up with the auditing literature. The change in philosophy mirrored the recommendations in the leading auditing book of the time, which was written by Robert Montgomery. Bankers were less concerned with clerical accuracy than with balance-sheet quality. Thus, as bankers became major users of audited financial statements, the objective of the audit became more concerned with the valuation of assets on the balance sheet.

This new direction culminated in the 1917 issuance of *Uniform Accounting,* a joint publication of the American Institute and the Federal Trade Commission, which also had the endorsement of the Federal Reserve Board. This publication was reissued, with minor changes, in 1918 under the title *Approved Methods for the Preparation of Balance-Sheet Statements.* This document was the first formal declaration of generally accepted accounting principles and auditing standards. It outlined a complete audit program, instructions for auditing specific account balances, and a standardized audit report. In 1929, another revision included more emphasis on the income statement and internal controls. Still another revision in 1936 placed equal emphasis on the balance sheet and income statement. The 1917 document and its revisions became the bible of the auditing profession for more than two decades.

The recent history of external auditing is more events-oriented. In other words, little has occurred in recent years that was not brought about by some catastrophic event such as a lawsuit, financial disaster, or a major fraud case. One of the earliest important auditing cases was that of *Ultramares Corporation v. Touche, Niven & Company* (1931). Ultramares had loaned money to Fred Stern and Company in 1924 on the basis of financial statements prepared by Touche. On those statements, accounts receivable had been overstated. Subsequently, in 1925, Fred Stern and Company filed for bankruptcy. A lower court found Touche guilty of negligence, but the firm was declared not liable to Ultramares because there was no privity of contract between the auditor and Ultramares. The New York Court of Appeals agreed that third parties could not hold an auditor liable for ordinary negligence, only for fraud. However, gross negligence could be construed as fraud, which opened up the auditor to lawsuits even though there was no way of knowing who was going to rely on the misleading financial statements. Thus, the auditor became subject to almost infinite third-party liability. This liability was further expanded at the federal level in the securities acts of 1933 and 1934.

By the time of the 1929 stock market crash, external auditing had become a somewhat standardized profession, but not a particularly large profession. Since bankers were the primary users of financial statements, the only companies needing audits were those that depended on banks for capital. Companies that depended on stockholder financing were not required to have audits. Consequently, even companies listed on the New York Stock Exchange often did not issue audited financial statements. That was to change because of Ivar Kreuger—one of the greatest swindlers the world has ever seen.

The most widely held securities in the United States—and the world—during the 1920s were the stocks and bonds of Kreuger & Toll, Inc., a Swedish match conglomerate. The company was founded and headed by Ivar Kreuger, supposedly the richest man in the world. Kreuger's securities were popular because they sold in small denominations and paid high dividends and interest (often 20% annually). Financial reporting as we know it today was in its infancy; stockholders based their investment decisions solely on dividend payments. Kreuger's dividends were paid, however, out of capital, not profits. Kreuger was essentially operating a giant pyramid scheme, which was hidden from the investing public by Kreuger's insistence that financial statements not be audited. He advocated that financial secrecy was paramount to corporate success. In Kreuger's defense, some amount of secrecy was needed because he was often dealing with foreign kings and dictators about government monopolies and taxes on wooden matches. Subsequently, it was discovered that many of his companies' assets were in the form of intangible monopolies.

The stock market crash of 1929 made it more difficult for Kreuger to sell new securities to fuel his pyramid scheme. Thus, he committed suicide in March 1932. Within three weeks, his companies were in bankruptcy as it became apparent that there were few assets to support the unaudited financial statements that had been issued over the years. The bankruptcy was the largest on record up to that time and resulted in numerous changes in financial reporting.

Newspaper articles kept U.S. citizens aware of the extent of Kreuger's fraud at the same time that Congress was considering passage of the federal securities laws. Thus, the timing of the bankruptcy and the corresponding media coverage made it politically expedient to pass laws that would make similar schemes difficult in the future. A single event, the corruption of Ivar Kreuger, had shaken investors' confidence and provided the media event of the decade.

As a result, the Securities Act of 1933 was passed, and the New York Stock Exchange issued rules mandating audits of listed companies. Even a movement toward uniformity in accounting principles can be laid at the feet of Kreuger. Auditors thus owe much of their livelihood to the fraud perpetrated by Ivar Kreuger. In fact, some might say that because of the resulting improvements to financial reporting, Kreuger did more good than harm for the financial community. A person of his ilk was needed to show the world that auditors are necessary and can make a contribution to a regulated securities market.

The 1936 version of the American Institute's 1917 joint pronouncement with the Federal Trade Commission on auditing standards suggested that auditors might want to observe inventories and confirm receivables, but there was no requirement for these procedures. Many auditors had long opposed observing inventories under the theory that CPAs were not skilled appraisers and that a statement that they had physically inspected inventories might be construed as a guarantee of the inventory valuation. This lack of a requirement for inventory observations and receivable confirmations proved to be an embarrassment to the profession when the McKesson & Robbins scandal surfaced in 1938. The senior management of McKesson & Robbins had used a facade of false documents to conceal the fact that $19 million in inventory and receivables

were nonexistent. A Securities and Exchange Commission (SEC) investigation concluded that Price Waterhouse & Company had adhered to generally accepted auditing procedures as recommended in the 1936 Institute pronouncement. The auditors had obtained management assurances as to the value of the inventories and had test-checked the inventories to purchase orders (which were fabricated to conceal the fraud). But the SEC concluded that although general accepted procedures had been followed, those procedures were inadequate.

As a result, in 1939 the American Institute issued Statement on Auditing Procedure (SAP) No. 1 that required auditors to observe inventories and confirm receivables. The McKesson & Robbins case was a turning point in auditing history. No longer was the auditor responsible for auditing the accounts of management; responsibility was extended to an audit of the business itself. And the profession began to issue promulgated statements and standards related to the specific procedures and standards of audits.

Other cases have influenced auditors in recent years, but none to the extent of the frauds associated with Ultramares, Kreuger, and McKesson & Robbins. Continental Vending Machine Corporation (1968) was unusual in that it marked the first instance of an external auditor being criminally convicted for fraud. The overriding conclusion of all of this activity is that the (external) auditing profession has long been reactive rather than proactive. On the whole, the recent history of auditing has been centered on reacting to adverse events affecting the profession.

1.3 History of Internal Auditing[3]

Some types of internal audits date back thousands of years. As mentioned earlier, the Greeks, Romans, and Egyptians were conducting audits before the birth of Christ. Interestingly, the scope of these early audits was in many ways akin to that of modern internal audits; both included an examination of the correctness of accounting records and an evaluation of the propriety of activities reflected in the accounts. Emphasis was on improving management control over the activities of the organization. Such broad emphasis was not to reappear on a wide scale until after World War II.

In the United States, there was little need for internal auditing in the colonial period because there was little in the way of large industry. In fact, accounting textbooks of the period never referred to the subjects of internal auditing or internal control. In government, however, the need for an audit function was recognized. The first U.S. Congress in 1789 approved an act that included a provision for the appointment of a secretary of the treasury, a comptroller, and an auditor. The auditor's job, basically a clerical function, was to receive all public accounts, examine them, and certify the balances.

Despite the aforementioned early references, railroad companies are usually credited with being the first modern employers of internal auditors. It was during the latter part of the nineteenth century that these first real internal auditors became commonplace. The title applied to these employees was *traveling auditors,* and their duty was to visit the railroads' ticket agents and determine that all the accounting for all monies was properly handled.

Other early industries to use internal auditors included the large Krupp Company in Germany. Krupp apparently employed some type of internal audit staff at least as early as 1875 since there is a company audit manual dated January 17, 1875, which includes the following provisions:

> *The auditors are to determine whether laws, contracts, policies and procedures have been properly observed and if all business transactions were conducted in accordance with established policies and with success. In this connection, the auditors are to make suggestions for the improvement of existing facilities and procedures, criticisms of contracts with suggestions for improvement, etc.*

Although the roots of internal auditing do date back into the nineteenth century, real expansion did not occur until the early part of the twentieth century with the growth of the large corporate form of business. The major factor in the emergence of internal auditing was the extended span of control faced by management in business employing thousands of people and conducting operations in many locations. Defalcations and improperly maintained accounting

records were major problems, and the growth in the volume of transactions resulted in a substantial bill for public accounting services for the organization that tried to maintain control by continuing the traditional form of audit by the public accountant.

