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# Association for Information Systems Americas Conference on Information Systems Information Systems Auditor Decision Making in an Information Systems Domain

Rodger Jamieson

*University of New South Wales, r.jamieson@unsw.edu.au*

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# **Association for Information Systems Americas Conference on Information Systems**

## **Information Systems Auditor Decision Making in an Information Systems Domain**

Rodger Jamieson - Senior Lecturer, School of Information Systems  
University of New South Wales, Sydney NSW 2052 Australia  
Ph: (61) (2) 385-4414/5283 Email: r.jamieson@unsw.edu.au

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### **Summary of the Study**

Information Systems (IS) Auditors perform a valuable role in reviewing and evaluating information systems in order to improve their security, controls, and auditability. The research investigates the decision processes and strategies used by auditors when performing this task. Three components of the task are investigated, namely, auditors' information search processes, decisions made, and their explanations of the decision process.

To assist in the capture process a new research tool was developed - KASE Knowledge Acquisition System Evaluator. This tool simulates the future paperless audit automated environment, permits capturing of a full trace of the auditor's information search behaviour, and tracks decision making in a controlled experimental setting. Results of the experiment are output into a series of files used as input into SPSS for Windows for further statistical analysis and review. In addition, an auto-generated SPSS program file with definition of variables and variable labels is produced. Text files of written protocols and textual decisions are generated and then used as input to QSR's NUD\*IST program for qualitative data analysis. NUD\*IST facilitates qualitative data analysis by providing coding or indexing of the written data, text and pattern searching, and then allows theorising about the analysed text decisions, explanations and written protocols.

Preliminary results indicate that there are significant differences between the information search and decision strategies used by the experiment's two groups of auditors (information systems auditors and general auditors). Different information presentation order manipulated in the experiment induced a cognitive load on both groups of auditors and produced significant differences in the search and decision strategies used. Further analysis is currently underway and written protocols are yet to be analysed.

Potential contributions of this research include the development of a generic research tool KASE that may be used in a wide variety of research in information systems and other domains. The KASE facilities should assist IS audit researchers to understand experienced and less experienced IS auditors information search and decision behaviour as well as explanations of that behaviour. The information cue trace, decisions made and explanations from experienced auditors allows a cognitive model of the process to be constructed. This may be useful to expert systems researchers and be of assistance to novices learning in the IS audit domain. Finally this research contributes towards a theory of the process of auditing in an IS audit domain.

## **Research Aims**

The aim of the research is to investigate information systems and general auditors decision processes and strategies in an information systems domain. The investigation should provide insight into how auditors make decisions on a system's security and control, and determine what information they use in that process. The factors motivating this research include:

- lack of a cohesive body of theory which supports and explains information systems auditor decision making;
- high cost of wrong decisions made in an audit, and the potential litigation problems;
- problems of acquiring knowledge when building audit knowledge based systems;
- problems of educating/skilling less experienced auditors; and
- investigating auditor decision making in the context of the future automated audit working environment (paperless audit office).

## **Theoretical Foundations for the Study**

The value of expertise and knowledge in our society is enormous and is a commodity whose refinement and reproduction creates wealth. "Knowledge and expertise are the most precious resources for rendering audit services. The capturing, classification, and delivery of that knowledge to field auditors in an appropriate and economic way are critical to the profession keeping pace with the continually changing environment" (Graham, Damens and Van Ness, 1991, p 95).

The theoretical underpinnings of this research are drawn from the audit expertise and judgement literature (refer Bedard, 1993, for a summary; Libby & Luft, 1993 for a framework, Libby & Tang, 1994), decision processes (Einhorn & Hogarth, 1981; Simon,

1957), verbal protocols (Simon, 1985/94; Klersky & Mock, 1989), expert systems (Biggs, Messier & Hansen, 1987), memory organisation (Fredrick, 1991; Bonnor & Pennington, 1991), process tracing (Brucks, 1988; Johnson, Payne, Schkade & Bettman 1991; Bedard & Mock, 1992), and explanations of decision processes (Pennington & Hastie, 1988).

## **Research Methodology**

### **Development of the Research Tool**

The KASE research tool has been developed over the past few years, and is currently being converted to run in a windows environment. Appendix 1 outlines the benefits and hence some of the features of this research tool.

