Usage of technology in audit: A case study with a large Audit Firm[[1]](#footnote-2)

Miklos A. Vasarhelyi

Rutgers the State University of New Jersey

miklosv@rutgers.edu

Silvia Romero

Montclair State University

romeros@mail.montclair.edu

Usage of technology in audit: A case study with a large Audit Firm

## Abstract

Accounting information systems are ubiquitous in today’s business, supporting most of its operational functions. Since their review and assessment is necessary and appropriate software tools are now available, this paper asks: Do auditors use the available technological tools? What are the difficulties they find? Are there mediators to facilitate usability?

Through a cross sectional case-based field study comparing four engagements in a major audit firm, this paper finds that the characteristics of the audit team determine the levels of technology adoption. However, quality integration between technology support teams and auditors may improve usability and consequently increase technology adoption.

**Keywords:** audit tools, audit technology, usability audit

## Introduction

The potential of technological tools, and the progressive digitization of business, has changed the way external audits are conducted. The increasing ubiquity of accounting information systems has made it necessary enhance the auditor’s toolset and to include specialized teams to evaluate those systems throughout the external audit. Dowling [1], looks at factors that determine the appropriate usage of technological tools; and Dowling and Leech compare the audit support systems used in five big audit firms. In this paper, on the other hand, we focus on tool usage and their conditionants. We also discuss what are the difficulties found in system implementation and tools to facilitate usability. These questions are investigated through a cross sectional case-based field study comparing four audit engagements. The following section reviews the literature, the ensuing section discusses the methodology, and the final two sections address findings and conclusions.

### Conditions that favor usage of technology

In this section we examine the determinants of technology usage. Then, by conducting interviews with audit teams, we inquire why available technological tools are not used. Further analysis leads to suggestions concerning tools to improve the levels of usage.

#### Manager’s attitudes, beliefs and social environment

“Many times users do not rely on decision aids even when doing so would improve the quality of the decision” . For any technological tool to be adopted in an audit engagement, the audit manager must believe that its use will provide some advantage. However, auditors are often overconfident in their judgments and believe that they do not need the tool, and will adopt it only if it confirms their judgment . Different studies have examined the determinants of information technology usage. Karahanna et al. [5] present the following key constructs in the innovation-decision process:

1. Innovation’s perceived attributes,
2. Individual’s attitude and beliefs, and
3. Communications received by the individual from his/her social environment about the innovation (subjective norm). These norms are determined by the individual’s beliefs about what their peers expect from them.

Therefore, when audit managers do not have the required knowledge about a new tool and/or do not perceive its benefits, the tool will only be adopted if there is substantive pressure by peers or supervisors. Dowling [1] surveys 569 auditors of large and medium sized audit firms, and finds evidence that intention to use a system increases the appropriate use. She also finds that perceived normative pressure and auditor’s attitude influence appropriate auditor’s system usage. However, lack of knowledge about the tool might convince the auditor that s/he should rely on other evidence .

Arnold and Sutton [6] express concerns that the continued use of an intelligent decision aid might reduce auditors’ skills in the domain of the decision aid. They propose that the intelligent decision aid should become an electronic colleague; so that while individuals do not make decisions with the use of an aid, the decision aid receives feedback and maintains a dialogue that continuously helps the decision maker arrive at a final judgment. Karahanna et al. [5 p. 187] suggest “attitude toward adopting (or continuing to use) an IT tool is generated by the individual’s salient beliefs about the consequences of adopting (continuing to use) the tool (behavioral beliefs) and evaluation of these consequences.” Attitude was also found to influence the auditor’s intention to use a system appropriately[1]. Therefore, if audit managers are not technology adopters, their beliefs and attitudes, as well as their perceptions of the attributes of the tool, might prevent them from considering it as an electronic colleague. Given the importance of attitudes for adoption of new audit tools, and the fact that auditors might not be technology adopters, it is necessary to find a mediator between the tool and the audit team to provide the necessary advice, feedback and dialogue.

