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THE CPA'S RESPONSIBILITY FOR THE PREVENTION AND DETECTION OF COMPUTER FRAUD

by

Charles R. Wagner

A DISSERTATION

Presented to the Faculty of

The Graduate College in the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Interdepartmental Area of Business

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Under the Supervision of Professor George C. Holdren

Lincoln, Nebraska

May, 1976

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TITLE

THE CPA'S RESPONSIBILITY FOR THE PREVENTION

AND DETECTION OF COMPUTER FRAUD

BY

Charles R. Wagner

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Charles R. Wagner

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CHAPTER 1

COMPUTER FRAUD: IS IT A PROBLEM?

Computer fraud: Is it a problem? Yes! Some experts believe that the illegal use of computers is the fastest-growing type of white-collar crime, which in total is estimated to now exceed $40 billion annually, and that as much as 85 percent of the computer crime, which is estimated to now exceed $100 million annually, is not reported.[1]

In our free enterprise system, the burden of the economic losses resulting from such business crimes are, for the most part, shifted to the consumer via an increase in the price paid for goods and services. Naturally, computer fraud is punishable under our legal system--but often the victim chooses for one reason or another not to press charges. Obviously, the commission of computer fraud is an expression of behavioral phenomena that may not conform to normative sociological precepts.

For society at large, computer fraud causes economic, legal and/or sociological problems just as does any other identifiable kind of fraud. The more commonly recognized terms to identify other kinds of fraud would probably include: Art fraud, bank fraud, bankruptcy fraud, business fraud, check fraud, consumer fraud, contract fraud, credit card fraud, employee fraud, government fraud, insurance fraud, management fraud, pension fraud, securities fraud, tax fraud, and writer's

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[1] Based on facts and figures referenced later in this chapter.

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fraud. Some of these may also be of the computer fraud variety.

The term itself--computer fraud--may cause a problem as to its meaning as understood by either a "sender" or "receiver" in the typical communication process. As in any of the other kinds of fraud mentioned in the preceding paragraph, the descriptive term is merely a label that attempts to define the fraud by its most readily identifiable and distinguishing characteristic. In most cases, this characteristic entails a unique environment or a class of individuals or the instrument utilized. There is no one definition or even one term that is used universally to cover all incidents of computer fraud.

Computer fraud: Is it a problem for the CPA? Yes! His professional image may be diminished in prestige and stature since it appears that the news media and some "key publics" believe that there is a lack of auditor involvement in the detection of computer fraud.[2] Recently a court decision for the Equity Funding case resulted in the conviction of three CPAs primarily on the basis of "sheer negligence" and "'lack of involvement' in the basic auditing of Equity Funding accounts." Important aspects of this fraud case included mis-use of computer files and reporting of fictitious data on computer output.[3]

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[2] Based on facts and figures referenced later in this chapter and in Chapter 6.

[3] The Equity Funding case is briefly described in Chapter 2. See Wall Street Journal, May 22, 1975, p. 9, for more complete results of court action noted above.

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The auditing profession has established standards that are supposed to define the degree of responsibility that a CPA has for the prevention and detection of fraud. Since the use of a computer by a client may, and often does, constitute a new "encounter" for a CPA on an audit engagement, the CPA must have the ability to "cope with" the changed environment and controls. Inherent in this ability, in the opinion of this author, is the obligation of the CPA to prevent and detect "material" amounts of computer fraud if the client firm's resources have been unable or unwilling to do so.

The initial objectives of this research project were to determine the extent of computer fraud; to ascertain the reasons for its occurrence and how it was discovered in each case; to study each case, if possible, in an effort to uncover weaknesses in auditing procedures; to examine the characteristics of a computer environment and computer fraud in relation to auditing procedures and generally accepted auditing standards; and to re-assess the question of the auditor's degree of responsibility for the prevention and detection of fraud in a computer environment.

In the pursuit of the above objectives, library and periodical research and a survey of potential information sources were conducted. The survey revealed that the Advanced Research Projects Agency (ARPA) of the Department of Defense and the National Science Foundation (NSF) had funded projects which issued in March and November 1973 final reports entitled Threats to Computer Systems and Computer Abuse, respectively. With the results from the survey and from the examination of these reports

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the decision was made to modify the objectives of this research.

