AN INFORMATION SYSTEMS AUDITOR'S PROFILE

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Abstract: The increasing dependence upon Information Systems (IS) in the last few decades by businesses resulted in many concerns regarding auditing. Traditional IS auditing changed from auditing 'around the computer' to auditing through and with the computer. Technology is changing rapidly and so is the profession of IS auditing. As IS auditing is dependent on Information Technology (IT), it is essential that an IS auditor possesses IT and auditing knowledge to bridge the gap between the IT and auditing professions. In this paper we reflect on the auditor's profile in this changing domain, where we first define the roles and responsibilities expected from IS auditors, describe the basic IT and audit knowledge required from IS auditors based on the roles and responsibilities identified, describe the soft skills required from IS auditors to successfully perform an IS audit assignment, define the main types of IS audit tools and techniques used most often to assist IS auditors in executing IS audit roles and responsibilities and lastly propose the IS auditor's profile.

1 INTRODUCTION

In the last decade, people and businesses became more and more dependent on the use of computer applications and technology, due to the Information revolution and rapid development of computer technology (Cornett, 2004). As a result new concerns and challenges such as security vulnerabilities, fraudulent activities and the speed of transaction processing were experienced within organisations. This phenomenon also influenced the auditing field where the internal storage of data and programs created risks such as the possibility of unauthorised manipulations to data and programs, and the possibility of audit trails to disappear (Watne and Turney, 2002). On the positive side IT inspired the reengineering of traditional business processes to promote operations and improve communication within the organisation and between the organisation and its customers and suppliers (Hall and Singleton, 2005).

As stated by Ahmed (2003:20), organisations reached the point where it was "no longer possible to meet the expectations of users of financial and other business performance information without using Information Technology".

With the increasing use of Information Systems by most organisations a new audit challenge emerged. Two, once independent, professions needed to be integrated into a new emerging impartial profession, relying on the knowledge, skills, expertise and experience from both audit and IT professionals (Pathak, 2004).

The integration of the two professions caused the focus to shift from manual processes and procedure testing to include automated application testing. Although the objectives of an audit remain relatively unchanged, the process an IS auditor follows in executing the audit was immensely affected by the change in Information Technology (Doughty and O'Driscoll, 2002). This resulted in a specialist group of IS auditors who deals with systems that are technology complex and diverse. Hall and Singleton (2005:3) elaborated that an IT audit is associated with auditors who use technical skills and knowledge to audit through the computer system, or provide audit services where processes of data, or both, are embedded in technologies.

IS auditors are therefore faced with the challenge of being involved in the planning and organising of IT projects, implementation of proposed solutions, delivery and support of Information Systems and the monitoring of the process, controls, assurance and evaluation (Kimpton & Martin, 2001). Therefore, to

perform the roles and responsibilities required from IS auditors it is essential for these individuals to possess some skills and knowledge from both the IT and auditing professions.

In the past research focused on how IT changes the role of IS auditors, the available tools for IS auditors, the scope of IS auditing, the importance of training, IT governance, IT security, General Computer Audits, Application Control Audits, Computer Aided Audit Techniques (CAATs) and the inclusion of audit software in the curricula for undergraduate and postgraduate students. IS auditing is a relatively new field and a limited number of studies are available on the IS auditor's profile.

The purpose of this paper is to reflect on an investigation done into the components of the IS auditor's profile, including the level of IT knowledge, audit knowledge, the soft skills required from IS auditors and the IS audit tools and techniques used to assist the IS auditor in executing an IS audit assignment.

In section 2 we give a short overview on supporting theoretical work within IT and auditing. In section 3 a short description is given on the research approach used for data gathering. Section 4 reflects on the data gathered. Section 5 follows with a description of the IS auditor's profile and section 6 reports on the possible use of the profile.