#### Cost, quality and time

Other factors that affect the usability of any tool are those related to project management, known as the Iron Triangle: cost, quality and time . Klonglan and Coward suggest that sociological variables may be more important in explaining mental acceptance of innovations, whereas economic variables may be more important in explaining their use. No tool will be adopted if auditors perceive the costs to outweigh the benefits. In this stage, a mediator may also reduce the cost of adoption by helping managers to master the tools. Consequently our research questions are:

**RQ1:** Do audit teams use the available technology tools?

**RQ2:** What are the difficulties they find in using them?

**RQ3:**  How can we integrate mediators into the audit teams to facilitate usability?

## Methodology

We conduct a cross-sectional case-based field study comparing four audit engagements in a large audit firm. Our case studies are both descriptive and exploratory. In that sense, they first describe the state of technology adoption by audit teams. Second, they explore variables that affect technology adoption by audit teams such as auditor team characteristics, collaboration and training, as well as issues relative to software usage and client data access. Because computer usage is currently ubiquitous, it is possible that the perceptions of users of technological tools have grown less fearful and more confident. These factors may have changed the determinants of usability mentioned in the literature reviewed.

Yin defines a case study as an empirical enquiry to investigate facts in its context, and states that the case study’s unique strength is its ability to deal with a variety of evidence (documents, artifacts, interviews and observations) and to detect missing constructs. An exploratory study utilizes a method that supports the building and development of theory as opposed to methods directed to testing theories (Arnold ; Rom and Rohde ). Lillis and Mundy try to close the gap between case studies and surveys by pointing out advantages of cross-sectional field studies. Consequently, it is reasonable to use a cross-sectional study with four different audit engagements to compare differences in adoption of technology among teams.

Although interviews were the primary source of information, we also collected information from several documents, including working papers. The audit teams interviewed (10 interviewees in total) work for a large external audit firm and were selected from a pool specified *a priori* by one of the firm’s partners. Since we were interested in adoption difficulties and enablers, we selected large engagements in different industries to evaluate any special difficulties in adoption due to industry related factors. The interviews were conducted by two researchers via face-to-face sessions when possible, or conference calls. The general questions focused on determinants of technology adoption and group relationships. We used a semi-structured approach, starting with a set of questions that was extended according to the circumstances of the interviews. The interviews were recorded and transcribed.

### Characteristics of the different teams interviewed

The forensic and IT consultants[[2]](#footnote-3) interviewed had different backgrounds. While some of them had Masters degrees in Information Science, others started their careers in accounting, and became interested in IT after being trained by the audit firm. Some of the audit managers were interested in testing new technological tools; they used the software themselves, and went to training sessions when new tools became available (technology adopters). Others were more reluctant to test new tools (not technology adopters). Figure 1 presents the industry of the company being audited and the characteristics of the audit manager and supporting team consultants.

Figure 1

|  |  |  |
| --- | --- | --- |
| IT Manager Accountant | Insurance Company |  |
| IT consultant MSIS | Bank CompanyChemical Company | Manufacturing Company |
|  | Auditor Technology Adopter | Auditor Not Technology Adopter |

Figure

Cushing & Loebbecke’s represented the audit process in six main activities:

1. Pre-engagement

2. Planning

3. Compliance testing

4. Substantive testing

5. Opinion formulation and reporting

6. Continuous activities

During the first year of an engagement, the audit process is different from subsequent ones,(Arens and Loebbecke [14]), due to a lack of knowledge of the client’s operations and the need to check additional information (e.g. beginning balances of accounts). None of the teams interviewed were in the first year engagement. Consequently, we exclude first year activities from the analysis and focus on the planning stage. These activities involve obtaining knowledge of the business, preliminary estimation of materiality, review of internal controls, and development of audit plan ([13], page 6).

Since the interviewed teams were involved in recurring audits, all the auditors had previous knowledge of the business and estimated materiality. However, the manufacturing company had changed its ERP system, which required additional work. This problem was solved by involving the forensic team, as will be discussed later in detail. In order to review internal controls, the audit firm, has a structured approach to utilize support teams. Figure 2 presents this structure. Auditors in this firm, follow audit planning templates with specific questions about the engagement that determine the need of involving specialty teams such as computer audit or forensic. When deemed necessary, the IT support team checks application controls of the client’s systems before the audit team starts its assessment. This check is more thorough when there are changes in systems or controls from the previous year. Once the controls are checked, and the support IT team reports their results, the role of this team varies across the engagements. The participation of the forensic team requires budget and a request from the audit manager.