### **Subjects and the Task**

Subjects for the experiment were all practicing auditors from major accounting firms. Auditors were drawn from two groups, namely experienced information systems auditors and general auditors with one to three years of experience. For the experimental task, subjects used the KASE systems to firstly familiarise themselves with a trial case, and then solve the main case by reviewing and analysing information about a payroll information system. The other major variable besides experience that was manipulated was the presentation order of information. Subjects were randomly assigned to either a random or a structured presentation order. For both presentation orders, subject could search and choose to view and select information in any order. Subjects were also required to make several decisions, the answers to which could be changed at any time during the experiment. During the experiment, subjects could enter their thought processes as written protocols into the system. After making a decision, subjects were automatically presented with the written protocol entry screen to input their explanations for why and how they made that decision - as if they were explaining their decision to a more junior member of staff.

### **Analysis of Data**

Data was both quantitative and qualitative. Quantitative data from the basic structure of a 2x2 factorial design (expertise and presentation order) was analysed primarily by Anovas. Qualitative data is to analysed using the NUDoIST (Non-Numerical Unstructured Data Indexing Searching and Theorizing) tool.

### **Preliminary Results**

Results of the investigation so far reveal that:

- there is both a significant effect for experience and for presentation order for subjects' overall decision strategy - auditors use a much more directed search strategy when presented with a more structured order than under the random order

- treatment. More experienced information systems auditors searched less numbers of cues than general auditors.
- IS auditors take less time when performing information search of information cues than general auditors.
  - IS auditors take significantly more time to make decisions than general auditors and yet type approximately 1.5 times faster. These decisions include substantial analysis and identification of the system's control and weakness and provision of recommendations for improving the system of internal control.
  - auditors presented with the structured order take significantly less time to explain their decision processes
  - IS auditors take significantly less choice time (time taken between the end of one search and the beginning of the next) than general auditors
  - the random order treatment created a more significant cognitive load on the auditors than those receiving the structured order treatment. As the cognitive load was increased by auditors having to sort through the randomised cues, auditors opted for a simpler search strategy, namely a more "within" categories search strategy (information cues were presented in categories). On average, subjects presented with the structured order had a lighter cognitive load and used a more directed "between" category information search.
  - IS auditors are significantly more confident in their decisions than general auditors
  - while there was no significant difference in the overall internal control risk evaluation decision, auditors receiving the structured order treatment took half the number of accesses to the decision frame compared to the random treatment, and while there was no difference in time for IS auditors between treatments, general auditors took 50% less time to make the decision under the structured order presentation.

These preliminary results indicate significant differences in information search and decision strategies between auditors. Further analyses to be carried out are referred to in the next section and should provide more insight into individual differences and also why these differences occur.

## **Current Status of the Project**

The experiment has been run and the data is currently being analysed and written up. Analysis to be completed includes more indepth analysis of the search process, analysis of information cue importance, analysis of the written protocols (explanations) using NUD\*IST, analysis of the content and quality of decisions requiring written answers (such as the identification of controls and security measures in the system, and the identification of weaknesses, implications and recommendations).

The results of this analysis should be completed and written up in time to present at the conference.

## **Summary of the Proposed Presentation**

The proposed presentation would cover the following points:

- introduction to the research - aims and rationale
- research methods including a live demonstration of the KASE research tool
- live demonstration of QSR's NUD\*IST qualitative analysis tool relating to this research project (if time permits)
- presentation of findings to date and their implications
- conclusion and future research directions

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Appendix 1 was omitted to met the space limitation but is available on request.

## **Appendix 1 - Benefits of the KASE Research Tool**

The benefits of the KASE system from a researcher or knowledge acquisition point of view include:

- simulates future audit work environment
- provides a generic system for computerised research or a knowledge acquisition environment
- provides a trace of information search processes
- streamlines case creation and maintenance and gives the researcher control of arrangement of case details during experimental set-up.
- collects, analyses and reports data automatically
- optionally prints experiments for manual runs
- maintains online records of experiments and subject details
- interfaces with SPSS for Windows, and provides both data and program file (data definition)
- provides a training/monitoring facility for organisations, and
- helps to overcome the criticisms of verbal protocol analysis and the small sample sizes used in these studies.

The benefits of the KASE system from a subject or expert's viewpoint include:

- stimulates subject's interest in the experiment
- easy to navigate and use
- simulates work environment and hence subject's familiarity with both task and equipment
- uses of the system like using it.