2 BACKGROUND

Information Technology (IT) is defined by Whitten, Bentley and Dittman (2001:8) as "… the combination of computer technology (hardware and software) with telecommunication technology (data, image, and voice networks)". Information Systems (IS) are defined as " …an arrangement of people, data, processes, information presentation, and information technology that interact to support and improve day-to-day operations in a business as well as to support the problem-solving and decision-making needs of managers and users" (Whitten et al., 2001:8).

Traditional auditing mainly focused on the testing of IT processes and controls mitigating identified business risks as well as the testing of controls related to the fair representation of the financial statements. Traditional auditing objectives are therefore influenced by the impact of IT / IS, where manual inputs and outputs are no longer processed and more risks are threatening the security of businesses, their financial statements and

fraudulent activities. Therefore, the two professions of IT and auditing need to be integrated to execute an effective IS audit.

Weber (1999:10) defines IS auditing as: "the process of collecting and evaluating evidence to determine whether a computer system safeguards assets, maintains data integrity, and allows organisational goals to be achieved effectively and user resources efficiently". Hinson (2004:5) expands on this by stating that computer (IS) auditing is all about, "… a branch of general auditing concerned with governance (control) of information and communication technologies (computers). Computer auditors primarily study computer systems and networks from the point of view of examining the effectiveness of their technical and procedural controls to minimize risks". According to Hall and Singleton (2005:3) an IS audit is associated with "auditors who use technical skills and knowledge to audit through the computer systems, or provide audit services where processes or data, or both, are embedded in technologies". Lucy (1999:44) summarises the definitions effectively when he stated that "management utilises Information Systems auditing as a tool for ensuring: 1) the reliability and integrity of information; 2) compliances with IT policies and procedures; 3) the safeguarding of IT assets; 4) the economical and efficient use of IT resources; and 5) the accomplishment of established IT objectives and goals".

It can therefore be concluded that Information Systems Auditing is the examination of an Information System and surrounding procedures to express an opinion as to whether or not the data involved in processing, from the initiation of the transaction to its inclusion in the financial statements, is fairly represented at a specific date, to ensure completeness, accuracy, validity and timeliness of data and transactions and to scrutinise the controls implemented to mitigate identified risks as well as to provide assurance on the safeguarding of organisational assets and resources.

The evolution in audit and Information Systems has forced auditors from auditing around the computer to auditing with and through the computer by incorporating the necessary knowledge and skills from IT specialists. IS Auditors began to understand that Information Systems can be used to their advantage and used as a tool rather than be seen as an adversary. Computer Systems reached the point where auditors were forced to use computers as the target of their audit, since all information was processed internally.

With emerging technologies such as e-commerce, data mining, digital signatures, the Internet and new legislations and statements, the work for IS auditors keeps on increasing rapidly, as well as the specialised knowledge and skills needed by IS auditors.

Therefore, it can be concluded that IS auditors need to understand the process flow of transactions or information in Information Systems, which include technical knowledge and an understanding of the controls needed to ensure accuracy, validity, timeliness and completeness of organisational information, resources and assets. For this reason the combination of knowledge, skills, experience and daily roles and responsibilities of IT and auditing professionals fall under the profession of IS auditing. Thus, professionals coming from different backgrounds (IT and/or auditing) are forced to learn and develop the skills necessary to meet the demands of IS auditing.

From the above, the question arise: What are the IT and audit knowledge and soft skills required from an IS auditor, given that specific auditing tools and techniques are available to assist the auditor in executing an IS audit assignment, in order for an IS auditor to optimally perform his or her daily roles and fulfil his or her professional responsibilities?

3 RESEARCH APPROACH

For this study a qualitative research approach was followed, based on a combination of non-empirical (literature survey) and empirical studies (structured interviews). This approach was followed to firstly establish a theoretical understanding of the work published in this field and secondly to reflect on practitioners experience and belief regarding the characteristics of an IS auditor.