The objectives of early internal auditors were primarily built around the protection of assets. The National Industrial Conference Board's study of internal auditing explained the early motives as follows:

> *Protection of company assets and detection of fraud were the principal objectives. Consequently, the auditors concentrated most of their attention on examinations of financial records and on the verification of assets that were most easily misappropriated. A popular idea among management people a generation ago was that the main purpose of an auditing program was to serve as a psychological deterrent against wrongdoing by other employees.*

That same study recognized the internal auditor of yesteryear did not perform the same duties as the modern-day internal auditor. In addition, there was no need for the pioneer internal auditor to perform all of the functions that are handled by today's internal auditors.

> *In less complicated times, of course, management frequently maintained control over company operations by personal supervision. There were not so many levels of authority separating policy makers from production workers, and demands on senior executives' time were neither so numerous nor so urgent.*

Prior to 1941, internal auditing (IA) was essentially a clerical function with no organization and no standards of conduct. Because of the nature of accounting record keeping at the time (i.e., manual), auditors were needed to check the records after they were created for accuracy—for errors in postings or footings. Auditors were also concerned with the possibility of fraud. Thus, the internal auditor was a verifier, or a "cop," to protect organizational assets.

The old concept of internal auditing can be compared to a form of insurance: The major objective was to discover fraud more quickly than it could be discovered by a public accountant during an annual audit. That is, the internal auditor was performing a function similar to a police officer or detective. The modern concept of internal auditing is that of an arm of management. Today, internal auditors are an integral link in the management process and are just as concerned with waste and inefficiency as with fraud. Part of the development probably can be attributed to the change in technology. As accounting became mechanized and computerized, records became subject to automatic checking procedures. Thus, the need to check every transaction declined, giving internal auditors time to reach beyond the historical clerical limits.

The year 1941 marked a turning point in the development of internal auditing as two significant events occurred. One of those events was the publication of the first major book on the subject—Victor Z. Brink's *Internal Auditing.* Also in 1941, 24 individuals joined together to form The Institute of Internal Auditors (IIA).

During the 1940s, internal auditors began to expand their audits to encompass more than the traditional financial audit. The shift to a war economy in the early 1940s was the primary cause for the expansion of internal audit scope. Management became more concerned with production scheduling, shortages of materials and laborers, and compliance with regulations. Also, cost reporting became more important than external reporting. As a result, internal auditors began directing their efforts toward assisting management in whatever way possible. Following

the war, the benefit of the auditor's assistance was so obvious to management that there was no consideration of reducing the auditor's scope to prewar levels.

The term *operations* or *operational auditing* was adopted to describe the expanded activity. In March 1948, Arthur H. Kent's work, "Audits of Operations," published in *The Internal Auditor,* was the first article to describe the expanded-scope audit. In that piece, Kent made frequent mention of an *operations audit.* Other authors had discussed the subject, but had referred to non-accounting matters, instead of operational subjects. The first technical paper to use the phrase *operational auditing* in the title was published in *The Internal Auditor* in June 1954 and written by Frederic E. Mints.

By the mid-1950s, others were using the term in speeches, articles, and technical publications. At about the same time, accounting became more mechanized and computerized, and records became subject to automatic checking procedures once performed by internal auditors. That trend was reflected in the 1957 *Statement of Responsibilities of Internal Auditing,* published by the IIA.

The growth in the internal auditor's scope of responsibility can be observed through a comparison of the 1947 *Statement of Responsibilities of the Internal Auditor* and the 1957 revision of the same document. The 1947 version stated that internal auditing dealt primarily with accounting and financial matters but may also properly deal with matters of an operational nature. That emphasis was to change in just one decade. The IIA described the broad role of internal auditing with its 1957 *Statement of Responsibilities of the Internal Auditor.* Whereas the 1947 *Statement* said that an auditor *might* also deal with operating matters, the 1957 *Statement* stated that the auditor *should* be concerned with any phase of business activity. The 1957 *Statement* included these internal auditor (IA) duties:

- Reviewing and appraising the soundness, adequacy, and application of accounting, financial, and operating controls
- Ascertaining the extent of compliance with established policies, plans, and procedures
- Ascertaining the extent to which organizational assets are accounted for, and safeguarded from, losses of all kinds
- Ascertaining the reliability of accounting and other data developed within the organization
- Appraising the quality of performance in carrying out assigned responsibilities

As previously mentioned, there were two significant events in 1941—the publication of the first major book on internal auditing and the founding of the IIA. Interestingly, the latter event was related to the former. Victor Z. Brink's doctoral dissertation was published in January 1941 by Ronald Press. At the same time, John B. Thurston, internal auditor for the North American Company in New York, had been contemplating establishing an organization for internal auditors. Thurston and Robert B. Milne had served together on an internal auditing subcommittee formed jointly by the Edison Electric Institute and the American Gas Association. These two had decided that further progress in bringing internal auditing to its proper level of recognition would be difficult in the two organizations. Instead, what was needed was an independent organization for internal auditors. When Brink's book came to the attention of Thurston, the two men got together and found they had a mutual interest in furthering the role of internal auditing.

Only 11 members were present at the first annual meeting of the IIA. Thurston was elected as its first president. Membership grew quickly. The original 24 increased to 104 by the end of the first year, to 1,018 at the end of five years, and to 3,700 by 1957, with 20% of the latter figure located outside the United States.

The new group was quick to begin its activities to further the development of its members. A director of research approved in January 1942 the first book published under the IIA auspices, and it was issued in March 1943. A journal, *The Internal Auditor,* was begun in September 1944. Membership was divided into local chapters beginning in December 1942, when the New York chapter was formed. The Detroit, Chicago, Los Angeles, and Philadelphia chapters followed in 1943. Additional chapters were formed the following year in Dayton, Cleveland, and Toronto, the first outside the United States. By the end of 1947, 19 chapters operated throughout North America. The first chapters outside North America were formed in London and Manila in 1948 to begin the trend toward true internationalization.

Other developments would further focus IA on operational audits. In 1963, the National Industrial Conference Board studied 177 organizations' objectives for their internal auditing programs. The Board concluded with five primary objectives:

1. Determine the adequacy of the system of internal control
2. Investigate compliance with organizational policies and procedures
3. Verify the existence of assets, ensure that proper safeguards for assets are maintained, and prevent or discover fraud
4. Check on the reliability of the accounting and reporting system
5. Report findings to management and recommend corrective action where necessary

In 1975, the IIA found that 95% of all respondents to a survey conducted operational audits for purposes of judging efficiency, effectiveness, and economy. The same study found that 51% of the total audit time was spent on operational auditing activities. Thus the shift from financial to operational had become profound and permanent. The modern work of the internal auditor had become auditing for efficiency and effectiveness more than financial propriety. The internal auditor had also become an integral part of the management team.

Another dramatic change in the IA function in the United States occurred in 1987 with the Treadway Commission report. The Commission was organized by five accounting organizations—IIA, AICPA, American Accounting Association (AAA), Institute of Management Accountants (IMA), and Financial Executives International (FEI)—known as the Committee of Sponsoring Organizations (COSO). The commission was formed to study the cause of fraudulent financial reporting. The committee concluded: (1) an internal audit function should exist in every public corporation, and (2) there should be a corporate audit committee composed of nonmanagement directors of the corporation. These conclusions not only enhanced the IA profession but also brought fraud to the forefront of IA functions, like it had been before 1941.

Also in the 1990s, one trend caused a change in the way the IA function was carried out. Outsourcing became a popular way for organizations to employ the IA function. The role of the IA function was served by public accounting and other providers. The IIA *Standards* and *Statement* have evolved further and now have the cornerstone of risk assessment.

The internal auditing function has undergone significant changes in the last century. The main objective of the IA function has moved from that of fraud detection to assisting management in making decisions beginning with a risk assessment. The IA staff of today is considered a good training ground for management-level personnel, but many organizations have outsourced the entire IA function.

1.4 AUDITING GOVERNMENT AGENCIES

Various governmental audit agencies throughout the world have played a role in the movement toward the modernization of internal audit procedures. In the United States, the General Accounting Office (GAO) has played a major part in broadening the role of the auditor. The GAO's publication, *Standards for Audit of Governmental Organizations, Programs, Activities and Functions* (commonly called the "Yellow Book" because of the color of its cover) explains the metamorphosis in the following manner:

> *This demand for information has widened the scope of governmental auditing so that such auditing no longer is a function concerned primarily with financial operations. Instead, governmental auditing now is also concerned with whether governmental organizations are achieving the purposes for which programs are authorized and funds are made available, are doing so economically and efficiently, and are complying with applicable laws and regulations.*

Basically, the recommended standards encompass those standards that have been adopted by the AICPA for use in audits to express an opinion on the fairness of financial statements. Governmental audits, however, go a step beyond those standards that are applicable to audits of financial statements. The scope of a governmental audit (e.g., an audit of or for a government agency) is composed of three elements:

1. Financial compliance,
2. Economy and efficiency, and
3. Program results.

The typical definition of a financial audit would not include elements 2 and 3. These are operational auditing techniques.

