Working Paper Automation:

An Audit Decision Support Tool

Miklos A. Vasarhelyi

Graduate School of Business

Columbia University

This paper is in preliminary form and should not be quoted. Comments are requested. The research assistance of Messrs. Thomas Verghese and David F. Bacon is appreciated.

ABSTRACT

This proposal describes a two phase project to develop the fundamentals of computer based audit workstations. The first phase encompasses a process study and feasibility assessment while the second phase entails acquisition of hardware and the development of the operating software of part of an Audit Decision Support System.

The first phase will develop the theoretical concepts and practical considerations that will enable the development of an audit automation system. It entails preliminary process work and a feasibility study. The second phase will consist of equipment acquisition, familiarization, interfacing with the Columbia University systems, and actual development of the system. The first phase will be the conceptual foundations on which the second phase of development will be based. This paper lays out the stages in the two phases, an approximate time-table and estimated costs.

INTRODUCTION

The auditing profession has been notoriously slow in incorporating modern technologies into its accepted practices. In other fields e.g. banking, stock brokerage [4], law [9] some of the new technologies have been explored and in certain cases actually implemented. This paper takes the position that it is in the best interests of auditors that they begin investigating and utilizing the new technologies arising from the research to set up auditor oriented office information systems. Bailey et al [1] in their paper on office automation consider the rationale of developing such auditing automated OIS. They state that the growing complexity of organizations makes traditional auditing by means of flow charts and laborious narrative descriptions obsolete and that this difficulty can be overcome by judicious use of the computer. They also consider two important advantages to automated auditing, namely,

1. The speed, precision and cost of computer processing compares favourably with its human counterparts.
2. Interfacing an automated auditing and internal control system with an OIS will result in a nearly continuous audit, considered to be ideal in auditing literature.

Among the many phases of the audit process that could benefit from the incorporation of modern technologies is the preparation of audit working papers. Experience from other fields such as medicine [6] has shown that standardization and automation can substantially abbreviate and improve the quality of professional work. Despite considerable effort in firm rules and the issuance of professional standards there has been no major technological breakthrough in the way audit working papers are prepared, in spite of the considerable advances in the fields of word processing, text formatting, information retrieval, computerized document storage and telecommunications. The preparation of working papers constitutes a major proportion of the audit effort and is an area where substantial economies can be effected by automation.

The project described in this paper is an initial attempt in the development of an automated internal auditor work station. The system is seen as a major new tool to enhance and support traditional audit skills and is a synthesis of the new information technologies among them being automated filing systems, information retrieval, telecommunications and artificial intelligence. It takes the view that the automation of work papers is the first logical

step in the construction of the work station. The construction of working papers entails the gathering of information, its organization, the linkage and search for related information and totals and its storage on an accessible and secure medium. Independent workstations, with communication capabilities, wordprocessing and algebraic facilities have hardware and software components. Appendices A and B contain some thoughts on the hardware and software modules that will need to be acquired or developed.

STAGES OF THE FIRST PHASE

The first phase of the project, oriented towards the assessment of the problems and feasibility of the research project would encompass:

1. Process study. A set of visits, interviews and collection of data at three organizations' internal auditing departments in order to build a picture of the process of working paper development, techniques, difficulties and costs. Existing working papers will be analyzed for commonalities, language and relationships between various parts. Three institutions, Phillip Morris, Phelps Dodge Inc. and the Metropolitan Museum of Art in New York city have tentatively discussed participating in such a project.

2. Construction of standardized working papers. The findings of stage one will be used to formulate concepts of standardizing working papers and to actually build a set of standardized working papers.

3. Study of state of the art hardware technology. Criteria for auditor work station hardware selection will be set out in this stage. The researchers will search for a state of the art processor that will replace current Z80 and 8088 technologies in the next generation of microcomputers and which fulfill the criteria developed. In this connection please see appendix A.

4. Study of state of the art software technology. Criteria (such as transportability, user friendliness and ease of interfaceability with other systems) for choice of operating system and languages for the workstation and the development of audit specific software will be set forth.

5. Design of a framework of a large variety of audit decision support software(ADSS) modules and the linkages between these modules. Some current thinking in this area is shown in Appendix B. See also Ward [10] for other thoughts in this area.

6. Detailed design and specification of the working paper automation(WPA) systems and details for the proposal of phase 2. This will comprise statements of intent and procedure.

OBJECTIVES FOR THE SECOND PHASE

Based on the results of the first phase and the approval of the sponsoring entity, the second phase would be aimed at:

1. Development of a working version of the WPA. In this stage, equipment would be acquired based on the criteria developed in stages 3 and 4 of phase one. In this stage, the results of the first stage of phase one would be used to construct the machine implementable set of standardized working

papers based on a real life situation. Such an implementation would allow the internal auditor to call up previous work papers based on key word searches, machine analysis of previous years data, access to auditor specific data bases for analytical review, audit diaries, audit program development aids, scheduling schemes, and current working papers development among other functions.

2. Real life testing on site. The work station and its software functions will then be field tested by using it as an internal auditor decision aid in an organizational setting.

3. Presentation of research findings. Several presentations at both academic and non-academic venues will be one of the vehicles of public dissemination of research findings.

4. Ongoing research. The equipment and the body of knowledge that will result from this project can be used to set up an auditing research cell as part of the accounting research center at Columbia University. This cell will provide ongoing support for systems developed at the Center as well as act as a focal point of further research in this area. For a list of potential projects in this area please refer to Appendix B.