Figure 2- Audit teams participation in a typical audit

Review of internal controls

Requires IT?

IT Team

Engagement

Requires forensic?

Forensic Team Engagement

Audit Team

Engagement

Y

Y

N

N

## Findings

### Characteristics of the companies audited and the software used

Table 1 depicts the industry type, audit engagement characteristics, and key software usage information for the four target firms.

Table 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Industry | Insurance | Chemical | Manufacturer | Bank |
| ERP system used  | ORACLE | SAP | ORACLE | SAP |
| Characteristics of the engagement | Some presence year-round. Support IT team checks internal controls and works with auditors throughout the audit. No reliance on the company’s internal controls; they make their own tests. | IT Support team checks the internal controls before they start the audit. Auditors do not request support of technical teams because of their expertise with audit software. | The company switched ERPs in this period. | Audit team finds their work facilitated by the client having an ERP system because all the data is in the same source. More consistency in the data. |
| Use of word processor and spreadsheets | YES | YES | YESAudit manager sometimes prefers manual reports. | YES |
| Use of email and electronic file transfer | YES | YES | YES | YES |
| Use of audit software for data extraction | YESJournal extraction performed by the client with script provided by auditors. Auditors use their own laptops. | YESData extraction performed by the client with script provided by auditors. Audit team uses own laptops. | YESData extraction performed by the client with script provided by auditors.  | YESData extraction performed by the client with script provided by auditors.  |
| Use of audit software for SOD | YESData extraction done by the client with script provided by auditors. Audit team uses own laptops. | NO | NO | YESUsed in a pilot SOD. Multiple rule-based errors.Managers would not rely on the results. Don’t expect to use in the future. If the internal audit used it, they would leverage their work only if they could map the risks with the financial statements risks they are worried about.Can get same result with other tools. |
| Use of software by forensic team | Not mentioned. | YESTo test manual transactions in their own server. | YESThe audit team engaged forensic.They rely more on forensic than on any tool they can use themselves. | YES |

### Determinants of technological tools adoption

The interviewed audit managers are CPAs with an accounting undergraduate degree and an average of 4 years in the audit firm. When hired they are not required to have previous systems knowledge. However, the firm has intensive training programs, and requires auditors to complete the corresponding module (s) before using any specific tool. When new software is introduced, it is communicated to the auditors via email. Auditors are free to decide whether to adopt the software.

We found that the usage of those tools depends on the characteristics of the auditor and also on the integration of the support teams. If the auditor is interested in technology, when those tools are presented, s/he enrolls in training or gets information about the benefits it would bring to the audit. When the auditor is not a technology adopter, use of new tools is driven by the supporting team (IT). This relationship between IT and audit managers seems to be stronger than the simple suggestion of new technological tools. The ensuing anecdotes illustrate:

* In one of the teams, where the IT consultant had an accounting background, his work was more integrated with the audit team, and he collaborated to present and facilitate access to the available tools. He seemed to understand better what the auditor needed and how to make the tools useful by facilitating the access to them.
* In the other three companies where the IT consultant had a background in Information Science, the participation of the support team was limited to testing the client’s controls. In this situation (auditor technology adopter and support team with no audit background), the audit teams were more reluctant to use new tools and limited their use to spreadsheets, word processors, email and electronic transfer of documents and files. When the audit managers were technology adopters, although they had knowledge of the capabilities of the new tools, the software was not adopted due to the cost (time required to implement it successfully) and attitude (feeling that the results would not change in terms of findings).
* When the audit manager was not a technology adopter, he did not respond to emails announcing new tools and showed no interest in determining the advantages it would bring. Although this audit manager used spreadsheets, word processor, email and electronic transfer of documents, he expressed his preference for hand written reports and documentation.