1.5 History of Information Systems Auditing

The technology revolution in accounting and auditing began in the summer of 1954 with the first operational business computer. Information technology (IT) changed the way accounting data was stored, retrieved, and handled. These new systems led to radically different audit trails, if one at all. The revolution became a dynamic evolution as the computer industry sustained continuous, rapid technical innovations.

In addition to the introduction of computers to the business world, other IT-related events have also had a profound effect on the auditing profession and the way audits are conducted. These events included: (1) the commercialization of computers; (2) the introduction of AUDITAPE; (3) the Equity Funding scandal; (4) the emergence of Information Systems Audit and Control Association (ISACA); (5) the Systems, Auditability, and Control (SAC) studies by the Institute of Internal Auditors (IIA); and (6) constant emerging technologies.

Information technology affected, and continues to affect, auditing. It became necessary to add new standards, affecting the body of auditing standards. The audit process itself has become different from traditional audits prior to 1954 (e.g., audit tools and techniques). It was possible for an auditor to retire in the 1950s having used similar audit programs throughout one's career. That will never happen again! The effects of IT on auditing have culminated in a set of knowledge, skills, and standards necessary to conduct the contemporary audit that were nonexistent in 1954.

(a) Birth of Information Systems Auditing

The introduction of computer technology into accounting systems disrupted the routine auditors had been able to establish to properly audit accounting systems. General Electric is attributed with the first operational electronic accounting system, a UNIVAC computer, in the summer of 1954. Because of the new knowledge necessary to understand computers and electronic data processing (EDP), the auditing profession struggled to develop a new set of tools, techniques, and systems knowledge—and the training and standards to accompany them.

A seminal event occurred very early in the history of business computers. This notable example of early innovation was an article, "Using a Computer to Reconcile Inventory Counts to Books," published in *N.A.C.A. Bulletin* (National Association of Cost Accountants) in June 1956. In the article, the author, Frank Howell, member of the Auditor General's staff for the United States Air Force (USAF) in Washington, D.C., described how an organization used the computer to reconcile inventory counts to books. The computer was programmed to print out major differences between counts and inventory records while automatically adjusting the books to the count for minor differences. The program even evaluated the effectiveness of inventory

operations in various departments and determined which supervisors were doing the best job of counting inventory. Taking into account the length of publication cycles, this technique was being used as early as 1955, that is, at the beginning of IT history. Some nascent articles and discussions deliberated the possibility of using information technology (i.e., the computer) as an audit tool, but Howell at the USAF was actually using technology as an audit tool. At the time, this idea was radical and innovative. Thus, one early effect of information technology was to provide the very tools auditors would need to adequately audit accounting data. This effect became perpetual as future technologies would also be used as tools in audits of EDP systems.

Not all creative tools and techniques were delivered using emerging technologies. As early as 1961, the U.S. Air Force adapted traditional separation of duties between programmers, systems designers, and keypunch operators. Other traditional auditing principles would be similarly altered to accommodate the effects of IT on auditing.

In the beginning, IT itself provided an inherent protection. From 1955 to the mid-1960s, the computer world included only mainframes. During this time, few people had the knowledge and expertise to program a computer. This situation prevented most accountants from preparing programs to audit through the system. It also provided its own form of security, because few people knew enough to violate the systems.

(b) Commercialization of Computers

Beginning in 1963, the escalation of computer usage in accounting systems caused auditors to think about how they were going to deal with this new technology. Several organizations had begun to manufacture computers to be used in business during the late 1950s and early 1960s. Some manufacturers, such as Singer and General Electric, soon exited the computer market. Others, such as Burroughs and IBM, became major suppliers of business computers. Up until then, all of the computers were mainframes. The cost of these machines made it prohibitive for most companies to purchase one.

The use of computers in accounting began to escalate in 1963 with the introduction of a new, lower-cost computer by IBM—the IBM 360. The plan at IBM was to introduce smaller machines at more affordable costs to businesses. The IBM 360 accomplished this objective, and a rapid increase in sales of commercial-use computers ensued. This increase in computer sales was instrumental in creating a greater need for EDP auditing concepts in businesses and a need for auditors skilled and knowledgeable about EDP. And the spiral of better IT, cheaper IT, and smaller-size IT was off and running.

(c) AUDITAPE: Breakthrough for Information Systems Auditors

From the beginning, external auditors had a difficult time in auditing through the computer. First, the majority of auditors audited around the computer ignoring, for the most part, the effect of EDP on the audit. In the 1960s, those auditors who audited through the system had to rely on expensive, time-consuming, and continuously changing custom audit programs. For example, Keagle Davis undertook a study at Touche Ross that showed that their programmers had written 150 to 250 customized audit programs in 1967 alone. While 75% of these were effective, 80% required major programming changes the next year because of changes in the computer system or changes in audit needs.

Meanwhile, the number and variety of financial accounting systems and clients with computers greatly increased in the last half of the 1960s. The need for skills required to handle the

audit of computerized data significantly increased beyond those of an EDP technician. Together, these needs drove the development of generalized audit software (GAS).

A series of events and projects at Haskins & Sells (H&S) led to the initial GAS package. In the late 1950s, Kenneth Stringer began to develop a statistical sampling plan. In 1962, H&S formerly adopted the plan, Probability Proportional to Size Sampling (PPS). PPS was a precursor to AUDITAPE, but it was not the only motivation, or even the primary motivation, in developing AUDITAPE. Stringer and the management at H&S were also motivated by the fact that the more clients computerized their accounting, the more dependent auditors would become on computer expertise. The growth of computerized accounting systems would create an environment in which auditors would be unable to perform the audit steps once done manually. That is, access to data was gradually slipping away from auditors.

The introduction of AUDITAPE in October 1967 by Haskins & Sells at the American Accounting Association (AAA) annual meeting in Portland, Oregon, was a key event for external auditors in particular (at that time), and internal auditors (later). Practitioners were excited when they saw the potential of AUDITAPE because external auditors who were not highly technical could now run the computer and use it as an audit tool. Very few auditors had yet acquired a high level of technical skills in 1967.

As a direct response to the introduction of AUDITAPE, several GAS packages were developed from 1968 to the early 1970s. Every Big Eight public accounting firm developed its own proprietary GAS package during this time. Independent organizations, such as Computer Audit Systems, Inc. (Joseph Wasserman, CARS software) and, in the late 1970s, P.J. Corum (later Pansophic, Panaudit software), also developed GAS packages.

The development and use of GAS was a breakthrough in audit tools. In 1967, very few audit tools existed, and there was a meager use of the tools that did exist. AUDITAPE was the impetus that led to the development and use of audit tools, specifically GAS, in EDP audits. AUDITAPE also affected other aspects of auditing. Although statistical sampling preceded AUDITAPE by several years, AUDITAPE affected the use of statistical sampling as much as it affected anything. Thus, AUDITAPE was born from a need to audit through the computers (information technology) in a simple, efficient, and effective manner. Information technology's effect on access to data by external auditors (i.e., difficult to examine) drove the need for better audit tools. To this day, GAS is perhaps the most valuable tool an auditor has to audit data embedded in IT.

The AICPA added its contribution to EDP audits, even though it was without official standards or guidance. In 1968, Robert Trueblood of Touche Ross, president of the AICPA, pursued the theme of computers in accounting during his term. Trueblood used his influence to have the AICPA hire Gordon Davis to both assist CPAs in the use of computers and codify EDP auditing. Dr. Davis, a professor at the University of Minnesota, accepted the responsibility and took a leave of absence to be *de facto* chairman of the committee appointed by the AICPA. Each of the Big Eight firms was invited by the AICPA to participate on the committee in the development of this project, and seven firms provided representatives. The major result of the project was a book entitled *Auditing & EDP.* This popular book went through many printings and a revision in 1983. It included examples of how to document an EDP audit and a sample questionnaire for processing internal control review.

The Auditing & EDP project led to several changes in the auditing profession. Although the book itself did not present the official position of the AICPA (i.e., it was not promulgated standards), it did present a number of audit and control concepts and procedures as an unofficial

document. Perhaps the most important chapter was one dedicated to explaining when and how to audit around the computer. In the 1960s, auditors could officially audit input and output and still be in compliance with AICPA standards. If auditors did choose to audit around the computer, the chapter recommended that an evaluation of internal control be made to both review and test the system. Auditors could not simply ignore the presence of EDP in the accounting system. This recommendation was essentially the context of Statement on Auditing Standards (SAS) No. 3: *The Effects of EDP on the Auditor's Study and Evaluation of Internal Control,* promulgated six years later in December 1974.