The reports of the funded computer abuse-threat projects included all known cases of computer fraud up to the publication dates. The questionnaires used to collect data for the ARPA and NSF projects, however, were not designed to capture information items that had been contemplated as necessary in fulfilling the objectives of this author's research. Accordingly, the ARPA and NSF reports did not contain information on the amount of recovery through fidelity bond, liability insurance and/or court-awarded claims; on the CPA's role (if any) in the particular situations; on the weaknesses in internal control; or on the weaknesses in auditing procedures.

Since it was not considered possible to duplicate survey coverage of the participants in the funded projects,[4] this author's research objectives were altered slightly. Emphasis was placed on trying to determine the risk of computer fraud exposure for the CPA and on evaluating the auditing profession's acknowledgement of the computer in terms of auditing standards and accepted responsibility. However, the original, and still the chief, hypothesis of this study is that the CPA has a greater degree of responsibility for the prevention and detection of computer fraud than the auditing profession currently accepts in its expression of auditing standards relating to the subject of fraud.

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[4]Although personal funds in the amount of (approximately) $2,000 have been expended by this author in the furtherance of this research project, considerably more would have been necessary to reach the levels of funding available to Stanford Research Institute under the ARPA contract and the NSF grant.

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In Chapter 1 the developments in accounting, auditing, data processing, computers and communications are briefly traced and related as components of the business and auditing environments. Then the methods of computer fraud as seen by several authorities are enumerated. The losses from employee dishonesty in dollar amounts are considered as a prelude to computer fraud impact in dollars and on the auditing profession.

The primary thrust of Chapter 2 is toward developing an awareness of the extent and diversity of computer fraud cases, which are summarized in Appendix A, and of the problem of collecting information about computer fraud cases. The results of the survey of information resources are summarized here with details in Appendix B. Some excellent suggestions and noteworthy comments from survey respondents are included. Some existing "fraud" reporting systems are noted.

Chapter 3 details the important findings of the literature search. The significant early literature on auditing and EDP is identified as well as references pertinent to a study on computer fraud as contained in the Accountants' Index and Subject Guide to Books in Print 1974.

The material in Chapter 4 is presented in such fashion that definitions and interpretations from the pre-computer era and non-computer sectors form a foundation for development of an understanding of "computer fraud" as it is interpreted today. Legal, layman, and auditor definitions and interpretations of fraud, embezzlement and white-collar crime are developed as a prelude to consideration of computer

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fraud terminology in the literature.

The primary purpose of Chapter 5 is to attempt to determine an index of a CPA's exposure to computer fraud. Several parameters--namely, numbers of computers, of terminals, of employees in direct computer occupations, of business firms, of CPA firms, and of computer fraud (abuse) cases in the several industry divisions--are used to illustrate some relationships for the development of a model.

Against a "backdrop" of eras in the auditing evolution, Chapter 6 traces the development of auditing standards and audit objectives. Computer auditing skill levels are examined in the light of knowledge and proficiency considered necessary by some early-on EDP authors as well as by several AICPA task groups. The AICPA position on acceptance of responsibility for the detection of fraud is traced and the public's doubts about that position are noted.

Chapter 7 summarizes the findings of the research effort in terms of the study objectives and hypothesis. The AICPA position in regard to audit standards and EDP expertise is noted. The search for a solution also includes identification of generalized computer audit programs and the details of such a survey in Appendix C and Appendix D, respectively. Conclusions and recommendations based on research results are offered. Essentially, it is deemed necessary for the CPA to enlarge his responsibility for fraud detection with beginning steps involving a computerized information retrieval system and the offering of a separate service for computer fraud detection.

As indicated earlier it will be necessary first to briefly

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picture the development of accounting systems, data processing, computer and communications technology, and adaptation of auditing to these changes in the business environment. Current accounting systems stem from developments that have spanned more than five centuries. Historical documents reveal, however, that accountability records were maintained in some fashion--clay tablets, stone, or wood--as early as 2,000 B.C. The coordinate function of auditing also appears to be ancient in origin. There is evidence that audits of records were accomplished as early as nine centuries ago. As one might suspect, accountants and auditors in early times held a common set of skills and knowledge; nearly all auditors served apprenticeships as accountants.