RESEARCH OUTCOMES

The study in phase one should lead to the publication of a concept paper in a leading academic journal. A second paper dealing with the criteria and findings of the research team on hardware and software availability will be submitted to a scholarly journal in the applied systems area. It is felt that the entire project outcome can be developed into a

monograph under the auspices of the Institute for Internal Auditors.

The building of the prototype system in phase two of the project will establish, it is hoped, the state of the art in computer based audit technology. The establishment of an audit research cell as part of the accounting center at Columbia University should serve as a focal point of collaboration between academe and industry. The system developed in the project will be supplied to a selected set of organizations for site testing in their audit departments.

TIME SCHEDULES

Item	Time
Project begins.	t
Process study- data collection	t + 2
- analysis	t + 3
Construction of standardized working papers.	
- concept development	t + 4
- construction of standardized work papers.	t + 5
Hardware study	t + 6

Software study	t + 6
ADDS(Audit decisions support systems) framework design	t + 7
Detailed design and specification of WPA systems.	t + 9

All numbers given above are in months. Resumes of the proposed members of the research team are at appendix C.

BUDGET

The detailed forecast costs for the seed project(phase 1) is presented below.

Principal Investigator	$4000.00
Research Assistants(two)	6000.00
Miscellaneous(incl. computer time, telephones, mailing costs, secretarial help)	2500.00
Travel(interviews/document coll)	2000.00
total	$14500.00

CONCLUSION

This proposal has laid out the rationale and a plan of action for developing state of the art audit technology by

use of the computer. The many advantages of the work station concept including their relatively low prices, their inherent modularity thus allowing flexibility in expansion plans and the increase in staff efficiency merit serious consideration as to their suitability in the field of auditing.

The usage of audit automation tools will substantially and inevitably affect audit cost economies. A greater change will probably be the effect on the nature of audit procedures and techniques. This project is a state of the art attempt in this direction and may substantially affect future thinking about the audit process.

Appendix A

Some hardware criteria

The work station concept requires hardware that is capable of data processing, text processing and graphics. Because the component configuration of each of these functions taken individually requires trade-offs in processing speed and cost the ideal configuration would be one that had been extensively researched. The criteria for hardware selection will be based on the design philosophies of existing systems. For example, the SUN work station being developed at Stanford University over a period of four years will be one of the systems studied. The SUN uses the Motorola MC68000 processor. The Motorola is the most advanced commercially available CPU and Motorola claims that introduction of an even more advanced version in 1983 is possible. The MC68000 is approximately four times as fast as the Intel 8088 used in the IBM Personal Computer and has thirty-two times its memory addressing capacity. The SUN runs the UNIX operating system, which is one of the most popular operating systems. Software availability and support will also constitute a major criterion.

Appendix B

Some software modules envisaged for the work station

In this appendix some of the modules that would comprise an overall auditor information system and decision aid are enumerated. As envisaged, the system consists of a number of dedicated microprocessors along with an in house large or mini-computer. The software for such a system should be modularised in order to ensure that system expansion can be performed easily. As envisaged at present the software modules will consist of

1. Text editor, machine readable dictionary and formatter system.
2. A statistical package. Such a package must have the following minimum capabilities.

    a. Matrix manipulation.

    b. Frequency distributions and tables.

    c. Descriptive statistics-means, medians, variances etc..

    d. Regressions - simple and multiple.

    e. Contain mechanisms for developing

        i. random variables for various distributions.

ii. curve fitting.

3. Archival capabilities. The system should be capable of storing data into archives as well as retrieval from archives.

4. Automatic monitoring of work performed for billing purposes.

5. Some graphic capabilities.

6. Some rule based inference systems on the lines of DH&S decision tables and control set.

7. An interfacing module which allows the system to work with clients' computers. This involves code conversion, file access systems and downloading capabilities.

8. Capability of working as an ITF or parallel system.

9. Help and recognition modules.

10. A work scheduler e.g. some PERT or GANTT chart facility.

11. An electronic worksheet and calculator like visicalc.

12. An "audit linker" which would allow logical definitions of fields in different work schedules, enabling the auditor to cross-reference ,index,foot and perform other audit functions.

Appendix C

B R I E F R E S U M E S

Miklos A. Vasarhelyi

Miklos A. Vasarhelyi is Associate Professor of Accounting at the Graduate School of Business, Columbia University. He has been principal investigator for two research projects for the Touche Ross Foundation on the development of TREAT, an educational EDP audit software package. In addition he has been leading Columbia's co-operation with the FASB on the development of the database 33 and 36 projects. Prof. Vasarhelyi is currently working on a project under the ROA program sponsored by the Peat Marwick and Mitchell Foundation dealing with the evaluation of internal controls.

Prof. Vasarhelyi holds an MBA from MIT and a PhD from UCLA in management. He was formerly the director of the computer center and head of the MBA program of the Catholic University of Rio de Janeiro as well as on the faculty of the University of Southern California. He has three books and many published scholarly articles.

Thomas Verghese

Thomas Verghese is a doctoral student at Columbia University at the dissertation stage. His research interests deal with the representation of internal control and office automation systems with particular emphasis on auditing systems.

Mr. Verghese holds a B.S.E.E. from Madras University, an M.S.Accy. from the University of Houston.

David F. Bacon

David F. Bacon is an undergraduate student at Columbia College. He is also currently working as a consultant at the Columbia University Computing Center. He has extensive programming experience in both commercial and scientific settings.

Evelyn Faillace

Evelyn Faillace holds a BA from Barnard College and an MBA from Columbia University. She works as a fulltime researcher on the FASB 33 and 36 database projects.

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