Another result of the Auditing and EDP Task Force was the establishment of a permanent EDP auditing committee within the AICPA. The committee's efforts eventually led to the issuance of several audit guides and SAS No. 3.

(d) Equity Funding Scandal: Abuse of Information Technology

Oddly enough, the abuse of information technology—to falsify accounting data and hide a fraud—was one of information technology's most significant influences on auditing. The Equity Funding financial fraud scandal jolted both the accounting profession and management—including audit management—from a stodgy, traditional audit ideology. Managers who believed that the computer was a black box and it did not really matter what went on inside began to change their minds. Audit managers who believed the computer was a fad or a fancy calculator began to take more seriously the implications of using EDP in accounting. The atmosphere, in general, was ripe for change.

Managers at Equity Funding Corporation of America used a series of frauds beginning in 1964 to show false profits, thus increasing the company's stock price. The primary fraud was the use of phony insurance policies. Equity Funding used several tactics to perpetrate the fraud. One was to use different external auditors in order to confound the audit process and prevent detection of the fraud. The company used another deceptive tactic during confirmation of receivables. When the external auditing firm tried to confirm receivables (policies) by phone, the Equity Funding switchboard operator simply patched them through to Equity Funding employees in the building. That is, EF employees were in on the fraud and actually provided external auditors with false information. The most amazing fact of the case is that it went undetected for so long. Many people inside the company knew about the fraud, and yet the fraud was a better-kept secret than some of our military secrets of the time. The fraud was exposed when a disgruntled ex-employee blew the whistle. In March 1973, the SEC suspended trading of Equity Funding stock.

The subsequent audit by Touche Ross was definitely not traditional. First, the auditors were trying to prove that the insurance policies did not exist. Second, it was a fraud audit, not a financial audit. Touche Ross auditors used the opportunity to apply a variety of new techniques to satisfy audit requirements in terms of information and how the system reports and files data. The audit took two years to complete. Touche Ross found about $2 billion of phony insurance policies—two-thirds of the policies Equity Funding claimed to have in force.

For the most part, the external auditors before Touche Ross failed to follow up on numerous clues that indicated something was wrong. The use of audit software could have detected the fact that the policy file was fraudulent. For example, all bogus policies were coded to department "99." The auditors also did not review system flowcharts or program code but treated the computer as a black box. Not only did the external auditors overlook the clues, but the SEC could be accused of the same thing. An SEC staff member wrote memos 15 months

prior to Equity Funding's collapse reporting rumors of irregularities. The SEC, however, dropped the investigation shortly after receiving the memos.

The popular press treated the fraud as a computer fraud, but it really was not—it was a management fraud. Still, the fact is that Equity Funding management probably could not have perpetrated the fraud without the use of computers. The public's perception of the part that the computer played in the fraud caused a new wave of interest in audit procedures where computers were a component of the accounting system. The prevailing belief at this time was that traditional audits (those that audited around the computer) were sufficient to detect the existence of material and significant frauds, such as the Equity Funding fraud. Others, primarily EDP auditors, had espoused the need for auditing through the computer. These people were now receiving attention from accountants, auditors, and management.

This financial fraud affected a wide range of constituencies. These included insurance regulators, bank regulators, postal inspectors, the FBI, and the U.S. Attorney's office. At least 12 different federal and state agencies were involved in the aftermath of exposure of the scandal. Equity Funding did more for the rise of EDP auditing (i.e., more EDP auditor jobs) than any other single event. For example, Harold Weiss was credited with providing the only major EDP auditing training during the late 1960s and early 1970s. He said that his activity increased so significantly after Equity Funding that he had trouble filling all of the requests. He also said most of the managers that had previously told him "no" to his requests of EDP audits or the use of EDP audit techniques were now calling and asking for his help to institute computer controls and EDP audit techniques.

The Equity Funding scandal had a domino effect in the auditing community. The attitude of isolating the computer system from the EDP auditors, held by some corporate management, changed after Equity Funding. In addition, auditing procedures were being challenged; some of the customary policies and procedures that had been acceptable began to be questioned. Equity Funding highlighted the need for audit standards that apply directly to EDP auditing (these were non-existent at the time). Security became an increasingly significant issue for all auditors—up until Equity Funding, auditors were absorbed with accounting-related issues in EDP.

Auditing literature was also affected. An analysis of citations prior to 1973 show an insignificant amount of research and publications on EDP auditing issues by such organizations as the AICPA, Big Eight firms, and IIA. From 1955 through 1970 (16 years), the AICPA published only 21 articles, two chapters in a book, and Auditing & EDP, according to *Accountants' Index* published by the American Institute of Accountants. The IIA published 10 articles and no books in the same period. State societies published 25 articles. None of these institutions averaged two articles per year. The more active Big Eight published about 40 articles (some overlap with the AICPA publications in *The Journal of Accountancy* and state society publications).

Between 1973 and 1977, however, numerous activities followed Equity Funding: publications, standards, research, and seminars. Even IBM changed; management at IBM decided to make a substantive effort to change the image of the computer from a villain to a hero. A comparison of the EDP auditing profession prior to 1973 and immediately thereafter leads to the conclusion that the Equity Funding scandal was the single most important event in EDP audit history.

(e) Systems, Auditability, and Control Research Study—Institute of Internal Auditors

By 1973, IBM had established a close working relationship with the public accounting community. In 1965, IBM helped establish a users group, Accountant Computer Users Technical

Exchange (ACUTE), in New York City. After Equity Funding, IBM established a liaison position to cooperate with the public accounting community.

As a result of these relationships, IBM instituted auditability and security programs for its computers and for auditors, a two-way communication line intended to benefit both parties. For example, every IBM computer had a technical guide on the security and auditability features of that particular computer. Auditors benefited from these guides when conducting their audits. Also, IBM invited accountants to training, even if they did not own an IBM computer (IBM normally required training attendees to be owners of IBM equipment). While other computer manufacturers were offering only technically oriented training, IBM offered training that was less technical, and thus more useful to accountants. In return, feedback from auditors led to improvements in the security and auditability features of IBM computers, and the referrals from accountants led to sales. Auditors were assisting IBM, to some degree, in becoming the leading manufacturer of computers.

Members of the IIA staff had been planning a large-scale research project into information systems and auditing called Systems, Auditability, and Control (SAC). In 1973, the IIA formally approached the IBM liaison, Sam Albert, about the possibility of IBM's financial support for the SAC research. Albert eagerly agreed to pursue possible financial support from IBM and was able to convince IBM management to invest in the project. Albert unilaterally decided it was in the best interests of IBM to be the sole sponsor of the project, and he secured a financial commitment of $500,000 from IBM.

In 1975, no entity had been able to define EDP auditing precisely and communicate that definition nationally. State-of-the-art tools, techniques, and procedures also suffered from a lack of exposure and codification. The SAC study had the ambitious goal of making a definitive evaluation of EDP auditing. In 1977, SAC was published. Due to this effort, SAC managed to define EDP auditing because SAC provided some prescription of how to approach EDP auditing. In addition, SAC codified tools and techniques into a benchmark or standard. That is, SAC established what effective EDP audit shops were doing, especially best practices. Others believed SAC legitimized the need for an EDP auditing staff and function. SAC's contributions made an impact, moving EDP auditing forward significantly.

SAC was a landmark study in changing the audit profession and controlling computer systems. The IIA and IBM gave away hundreds and thousands of copies for free. The prestige of IBM, the notoriety of the individual members of the Advisory Committee, and the IIA lent credibility to SAC. At least up until the mid-1980s, SAC was probably the most widely publicized, read, accepted, and applied publication that encapsulated a comprehensive set of principles for EDP auditing. SAC has been updated several times since its initial publication (in 1991, 1994, and eSAC 2001). It is currently referred to as eSAC (Electronic Systems Assurance and Control), and available online from the IIA.

(f) Electronic Data Processing Auditors Association

By the late 1960s, many EDP auditors were ready for an organization dedicated to EDP auditing. At that time, there was no authoritative source for EDP audits that would provide information, standards, tools, and techniques. From the efforts of a handful of interested auditors in Southern California, the Electronic Data Processing Auditors Association (EDPAA) was organized in 1969. Its first conference was held in January 1973, just before the exposure of the Equity Funding scandal, and its first regular publication, *The EDP Auditor,* began in May of the same year.