Although it is recognized that great contributions to the development of early accounting systems were made by individuals of diverse background and geographical origin, the single most important accomplishment may well have been the documentation of double-entry bookkeeping by Pacioli in 1494. Throughout these nearly five centuries of use, the basic accounting systems have retained some of the rather simplistic characteristics described by Pacioli. Individual journal or account entries are still defined as either debits or credits. Today, as in yesteryear, the basic accounting equation requires that debits equal credits.

Accounting encompasses every aspect of an entity that can be expressed in terms of money.[5] Thus, all economic events relating to

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[5]Committee on Terminology, Accounting Terminology Bulletins, Number 1, Review and Resume (New York, N.Y.: American Institute of

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assets, liabilities, ownership, revenue and expenses must be recognized and recorded. Accounting data include the debit and credit descriptions of all transactions stemming from the entity's set of economic events. In some cases, accounting data may include quantitative descriptions in terms of physical units of certain entity resources which must be controlled. Maintenance of an accounting system has traditionally entailed recording the accounting data details of the pertinent transactions on business documents or vouchers; journalizing and posting the debit and credit entries to appropriate books of account in accordance with an established account structure and generally accepted accounting principles; and preparing reports which summarize account balances or activity in the format of financial statements (to be furnished) to users.

The auditing function has kept pace with the accounting function. There is still a common ground for accountants and auditors for a set of appropriate skills and knowledge, but each may require some additional set. Today, auditors may enter directly into that field of endeavor. Some auditors use such training as a springboard to higher-level accounting positions. Each of the two functions may provide its own career pathing. Each may be classified as having two major areas of interest.

Accountants, 1953), p. 9. This bulletin notes that "after extensive consultation and careful consideration, the committee in 1941 formulated the following definition: Accounting is the art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof," and further notes that "after the passage of more than ten years, this choice of broad but significant language continues to seem wise, and the definition to appear comprehensive as well as succinct."

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Accountants may be either the financial or management variety. Auditors may work in either internal or external audit capacities.

Over the years, accountants have added refinements to both the physical and conceptual structures of the basic accounting system, as the volume[6] and variety of transactions increased and as the need for a change in accounting objectives was perceived. Since the turn of the century, developments within the accounting and auditing disciplines have had considerable impact on the thrust of the respective segments. The beginning of "big business" led to the development of the public accounting[7] (auditing) profession. Expansion of business resulted in increased "economic event" activity. Manual methods of handling accounting data were recognized as being inadequate. Ingenuity and technology teamed to provide mechanized and automated equipment suitable for accounting work.

Although it is impossible to include here all critical events in the advance of data handling and processing techniques, some of the

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[6]For example, for the years indicated transactions for selected items were:

	1940	1955	1970
Checks written	1.2 billon	2.1 billion	7.2 billion
Telephones in use	19.3 million	56.2 million	120.2 million
Airline passengers	3 million	42 million	171 million
NYSE transactions	282.7 million	820.5 million	3.2 billion

Source: Table 3-1, Databanks in a Free Society by Alan F. Westin and Michael A. Baker (New York, N.Y.: Quadrangle/The New York Times Book Co., 1972).

[7]Committee on Terminology, loc. cit. "Public accounting is the practice of this art by one whose services are available to the public for compensation." In this reference, "art" refers to the previously defined "accounting" as set forth in footnote 5.

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key inventions and their applications will serve to highlight and illustrate the transition from manual to automated accounting operations In 1914, the Sundstrand 10-key adding machine was produced and the Monroe calculator was invented. In 1936, the U. S. Social Security Administration installed IBM punched card equipment. By 1950, mechanical equipment was being used in all phases of the processing of accounting data. Much of the equipment was keydriven and electric energy was being used to power the larger desk-top equipment items and bookkeeping machines. After 1950, there was a rapid expansion in the use of punched card equipment. In mid-1951, Univac I was installed as the first commercial computer at the U. S. Bureau of Census. In late 1954, the first IBM 650 electronic data processing machine was delivered to a customer.[8]

For the purposes of this study, the time spans and the processing techniques involved are of considerable importance. In combination, these factors highlight the momentum of technological advances. Let us now consider what has happened as a result of the coming of the "machine age" in relation to the handling and recording of accounting data. Today relatively few accounting systems are maintained on a strictly manual ("written-by-hand") basis, whereas in earlier systems manual techniques were utilized exclusively. Accordingly, it is reasonable to say that the change in the techniques of processing accounting data involve the degree to which some form of mechanization or automation equipment

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[8]"EDP Almanac 1642-1971," Data Management, January, 1972, pp. 26-28.