### Reported issues faced by the audit teams

All the audit teams were concerned with client collection of the data. The fact that the client is in the middle of the data extraction process causes concern to the audit teams, all the interviewees would prefer independent data access

* One example of the problems audit managers faced relates to the implementation of audit software in service companies. Both teams interviewed in this industry (insurance company and bank) started using the software to test for segregation of duties (SOD). In this specific example, the success in implementation varied according to the relationship between the IT support team and the audit team. The standard rules embedded in the software are appropriate for manufacturing companies. Therefore, difficulties were found when the reports indicated hundreds of violations of SOD that were only related to manufacturing rules.
	+ In the insurance company, where the audit manager was a technology adopter and the IT consultant had accounting background, both teams worked together in producing the necessary rules and analyzing the violations to determine which of them were due to real internal control deficiencies. The implementation was a success and they expect to extend the usage of the software to other areas in the future.
	+ In the financial institution, on the other hand, the audit manager was a technology adopter, but the IT consultant had no accounting background and little involvement in the audit engagement. The audit team applied the standard rules, finding hundreds of meaningless violations. Because there was no IT involvement, they found themselves overwhelmed. They ended up eschewing the software and relying on other evidence. It appears that the IT consultant was unaware of the auditors’ needs, or that the audit managers did not think that IT was needed, since they could use the tools by themselves. As a result, the audit team did not find the software helpful, and decided not to use it again. The audit team believes that specific rules (a tailored approach) would enhance the results and usability of the software, but they do not think the effort is worthwhile since they have other alternatives to get the same results. This finding relates the low level of usability with cost and attitude factors.

### Perspectives for the future

Vasarhelyi et al. [15] used the modified Delphi method ( and ) to predict the effect of technological changes in auditing in the next ten years, which will determine how the audit will be done and the level of training needed for auditors. One of the key findings in that study is the need to shift from the current sampling-based audit to a model that includes continuous monitoring of all transactions, error reporting and immediate response. They discuss that the development of such an audit will reduce the time necessary in identifying risks, since external auditors will rely on the work of internal auditors, and allow more time for interpretation of the results. They also envision the use of XBRL-formatted data to examine similar risks among clients in the same industry, and the use of resources like sensors, biometrics and voice recognition as tools for evaluating evidence. Therefore, the envisioned audit of the future relies on technological tools, and requires access to quality data.

At the end of the interviews, we asked auditors about what changes they need and how they envision audit in the near future. Their answers can be classified in the following categories:

1. Have access to the client’s data independently. They understand that measures have to be taken to guarantee the security and privacy of the data. The interviewees do not expect it to be easy to obtain, but they report it as one of the main concerns and a first step necessary to guarantee data quality with the automation of audit envisioned by [15].
2. The development and update of electronic working papers. As discussed in the general adoption of software, this need is related to the technological sophistication of the manager. The manager with little interest in technology, for example, finds that the whole team produces better results when they have to read and work on paper. His technological needs are limited to transferring files. In general, however, managers find it helpful to have electronic working papers in order to facilitate the production, review, storage and transfer of documents.
3. Training is considered to be appropriate by all the interviewees. However, they would appreciate more formal communications about available technological tools as well as the applications, and advantages.
4. Regarding how they envision audit in the future, the scenario is similar to the one depicted in the aforementioned study [15]. All managers agree on the importance and benefits of continuous control monitoring of all transactions. However, although they expect it will be implemented, they believe it will take time, because companies are currently concerned about the financial crisis and therefore reluctant to make new investments.

## Conclusions and limitations of the study

This study examined four engagements within a large audit firm. It aimed to increase understanding of the deployment, usage, and enablers of technology adoption in day to day practice. It was observed that although there are audit-specific software tools, those tools are not fully used for a variety of reasons. Cost of adoption relative to time required to effectively internalize and utilize the tool, in addition to auditor attitude, were found to influence the levels of adoption and usability. We also found that the inclusion of an integrated IT support team that assists auditors in understanding and adjusting the tools, acts as a facilitator to adoption. In our sample, the accounting knowledge of the supporting IT consulting team manager facilitated adoption since he could understand what the auditors needed. We presented the difficulties auditors face when using technology, such as access of independent data, and their expectations for the future. Given the importance of data quality, concerns expressed by the interviewees, and expected development of audit in the future, it is necessary for auditors to access data independently. The interviewees acknowledge client concerns about allowing external sources that might affect their data, and express the need for a nonintrusive extraction method to guarantee data integrity and quality.