In 1977, the EDPAA's Foundation (EDPAF) published its first edition of *Control Objectives,* a compilation of guidelines, procedures, best practices, and standards for conducting EDP audits. It was intended to provide a normative model for EDP auditors in performing their duties. The publication was revised and updated frequently in the subsequent years (1980, 1983, 1990, and 1992). Between 1992 and 1996, *Control Objectives* underwent a major revision. Since 1996, the document goes by the title CobiT (Control Objectives for Information and Related Technology). CobiT was revised in 1998 and 2000 (third edition), and is available on CD-ROM and online. CobiT has become an authoritative, up-to-date, international set of generally accepted IT control objectives for day-to-day use by business managers, users of IT, and IS auditors.

In June 1978, the EDP Auditors Foundation (EDPAF) introduced its certification program—Certified Information Systems Auditor (CISA). Because of information technology, some internal and external auditors wanted a separate certification for auditors of Information Technology; the CISA provided the vehicle. The first CISA exam was given in 1981 and offered in two languages. In 2002, more than 10,000 candidates around the world took the CISA exam in their choice of nine languages: English, Dutch, French, German, Italian, Japanese, Spanish, Chinese, or Korean. The introduction of the CISA certification program brought a standard for IS auditors that came to be respected throughout the auditing profession. Today, more than 27,000 professionals in dozens of countries have become certified through the CISA program.

By 1984, the international growth of the EDPAA began to accelerate. Many international chapters were chartered beginning about this time. For example, in 1985, Region 10—encompassing Japan, Hong Kong, Singapore, Malaysia, India, and the Philippines—was activated. The EDPAA began to translate key documents into foreign languages. When *Control Objectives* was translated into Japanese in 1986, it soon became a best seller—selling more than 10,000 copies. By 1988, the CISA exam and other documents were also translated into foreign languages. In 1989, the EDPAF issued its 10 worldwide General Standards for IS Auditing, and its first two worldwide Statements on IS Auditing Standards. In 1991, the EDPAA elected its first international president living outside North America—Deepak Sarup. The Information System, Audit and Control Association (ISACA) has become the only true international professional auditing organization, with international members, international chapters, and international standards (applicable on an international scale)—all within a single entity.

In June 1994, the EDPAA formally changed its name to Information Systems Audit and Control Association (ISACA). Over the years, EDPAA/ISACA has held training seminars, sponsored technical journals, and assumed sponsorship of Computer Audit, Control and Security conferences (CACS) begun by Harold Weiss in the 1960s. The activities of EDPAA/ISACA have contributed to the emergence of the large number of IS auditing experts today.

ISACA is known today for its CobiT project, its services, CISA certification, training, information—topics such as corporate governance and Global Knowledge Network (Global Information Repository)—and it continues to publish its technical journal, *Information Systems Control Journal.* ISACA has more than 26,000 members internationally in more than 100 countries.

(g) Emerging Technologies

Technology continued to change at a rapid pace until the introduction of the microcomputer in the late 1970s. At that time, information technology became portable and distributed, carrying with it new control problems. While the pioneers did blaze a trail for others to follow (in the mainframe area), all the trails seemed to change by 1979, and the walls around the data center

were no longer secure. In addition, EDP auditing had even evolved into a separate function in many organizations, or at least a separate position in IA: audit manager/IS audit.

The breadth of IT also began to compound the knowledge and expertise needed to perform audits and audit projects. The 1980s saw many new technologies incorporated into accounting systems. Some had been in the process of developing, but the proliferation of IT in the 1980s and 1990s drove the need for better IS products as well as new technology. The emerging technologies included microcomputers or personal computers (PCs), database management systems, electronic data interchange (EDI), bar coding, artificial neural systems (ANS) or neural networks, expert systems (ES), decision support systems (DSS) and group decision support systems (GDSS), executive information systems (EIS), online analytical processing (OLAP), enterprise resource planning (ERP), and—most important of all—the Internet and World Wide Web (WWW). In addition, changes in telecommunication technologies affected nearly all accounting information systems.

(i) Microcomputers and Networks

Microcomputers date back to 1975 with a group of young experts (e.g., Bill Gates) who built the first microcomputer called the Altair. Several attempts to mass market microcomputers followed from then-maverick companies such as Apple and Commodore, and traditional companies like Radio Shack. In 1977, Apple introduced its Apple II, followed in 1979 with Radio Shack's TRS-80. Also in 1977, Xerox developed a microcomputer with a mouse, graphical display, and other "windows"-like features. It was not until 1979 when VisiCalc (an electronic spreadsheet) hit the market, however, that micros really began to sell. In the fall of 1981, IBM began to sell its version of the microcomputer—the personal computer (PC).

Early in the 1980s, IS auditors were becoming concerned about the controls in microcomputer systems (e.g., spreadsheets used in accounting and financial accounting packages). Microcomputer software advances (financial accounting) had led to many installations on PCs. The widespread use of PCs dispersed the IS function within organizations. One result of micros was a loss of control of the security of computing activities. That is, computer processing, which had once at least been centralized at the mainframe computer in a single room, was now distributed throughout much of the organization.

Information system auditors quickly determined the need for new tools to audit the data that were resident on microcomputer systems. Yet the micro also provided IS auditors with the opportunity to develop new tools to take advantage of the power of micros for audit purposes. This potential led to the birth of the need for micro-based computer-assisted audit tools (CAATs), a major turning point because these tools enabled IS auditors to start doing their own micro work, instead of needing an IS expert as a go-between. Thus, the growth of PC-based CAATs was, in fact, driven by IS auditors. The PC was a greater tool for auditors than for just spreadsheets and word processing. The automation of work papers and micro-driven analytical tools were major innovations.

The 1980s also saw the growth of networked PCs. With networks, several applications and numerous users have access to the same data and resources. During transmission along network lines, data often were exposed to loss or theft (e.g., sniffers, hackers). Maintaining the security of the users connected to the network and their physical location (nodes) was also difficult because users could be frequently added or moved on a network. That is, the network a manager brings up in the morning may not be the same one brought up yesterday. This volatility creates

havoc for the network manager and can be a nightmare for IS auditors—it is virtually impossible to audit an environment when the environment keeps changing, and doing it so often.

These two developments (PCs and networks) have resulted in information systems that have become more difficult to audit. Technology continues to change and expand rapidly. Meanwhile, the structure of the organizational system has drastically changed (exactly where are the data and controls?), and the locus of control for data processing continues to expand. However, microcomputers (and CAATs developed for them) have also provided a powerful tool that IS auditors can use to improve or facilitate the audit process.

(ii) Database Management Systems

Use of relational databases grew in the early 1980s. The expanding base of PCs created a new market for application software, such as databases. Data integrity problems existed because several different applications (and users) had access to the same information. Databases (and PCs) eliminated much of the traditional separation of duties that had been established for mainframe systems. Information System auditing had to address these issues.

The introduction of products such as the series of DBASE products, ACCESS, FoxBase, and so on, gave end users the ability to perform tasks previously restricted to the IS group: that is, they could develop their own applications. With much of IS programming suffering from large backlogs, end users saw a way to achieve their goals much quicker. Because of this situation, databases were popular with users. This phenomenon drove end-user computing (EUC). EUC, too, expanded the scope and exposures of information systems, again leading to changes in IS auditing.

The proliferation of databases as the foundation of Accounting Information Systems (AIS) caused both problems and a simplification. Systems such as DB2 (from IBM) and Oracle began to dominate the market in the 1990s. The good news is that if an IS auditor understands database management systems concepts and technical issues, there is a good chance the organizational data resides within one. The basic concepts among database systems are fairly common. Also, the two most popular packages dominate IS in the larger businesses.

(iii) Electronic Data Interchange and Electronic Commerce

EDI technology provided users with many benefits in the delivery and production of products and services. The use of EDI, however, exposes data during telecommunications between the two systems. Because of incompatible EDI systems, some organizations use a third party to provide EDI services and introduce another source of exposure. Therefore, EDI (computerized) audit trails have become even more difficult to follow.

Universal product code (UPC) bar coding was first used in 1973 in grocery stores. Bar coding increased input accuracy and permitted fast data capture. Bar coding and scanning had advantages to management beyond inventory control. For example, Toys 'R Us uses bar coding and scanning for sales analysis: to know the hot toy first and order the entire supply!

Quick response systems integrate EDI, bar coding, and just-in-time (JIT) inventory management. The basic element of the JIT philosophy is to carry only enough inventory to meet customers' orders for a short time frame (ideally one day). Wal-Mart has fine-tuned its quick response system so well that its system has become one of its major competitive advantages. For example, the elimination of local warehouse storage at branch locations reduced costs enough to pay for the quick response system in about six months.

The security of data has not only escaped the confines of the IS central location within an organization, but it is now virtually open to exposure to anyone in the external environment who has enough knowledge and criminal intent to disrupt the information traveling over phone lines and networks. The increase in users of EDI has expanded the risks to transmission of data. Encryption and virtual private networks (VPN) became some of the controls used for these risks and exposures.