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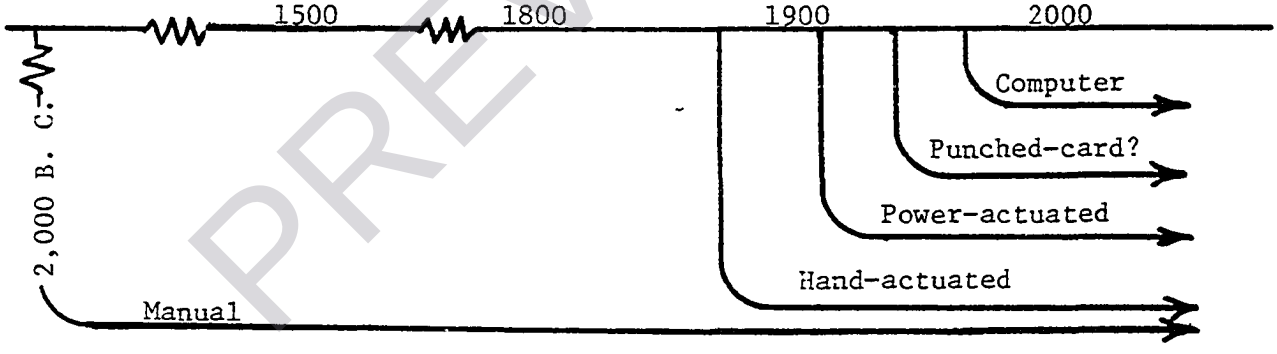
has been employed. Essentially, the combination of these techniques with the evolving equipment capability can be identified as stages of a continuum. These stages may be appropriately labeled by terms that highlight a distinctive characteristic or feature: manual, hand-actuated, power-actuated, unit record or punched card, and computer. All are still in use today; however, it is anticipated that the punched-card approach will eventually be eliminated.

Since all of these stages and the concomitant procedures should be included in any general description of data processing, it seems advisable here to illustrate (schematically) the momentum of the technological advances affecting accounting data processing.

CONTINUUM OF TECHNIQUES AND EQUIPMENT USED TO PROCESS ACCOUNTING DATA



Today, data processing books seem to proliferate as new (and even some repeat) authors profess to have found a new approach to explaining the subject. Most have in common, however, a statement to the effect that data processing is an activity that is ancient in origin--only the term may be new. A few acknowledge accounting as the antecedent.

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Similarity is also found in how the various authors describe the steps involved in data processing. Although even the most casual reader would surely note wide disparity among the authors in respect to the number of steps delineated in describing data processing in detail, the concept and terms are essentially the same throughout all the works. Some authors define data processing as consisting of nine steps; others use as few as three steps.[9] This author believes that all may be generalized into the following: Capturing, conversion, classifying, processing, storing, retrieving, and communicating.

The computer, as a data processing device, is one of the most important technological developments of the twentieth century. In less than three decades, we have seen the field grow from a handful of experimental machines to a point where the manufacture of electronic data processing (EDP) equipment is considered a major industry. In that short time span we have seen at least three generations of computer hardware and computer software as a result of technological breakthroughs.

Though the various data processing authors are not in exact agreement as to the beginning dates and life spans of each generation, there is at least a general concurrence. For the purposes of this study it is important to recognize the major changes in the technological features of each computer generation. Each such technological advance caused a change within one or more of the data processing steps and was

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[9] Recall that accountants have defined accounting as the "art of recording, classifying, and summarizing . . ." (see footnote 5). Some data processing authors use those same three terms.

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thus potentially of significance in applying auditing procedures to those steps. Table 1-1 summarizes the most important features marking the evolutionary process in the development of computers.