Although this study includes interviews with participants in only four engagements, it provides an understanding of the difficulties found when audit teams use technological tools. It also provides relationships found to facilitate usability, which can be used to establish hypothesis related to the determinants of usage of technological tools by audit teams, and extend the knowledge base relative to the effect of team relationships in audit engagements.

Different audit firms have varying cultures, practices, constituting employee competences and emphasize the use of technology differently. As such, we suggest an expansion of the survey to several audit firms including both Big 4 and non-Big 4; different types of audit proctices, and different employee teams.

# References

[1] C. Dowling, “Appropriate audit support system use: the influence of auditor, audit team, and firm factors,” *The Accounting Review*, vol. 84, 2009, pp. 771-810.

[2] C. Dowling and S. Leech, “Audit support systems and decision aids: current practice and opportunities for future research,” *Internation Journal of Accounting Information Systems*, vol. 8, 2007, pp. 92-116.

[3] M. Eining, D. Jones, and J. Loebbecke, “Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.,” *Auditing: A journal of practice and theory*, vol. 16, 1997, pp. 1-19.

[4] R. Ashton, “Preassure and performance in accounting decision settings: paradoxical effects of incentives, feedback and justification,” *Journal of Accounting Research*, vol. 28, 1990, pp. 148-180.

[5] E. Karahanna, S. Detmar, and N. Chervany, “Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre- Adoption and Post-Adoption Beliefs.,” *MIS Quarterly*, vol. 23, 1999, pp. 183-213.

[6] V. Arnold and S.G. Sutton, “The theory of technology dominance: Understanding the impact of intelligent decisionʼs aid on decision makers' judgments,” *Advances in accounting behavioral research*, vol. 1, 1998, pp. 175-194.

[7] R.P. Oisen, “Can Project Management be Defined?,” *Project Management Quarterly*, vol. 2, 1971, pp. 12-14.

[8] J. Klonglan, Gerald E. And E Walter Coward, “The Concept of Symbolic Adoption: A Suggested Interpretation,” *Rural Sociology*, vol. 35, 1970, pp. 77-83.

[9] R. Yin, *Case Study Research: Design and methods*, Sage Publications, 2003.

[10] V. Arnold, “Behavioral research opportunities: Understanding the impact of enterprise systems. No Title,” *International Journal of Accounting Information Systems*, vol. 7, 2006, pp. 7-17.

[11] A. Rom and C. Rohde, “Management accounting and integrated information systems: A literature review,” *International Journal of Accounting Information Systems*, vol. 8, 2007, pp. 40-68.

[12] A.M. Lillis and J. Mundy, “Cross-sectional field studies in management accounting research -Closing the gaps between surveys and case studies,” *Journal of Management Accounting Research*, vol. 17, 2005, pp. 119-141.

[13] B. Cushing and J. Loebbecke, *Comparison of audit methodologies of large accounting firms*, American Accounting Association, 1986.

[14] A. Arens and J. Loebbecke, *Applications of statistical sampling to auditing*, Englewood Cliffs, New Jersey: Prentice Hall, 1981.

[15] M. Vasarhelyi, D. Lombardi, and R. Bloch, “The Future of Audit: A Modified Delphi Approach in 2009,” working paper, 2010.

[16] G. Rowe and G. Wright, “The Delphi technique as a forecasting tool: issues and analysis,” *International Journal of Forecasting*, vol. 15, 1999, pp. 353-375.

[17] A. Baldwin-Morgan, “Impact of Expert System Audit Tools on Auditing Firms in the Year 2001: A Delphi Investigation,” *Journal of Information Systems*, vol. 7, 1993, pp. 16-34.

1. The authors appreciate the access given to these audit teams that allowed for this research. Some data has been withheld for privacy purposes. The authors thank for the multiple comments received at the Rutgers Accounting Research forum and several other presentations in particular the comments of Mr. Paul Byrnes. [↑](#footnote-ref-2)
2. The firm (as the other “Big Four”) is organized as having separate Risk Management (IT) and forensic groups. The Risk Management group is always involved in the audit to evaluate IT controls. The extent of their further involvement is contingent on the audit manager’s perception of needs. The usage of forensic consultants is totally optional although, as in the case of risk management, there are questions on the audit planning template that may drive their participation, [↑](#footnote-ref-3)