(iv) Artificial Intelligence and Decision Support Systems

Other major innovations in information technology provide additional opportunities for its use, sometimes as a competitive edge, by management in the area of artificial intelligence (AI), decision support systems (DSS), and group decision support systems (GDSS). Artificial neural systems (ANS) are a special type of AI systems. ANS emulate the functioning of the human brain in model building and decision-making. Neural nets appear to be well suited to problems of pattern recognition, classification, nonlinear feature detection, and nonlinear forecasting.

One good example of an emerging technology and how it affects IS auditing is executive information systems (EIS). EIS are computerized systems that support top management in their strategic decision-making. An EIS must be easy to use by relatively unskilled users. Because internal auditing is supposed to review the reliability and integrity of financial and operating information, the emergence of new EIS has had an impact on internal auditors. Information system auditors should define the control risks and internal controls of EIS—as well as all other information technologies. Internal controls should be "seamless" to ensure the flexibility necessary. Thus, IS auditors can contribute to the development of EIS in a variety of ways—but especially in defining controls, auditability, and security for the systems.

All of these emerging technologies led to constantly changing systems, with new information technologies being implemented frequently. Many times, systems are changed with input from IS auditors regarding audit, control, and security. Management and staff are often so enthralled with the features of the new IT that it can be easy to overlook important control and auditing attributes. But if IS auditors do participate in the systems development, the controls, auditability, and security probably will be adequate. CISA guidelines suggest that a CISA be involved in every systems development life cycle (SDLC) project.

(v) Telecommunications

In the mid-1960s, modems and acoustical couplers began to appear. Again, it was the growth of the PC that propelled the use of this technology. The 1980s saw global competition begin to affect many more organizations, driving a need for telecommunications. With this expansion of telecommunications came risks and exposures. One problem that arose with telecommunications was computer crime. For example, vandals—hackers and crackers—began to steal or corrupt data from long distance. With the legal system not ready to handle these types of crimes, many organizations could do nothing even if they caught the criminal. The nature of telecommunications and information technology makes it difficult, if not impossible, to identify computer criminals. Using viruses, hackers also vandalized information systems.

During the last decade, the impact of viruses has grown and is now considered dramatic.[4] Viruses entered the public limelight in the fall of 1987. But the military had been aware of viruses since 1978 (according to the head of information security at SRI International, Donn

Parker). Modern accounting systems, especially due to the expansion of telecommunications, are vulnerable to the detrimental effects of viruses. Most auditors are convinced viruses present a real threat to IS security and control that must be addressed by IS auditors. It is estimated that viruses cost companies $12.3 billion in 2001.

(vi) Expanded Interfacing/Scope of Accounting Systems

Other advances caused significant changes in existing accounting information systems (AIS). One major change was enterprise resource planning (ERP), in which AIS was interfaced with all, or most, of the other systems in the organization. For example, in common ERP systems, human resource systems are interfaced with the payroll system, and sales systems are interfaced with the accounts receivable system. In recent years, ERP is being expanded to include customer relationship management (CRM), supply chain management (SCM), and other functions. In addition, data needs resulted in software such as online analytical processing (OLAP), data warehousing, data mining, and a host of extraction software to create value and draw benefits from AIS and operational data captured over time in systems.

(vii) The Internet and the World Wide Web

The most dramatic of advances has been the proliferation of the Internet and the World Wide Web (WWW). With it have come new security problems, new risks, and new challenges for auditing. Suddenly, data is exposed to the entire world! Organizations want to use the 24/7 access to increase sales, improve customer relations, and achieve other business objectives. The increased risk of fraud and damage is considerable.

The growth of commerce over the Internet has been phenomenal. It has been estimated that between 2002 and 2005, the number of consumers using online account management will more than double, reaching 45% of the U.S. adult population. On the retail sales side business-to-consumer (B2C), electronic commerce, or e-commerce, sales grew 92% from 1999 to 2000, with a total of $29 billion. On the wholesale side business-to-business (B2B), e-commerce transactions increased 17% from 1999 to 2000, with a total of $213 billion. In the service sector, sales increased 48% from 1999 to 2000, with a total of $37 billion. Retail sales for 4Q 2001 were up 13% over 2000 at $10 billion. It is estimated that sales for the year of 2001 were $32.6 billion, an increase of 19% from 2001.

The Internet and WWW have changed commerce worldwide in both the nature of transactions and AIS. Electronic commerce makes it possible to better compete on a global scale and find the best suppliers without regard to geographic location. It also facilitates more efficient and flexible internal operations, better (closer) relationships with suppliers, and improved customer service, with better response to customer needs and expectations. Indeed, e-commerce has become a critical success factor for modern business, strategic needs, and economical development. Firms are changing their organizational and commercial processes to take full advantage of the opportunities that e-commerce offers.

Yet the electronic systems and infrastructure commensurate with effective e-commerce present significant exposures and risks related to abuse, misuse, and failure. Risks extend to all connected parties: merchants, customers, finance entities, and service providers. Risks from attacks range from hackers who are on a cyberspace joy ride to crackers who are out to kill, steal, and destroy. The risks also include viruses and intelligent agents (e.g., distributed denial of service (dDoS) agents). To a lesser extent, it includes those objects whose intent is to clog

bandwidth: urban legends, hoax viruses, and chain letters. Those responsible for information security (InfoSec), operational audits, and internal controls have a very difficult task managing the risks associated with the Internet. In general, the most common adverse consequences include the following types of exposures:

- Financial loss as a result of a fraud
- Destruction of important financial records
- Compromise of valuable confidential information to an unauthorized party
- Loss of business opportunities through a disruption of service
- Unauthorized use of resources
- Loss of confidentiality or customer relationship

Some of these consequences can be minimized through appropriate practices of internal control within the organization. For example, in order to minimize possible losses because of disruption of service, contingency planning and physical security measures could be taken. However, the risks may not always be minimized through the traditional security and/or preventative methods.

In addition, security threats have become a ubiquitous problem and an ever-evolving challenge for those responsible for information systems. There is a seemingly endless barrage of attacks from computer criminals with the intent to destroy systems, data, and information assets. Mailing lists such as those from BugTraq, CERT, and SANS Institute put out a continuous stream of warnings about emerging risks, from new viruses to vulnerabilities in operating systems and browsers. The costs of these security problems appear to outweigh even those of Internet fraud. The Computer Security Institute and FBI conducted a study of organizations that experienced security breaches. Respondents who could put a dollar amount on the cost of a security breach averaged more than $2 million in financial losses.

The rate of the growth of the Internet and e-commerce may have slowed, but the scope of this exposure is approaching 100% because it affects both suppliers (hosts/servers) and users (clients). Whether it is web servers (hosts), e-commerce systems, extranets, or just access to the Internet (clients/browsers), firms are exposed to a plethora of possible attacks if they are connected in any way to the Internet. Obviously, those firms with servers (hosts) have a much greater risk. Theoretically, data can be accessed by anyone.

In order to respond to these and other critical factors within the implementation strategy of electronic commerce, the role and responsibility of the IA is crucial in establishing auditing procedures and IS specifications that will, at least, minimize risks.

(viii) Paradoxical Evolution of Information Technology

The effects of emerging technologies have been paradoxical. On one hand, emerging technologies have created a more difficult system to audit effectively. On the other hand, auditors have managed to use emerging technologies as audit tools and thus become more effective and efficient. The microcomputer innovation in the early 1980s epitomizes this phenomenon.

An example of hindrances caused by emerging technologies is distributed data. Emerging technologies, especially the Internet, decentralized the control points. No longer could an auditor go to a single location and audit the major control points of an EDP system—usually a mainframe

in a single, glass-enclosed room. This distribution and multiplication of control points exasperated the audit process. Coupled with the scope change was new technology. Not only did the control points move away from a central location and expand in numbers, but they became different because the technology changed. Thus general controls and application controls were significantly different.

One current, actual example of using emerging technologies is the use of laptops and customized generalized audit software to audit credit unions long distance using telecommunications, never interrupting daily operations (Weber, 1994). One developing example is embedded audit modules: For example, an artificial neural system (ANS) could be developed to "sit" in the IS and warn auditors of transactions or events that are "outliers"—that is, fraud or irregularity is suspected. This type of warning system is possible because ANS can "learn" to recognize errors and possible fraud by exposing the system to actual errors and frauds. This tool would amount to 100%, real-time, on-line verification. Today several computer-assisted audit tools (CAATs) already exist that perform a 100% verification.

Despite the existence of IDEA, ACL, Panaudit Plus and other micro-based CAATs, these tools are apparently greatly underutilized at present. This situation is attributed to serious cost constraints within audits, the expertise to use them effectively, combined with a misconception that CAATs are cost effective only for large audits.