TABLE 1-1

EVOLUTION OF COMPUTER TECHNOLOGY

First Generation	Second Generation	Third Generation
	HARDWARE	
Year Introduced: 1951	1959	1964
Type: Special Purpose	General Purpose	Multiprocessor
Electronics: Vacuum Tubes	Transistors	Integrated Circuits
Memory Capacity: 2-4K words	10-20 Million Characters	100+ Billion Characters
Speed: Milliseconds (1/1,000 sec.)	Microseconds (1/1,000,000 sec.)	Nanoseconds (1/1,000,000,000 sec.)
	SOFTWARE	
Year Introduced: 1951	1954	1964
Operations: Instructions	Executives	Systems
Languages: Machine & Assembly	Compiler	Interactive
Files: Sequential	Sequential	Random

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TABLE 1-1 (continued)

NOTES: (A) Hardware and software generations do not necessarily coincide. For example, second generation software was not restricted to second generation hardware. This author completed an Assembly Language course in 1958 for the first generation IBM 650, and an Assembly Language course and a Compiler Language course in 1962 for the second generation IBM 7090. Generally, software capability has tended to lag hardware capability.

(B) Some data processing authors claim a third and a half or fourth generation was introduced in 1970, when further circuit miniaturization was achieved and a tie-in between computer and data communications systems became economical. Others believe the fourth generation will be introduced in the 1978-80 time frame, when distributive network systems will become popular.

(C) A few computers were in existence prior to 1950. The first effort to build a computer actually began in 1937.

(D) In EDP parlance "K" equates to 1,000. Since different computers have different word sizes in terms of number of characters, storage capacity is often referred to today in terms of the basic data unit, the character.

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Each generation (or stage) of development furthers the proliferation of computers as the increase in "power," the decrease in cost, or a combination of these factors attract more users.

During the decade of the Sixties the growth pattern was fairly consistent within the computer-size classifications of small, medium, and large. These segments consistently accounted for about 14 percent, 83 percent, and three percent of the computer installations. In general, the ranges for these classifications were based on monthly rental costs. Although a variety of scales was used by different

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writers, a common one had breakpoints at $5,000, $25,000, and $100,000 per month rentals, respectively.

By the early 1970s, however, computer technology was having an impact on that pattern. Minicomputers had been proved feasible, adaptable and economical--especially when used as a control and/or communications computer. The "minis" earned the name in part from their physical size and in part from the cost aspect--a common definition used a $25,000 purchase price for the basic machine as the upper limit of the mini-size classification.

The growth rate of data communications has been nothing short of phenomenal. The Bell System network has experienced an increase in such traffic of an average of 50 percent each year. It is projecting a tenfold increase in data transmission revenues within the next decade. The Bureau of Labor Statistics Bulletin, 1826, Computer Manpower Outlook (1974 edition) notes, ". . . growth trend in data communications . . . estimated to be 50 percent annually."

Competition seems to be "spurring" the data communications field as the industry widens. Western Union is expanding its offering of data communication services. The Federal Communications Commission has recently given approval for additional common carriers and several companies are already either in operation or under development. Some computer service companies offering time-sharing (T/S) have elected to create their own data networks in a bid to expand clientele in numbers and in geographic distribution. Thus, T/S client users in widely spread cities may use the common, central

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computer simply by dialing a "local" telephone number.

Data networks may provide only transmission services or they may be the link to computer data processing. Prior to the 1960s, data communication had been available for many years in the form of teletype. This capability was used primarily for transmitting telegrams and operated chiefly point-to-point via stations connecting intervening line segments between the sending unit and the desination unit. Newer applications involve many different kinds of terminals and usually route transmissions through a "store-and-forward" message switching system. These new systems often use minicomputers to control communications with a large central computer which is used for data processing.

Familiar examples of applications which use large numbers of data terminals and widespread data communications systems are found in airline reservation systems, credit checking systems, and hotel/motel reservation systems. Within these systems, the cathode ray tube (CRT) display and keyboard terminal is probably most common and should be readily identified by the auditor--as a traveler if not as an auditor. However, there is a variety of terminals. Jancura distinguishes three main types of commonly used devices: Document transmission terminals, human-input terminals, and answer-back devices and display. Examples of some common terminals that fall within one or more of these categories are: Paper-tape reader, badge reader, display screen, graph plotter, keyboard, teleprinter, light pen, and Touch-Tone phone.[10]

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[10]Elise G. Jancura, Audit and Control of Computer Systems (New York, N.Y.: Mason/Charter Publishers, Inc., 1974), p. 243.

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