One thing the future holds for certain is more rapid change in information technology. One source says:

> *The task will require ingenuity, special training, and, of course, experience to be efficiently accomplished. Unlike the auditors of the early 1900s, today's auditor is faced with a dynamic situation in which time is of the essence. The increased volume of data being handled, the speed with which these data are processed and the centralization of accounting functions have by no means reached their zenith, nor will the pace in technology diminish. The modern-day auditor must not only meet the challenge quickly, but parallel its future growth. To do otherwise will render the role he plays ineffective, if not futile.*

Sound familiar? This statement was written decades ago (USAF, 1966)! The challenge is to use the lessons of the past to solve problems of the present and future.

1.6 History of Federal Regulations Related to Auditing

A review of relevant federal regulations follows to provide the IA department and its members a general understanding of these laws. Each regulation has had an impact on audits.

(a) Income Tax Law (Sixteenth Amendment): 1913

One of the first major regulations that was passed by the U.S. Congress was the Sixteenth Amendment in 1913. This law legalized income taxes and had a direct impact on internal auditing. One provision of the law required all companies to maintain adequate accounting records. Thus, even small firms that did not need accounting for management or financing purposes suddenly had to maintain accounting records for income tax purposes. This change meant a need for more accountants and internal auditors—who had to review travel and business expenses for income tax returns and who would respond if the Internal Revenue Service solicited audit reports during their examinations.

(b) Securities and Exchange Commission Acts: 1933, 1934

The main impact of the Securities Act of 1933 and the Securities Exchange Act of 1934 was on public accounting. In fact, some have referred to this legislation as the "full employment acts for external auditors." The purpose of the acts was to make accountants liable for purchases of securities containing material misstatements in the portions of the registration statement for which the CPA is responsible. The registration had to include audited financial statements. Essentially, plaintiffs must only establish that they suffered investment losses and that the relevant financial statements contain material errors or omissions. If a plaintiff establishes those elements of proof, the defendant auditor assumes the burden of proving that its employees used "due diligence" in performing the audit. This purpose was a result of the Ivar Kreuger scandal mentioned previously.

The Supreme Court has made it clear that the plaintiff must prove more than mere negligence to impose liability on the CPA. Plaintiffs must prove scienter[5] ("a mental state embracing intent to deceive, manipulate, or defraud")—Section 10(b), Rule 10(b)-5 of the 1934 SEC Act. Most criminal cases brought against CPAs involve this section.

Perhaps the most significant fact about the SEC acts is the legal authority it gives the SEC for setting accounting and standards. The SEC has in effect delegated that authority to the Financial Accounting Standards Board (FASB). Because of its membership makeup and the influence the AICPA tends to have in the rule-making process, the SEC has basically delegated rule making to the accounting profession, allowing it to monitor and police itself generally. The SEC does issue *Staff Accounting Bulletins* that are authoritative for publicly traded companies.

For IA, the SEC acts provide impetus for financial accounting responsibilities for publicly traded companies. The acts also require all corporations that report to the SEC to maintain a system of internal control that is evaluated as part of the annual external audit. The responsibility for this system of internal control generally falls on the IA function.

(c) Foreign Corrupt Practices Act: 1977

Although the primary purpose of the Foreign Corrupt Practices Act (FCPA) in 1977 was supposedly to eliminate payments by U.S. corporations to foreign officials, the secondary purpose of enhanced internal controls is more important to internal auditors. Organizations were required to have sufficient internal controls so that any illegal payments would be uncovered by the accounting system or internal controls. Thus, if a corporation was guilty of making an illegal payment, management could not (supposedly) escape conviction by claiming a lack of knowledge. If a corporation tried that approach, then it would be guilty of having a system of internal controls that could not uncover illegal payments; that is, the organization would be out of compliance with a federal law.

FCPA required two things that affect auditing and IA:

1. SEC registrants must establish and maintain adequate books, records, and accounts.
2. SEC registrants must maintain an internal control system that provides reasonable assurance the organization's objectives are being met:
    a. Transactions are executed in accordance with management's general or specific authorization.
    b. Transactions are recorded as necessary to prepare financial statements (i.e., GAAP), and to maintain accountability.
    c. Access to assets is permitted only in accordance with management authorization.
    d. Recorded assets are compared with existing assets at reasonable intervals.
    e. Internal controls are capable of detecting illegal foreign payments.

Penalties for violations include fines (up to $2 million), imprisonment (up to five years), and, in some cases, both.[6]

(d) Copyright Laws: 1976 et al.

Also affecting internal auditing is the series of copyright laws beginning in 1976, relating to intellectual property. The acts have the following implications for IA:

- U.S. intellectual property is protected.
- The acts have been amended numerous times.
- Management is legally responsible for violations of the organization, even if executives did not know of any illegal activities.
- The U.S. government has continually sought international agreement on terms for protection of intellectual property globally, but without complete success (especially in areas of the Far East and Middle East).

(e) Sarbanes-Oxley Act: 2002

The Sarbanes-Oxley Act passed by the U.S. Congress in the summer of 2002 will have a dramatic effect on both external and internal auditing. Section 301 (Public Company Audit Committee) requires an audit committee for listed companies and describes the functions and oversight the audit committee should have over the audit processes. The new law requires the committee to have a great deal of interaction with major facets of audit, including IA auditors. It also requires members of the committee to be independent. Section 302 (Corporate Responsibility for Financial Reports) calls for the certification of financial reports submitted to the SEC by the principal executive officer and principal financial officer. Section 406 (Code of Ethics for Senior Financial Officers) requires a code of ethics for certain executive officers and requires disclosures when a code does not exist. Section 407 (Disclosure of Audit Committee Financial Expert) adds further requirements of the audit committee, specifically that at least one member should have financial accounting expertise.

But it is Section 404 (Management Assessment of Internal Controls) that will have the greatest impact on internal auditing. This section requires an annual report to management of the internal controls and their effectiveness. Internal audit is clearly in the optimum position to deliver this required service, and the law is therefore good news for the IA profession. Fulfilling this regulation is an excellent motivation to have an IA department in house. The scope of this section was amplified by the NYSE when it actually required, for the first time, an internal audit function for all NYSE-listed companies (Section 303A.7(c)). (See also Sections 3.4(e) and 9.2 for more on the Sarbanes-Oxley Act.)

1.7 Professional Organizations Related to Internal Auditing

Several organizations furnish professional services, certification, and continuing education that relate to IA. The following list summarizes some of these major organizations. A summary of each organization—mostly derived from information at their web site—follows.

Organization	Certification	Web Site
Institute of Internal Auditors (IIA)	CIA, CGAP, CFSA, CCSA	*www.theiia.org*
Information Systems Audit and Control Association (ISACA)	CISA	*www.isaca.org*
American Institute of Certified Public Accountants (AICPA)	CPA, CITP	*www.aicpa.org*
American Accounting Association (AAA)	n.a.	*www.aaa-edu.org*
Financial Executives International (FEI)	n.a.	*www.fei.org*
Association of Government Accountants (AGA)	CGFM	*www.agacgfm.org*
Association of Certified Fraud Examiners (ACFE)	CFE	*www.cfenet.com*

(a) Institute of Internal Auditors

The Institute of Internal Auditors
247 Maitland Avenue
Altamonte Springs, FL 32701-4201
Phone: (407) 830-7600
Fax: (407) 831-5171
E-mail: *iia@theiia.org*
Web: *www.theiia.org*

The IIA focuses on the internal audit function. Its certification is the Certified Internal Auditor (CIA).

Established in 1941, the IIA serves more than 75,000 members in internal auditing, governance and internal control, IT audit, education, and security from more than 100 countries.

The world's leader in certification, education, research, and technological guidance for the profession, the IIA serves as the profession's watchdog and resource on significant internal auditing issues around the globe.

Presenting important conferences and seminars for professional development, producing leading-edge educational products, certifying qualified auditing professionals, providing quality assurance reviews and benchmarking, and conducting valuable research projects through the IIA Research Foundation are just a few of the Institute's many activities.

The IIA also provides internal audit practitioners, executive management, boards of directors and audit committees with standards, guidance, and information on best practices in internal auditing. It is a dynamic international organization that meets the needs of a worldwide body of internal auditors. The history of internal auditing has been synonymous with that of the IIA and its motto, "Progress Through Sharing."

In December 2000, the IIA's Internal Auditing Standards Board approved the issuance of new standards, in the first major revision to the "Red Book" since it was introduced a quarter century ago (i.e., *Standards for the Professional Practice of Internal Auditing* (SPPIA)).

(b) Information Systems Audit and Control Association

Information Systems Audit and Control Association
3701 Algonquin Road, Suite 1010
Rolling Meadows, IL 60008
Phone: (847) 253-1545
Fax: (847) 253-1443
Web: *www.isaca.org*

The Electronic Data Processing Auditing Association (EDPAA) was formed in 1969 and later changed its name to Information Systems Audit and Control Association (ISACA). It is dedicated to the profession of IS auditing. Its certification is CISA (Certified Information Systems Auditor).

With more than 26,000 members in over 100 countries, ISACA is a recognized global leader in IT governance, control and assurance. The organization sponsors international conferences, administers the globally respected CISA designation earned by more than 27,000 professionals worldwide, and develops globally applicable information systems auditing and control standards. An affiliated foundation undertakes leading-edge research in support of the profession. The IT Governance Institute, established by the association and foundation in 1998, offers symposia, original research, presentations at both ISACA and non-ISACA conferences, and electronic resources to assist enterprise leaders in their responsibility to make IT successful in supporting the enterprise's mission and goals.

ISACA's vision is to be the recognized global leader in IT governance, control, and assurance.

ISACA's mission is to support enterprise objectives through the development, provision, and promotion of research, standards, competencies, and practices for the effective governance, control, and assurance of information, systems, and technology.

ISACA members residing in more than 160 chapters throughout more than 100 countries around the world unite through:

- One set of standards used as guidance for IS audit and control activities worldwide
- A respected certification program that is recognized internationally in the IS audit, control, and security fields
- A professional development program on critical managerial and technical topics
- Award-winning technical publications providing the latest research, case studies, and how-to information, and
- A code of professional ethics to guide members' professional activities and conduct

(c) American Institute of Certified Public Accountants

American Institute of Certified Public Accountants
1211 Avenue of the Americas
New York, NY 10036-8775
Phone: (212) 596-6200
Fax: (212) 596-6213
Web: *www.aicpa.org*

The AICPA is the professional organization that represents external auditors. The AICPA oversees the Certified Public Accountant (CPA) designation that is actually administered and awarded by individual states (the examination is common to all states).

It has a strict code of ethics that it enforces. Internal auditors must be familiar with their duties, Generally Accepted Accounting Principles (GAAP), and other financial reporting criteria in order to perform their duties effectively.

The AICPA and its predecessors have a history dating back to 1887, when the American Association of Public Accountants was formed. In 1916, the American Association was succeeded by the Institute of Public Accountants, whose membership numbered 1,150. The name was changed to the American Institute of Accountants in 1917 and remained so until 1957, when the name was again changed to the American Institute of Certified Public Accountants. Separately, the American Society of Certified Public Accountants was formed in 1921 and acted as a federation of state societies. The Society was merged into the Institute in 1936 and, at that time, the Institute agreed to restrict its future members to CPAs.

(d) American Accounting Association

American Accounting Association
5717 Bessie Drive
Sarasota, FL 34233-2399
Phone: (941) 921-7747
Fax: (941) 923-4093
E-mail: *office@aaahq.org*
Web: *www.aaa-edu.org*

The American Accounting Association is dedicated to accounting education with most of its membership comprised of accounting academics; in fact, it has fewer practitioners as a percentage over time. There is no separate certification associated with the AAA.

The AAA promotes worldwide excellence in accounting education, research, and practice. Founded in 1916 as the American Association of University Instructors in Accounting, its present name was adopted in 1936.

The AAA provides a wealth of resources for IA in doing research and in communicating education needs back to the classrooms. Interaction between IA and AAA should lead to a synergistic relationship.

(e) Financial Executives International

Financial Executives International
10 Madison Avenue
P.O. Box 1938
Morristown, NJ 07962-1938
Phone: (973) 898-4600
Fax: (973) 898-4649
Web: *www.fei.org*

FEI represents the financial profession and community. It has no separate certification.

FEI was founded in 1931. Over time the role of the financial executive expanded and it adopted its broader present name in 1962. On November 6, 2000, the Financial Executives Institute became what is now Financial Executives International.

FEI is the preeminent professional association for senior financial executives representing 15,000 individuals. Membership driven, FEI provides peer networking opportunities, emerging issues alerts, personal and professional development, and advocacy services to chief financial officers, controllers, treasurers, tax executives, finance and accounting professors in academia. FEI does this principally through its strong Internet community, its 85 chapters and its 9 technical committees. Membership is limited to individuals holding senior management positions, but the organization allows many other finance professionals to join if they meet certain criteria.

Other typical titles held by FEI members include assistant controller, subsidiary CFO or controller, assistant treasurer, and director of tax. FEI also has a special rate and status for academics.

As the global economy developed, FEI was the driving force in forming the International Association of Financial Executives Institutes in 1969. FEI proactively helped design the CFO Act and has a history of supporting legislation that enhances the business climate. Its largest chapters are in Boston, Santa Clara Valley, New York, and Chicago. In total, FEI has 85 chapters across the United States and Canada. FEI Canada was established in 1973 to serve the needs of its Canadian members and consists of 11 chapters.

Vision:
FEI will continue to be the association for the corporate finance profession.

(f) Association of Government Accountants

Association of Government Accountants
2208 Mount Vernon Avenue
Alexandria, VA 22301
Phone: (703) 684-6931
(800) AGA-7211
Fax: (703) 548-9367
Web: *www.agacgfm.org*

The Association of Government Accountants specializes in public financial management. AGA sponsors the CGFM (Certified Government Financial Manager) certification.

Since 1950, the AGA has been—and remains today—the educational organization dedicated to the enhancement of public financial management. AGA serves the professional interests of financial managers, from local, state and federal governments, as well as public accounting firms, responsible for effectively using billions of dollars and other monetary resources every day.

AGA has been instrumental in developing accounting and auditing standards and in generating new concepts for the effective organization and administration of financial management functions, including the passage of the Inspector General Act of 1978 and the Chief Financial Officer's Act of 1990. AGA conducts independent research and analysis of all aspects of government financial management. These studies have led AGA to be recognized as a leading advocate for improving the quality and effectiveness of government fiscal administration.

Since its inception in 1994, the CGFM has become the standard by which government financial management professionals are measured. Its education, experience and ethics requirements have served to elevate the most seasoned financial professionals. More than 13,000 individuals have received the designation so far.

(g) Association of Certified Fraud Examiners

Association of Certified Fraud Examiners
The Gregor Building
716 West Avenue
Austin, Texas 78701
Phone: (512) 478-9070
(800) 245-3321 (USA & Canada only)
Fax: (512) 478-9297
Web: *www.cfenet.com*

The Association of Certified Fraud Examiners (ACFE) specializes in anti-fraud activities and white-collar crime detection, and sponsors the CFE (Certified Fraud Examiner) certification.

ACFE, established in 1988, is based in Austin, Texas. The 26,000-member professional organization is dedicated to educating qualified individuals (Certified Fraud Examiners), who are trained in the highly specialized aspects of detecting, investigating, and deterring fraud and white-collar crime. Each member of the association designated a Certified Fraud Examiner has earned certification after an extensive application process and upon passing the uniform CFE examination.

Certified Fraud Examiners come from various professions, including auditors, accountants, fraud investigators, loss prevention specialists, attorneys, educators, and criminologists. CFEs gather evidence, take statements, write reports, and assist in investigating fraud in its varied forms. CFEs are employed by most major corporations and government agencies, and others provide consulting and investigative services.

The association sponsors approximately 100 local chapters worldwide. CFEs in more than 100 countries on four continents have investigated more than 1 million suspected cases of civil and criminal fraud.

ENDNOTES

1. Special thanks to Dr. Dale Flesher for the use of his article, "A History of Accounting and Auditing Before EDP," *The EDP Auditor Journal,* Vol. III, 1993, pp. 38–47. Most of this section came from this article.
2. Interestingly enough, a similar law was passed during the Civil War but was later ruled to be unconstitutional by the U.S. Supreme Court.
3. Some of the material from this section was taken from *The Institute of Internal Auditors: 50 Years of Progress,* by Dale L. Flesher, IIA. Copyright 1991 by The Institute of Internal Auditors, Inc., 247 Maitland Avenue, Altamonte Springs, FL 32701-4201. Reprinted with permission.
4. See *Journal of Corporate Accounting & Finance,* Vol. 13, Issue 4, 2002, pp. 29–39, for more on viruses. "Stop Fraud Cold With Powerful Internal Controls" by Tommie Singleton.
5. Per case: *Ernst & Ernst v. Hochfelder (First Securities Co. of Chicago)* 1976.
6. See full text of FCPA at *www.usdoj.gov/criminal/fraud/fepa/fepastat.htm.*