The qualitative research data obtained consisted of two main sources. Firstly secondary information was derived from the available body of knowledge through a literature review. The purpose of the literature review was to present the results of the work of the existing literature regarding the IT and auditing professions, specifically the IS auditor's roles and responsibilities, the required IT and audit knowledge, soft skills and available IS audit tools. The construction research method was followed to derive, analyse and present a summary from the literature survey. According to Page and Meyers (2003:4) the construction research method is defined as "the structural framework linking a number of concepts into a much more comprehensive concept,

mega-concept, of a phenomenon that is not directly observable or measurable".

Secondly, an IS auditor's profile was derived from following a survey approach, which is used to "enable the researcher to study a population sample in order to infer characteristics of a population (generalise findings)" (Page & Meyers, 2003:111). The survey approach was based on the empirical study method, which is set based on data about everyday objects (world 1) as the unit of analysis (Mouton, 2005). Interview questions were based on specific items that were asked of all participants, with the goal of qualifying the responses. This method is known as structured interviews according to Page and Meyers (2003).

The structured interviews were constructed based on a distributed sample selection. The sampling design method, used to select the sample population, was based upon judgmental samples. The sample selection adhered to the following criteria: 1) Background (IT or Auditing); 2) Years experience in IS auditing (4 or more); 3) Level (Management or higher); and 4) Type of audit role (External or Internal).

A sample of 10 interviewees was selected based on the different business sectors and whether the company performs internal or external audits. The interview population comprised of the following South African business industries containing IS auditing divisions: Audit Firms; Government Departments; Retail Industry; Banking Industry; and Telecommunications Industry.

Our research only focused on the key, high level characteristics identified by means of the research methodology and approach followed. The IS auditor's profile therefore also only included these key characteristics. The identified characteristics were generalised in a South African context. These characteristics may differ according to individual, profession, organisation, circumstance and level of employment and should only be regarded as a guideline.

4 DATA INTERPRETATION, COMPARISON AND SUMMARY

The primary data obtained through structured interviews was interpreted and compared to the secondary data obtained by means of the literature review that was conducted. The research aim was to combine the primary and secondary data in order to define an IS auditor's profile.

The interpretation, comparison and combination of the primary (interview response) and secondary data (literature review) are presented according to the following main characteristics and/or features: 1) Roles and Responsibilities of IS auditors; 2) Knowledge; 3) Soft Skills; and 4) IS Audit Tools and Techniques. These characteristics and features will aid in defining the IS auditor's profile.

4.1 Roles and Responsibilities of an IS Auditor

Roles and responsibilities set the direction for the tasks and types of IS audits to be performed. The roles and responsibilities may vary according to the level of responsibility. For the purpose of this study, the roles and responsibilities were divided into three basic responsibility levels based on the interview responses, namely: 1) Consultant; 2) Manager; and 3) Director.

Roles and responsibilities and the audit process set the direction for performing IS audits based on the type of audit assignment. In order to perform an IS audit through the defined roles and responsibilities, IT and audit knowledge, a certain set of soft skills and IS audit tools and techniques are required. The roles and responsibilities defined for the IS auditor's profile based on the literature study and interview responses are presented in Figure 1.

4.2 Knowledge

Based on the literature study conducted, knowledge is defined as the combined result of formal education, experience and training, something gained through listening, reading, learning and/or observation. Based on the interview responses, the most common entry routes into the IS auditing profession or employment requirements were found to be from either the IT/IS or auditing / accounting backgrounds. The knowledge required from IS auditors was therefore divided into IT knowledge requirements and audit knowledge requirements. The IT and audit knowledge requirements as per summary from the secondary (literature) and primary (interview responses) data, are presented in Table 1.

In understanding the different concepts of IT and audit knowledge and the relationship between them, it can be concluded that audit knowledge should be applied to the IT knowledge to enable an IS auditor to successfully executes his or her daily roles and responsibilities.

The following example will aid in clarifying the statement that audit knowledge should be applied to IT knowledge: The audit knowledge concept, "understanding of the concept of risk" should be applied to a specific area of IT knowledge depending on the type of audit assignment and the scope and objectives of the audit. Therefore, the auditing concepts of "understanding the concept of
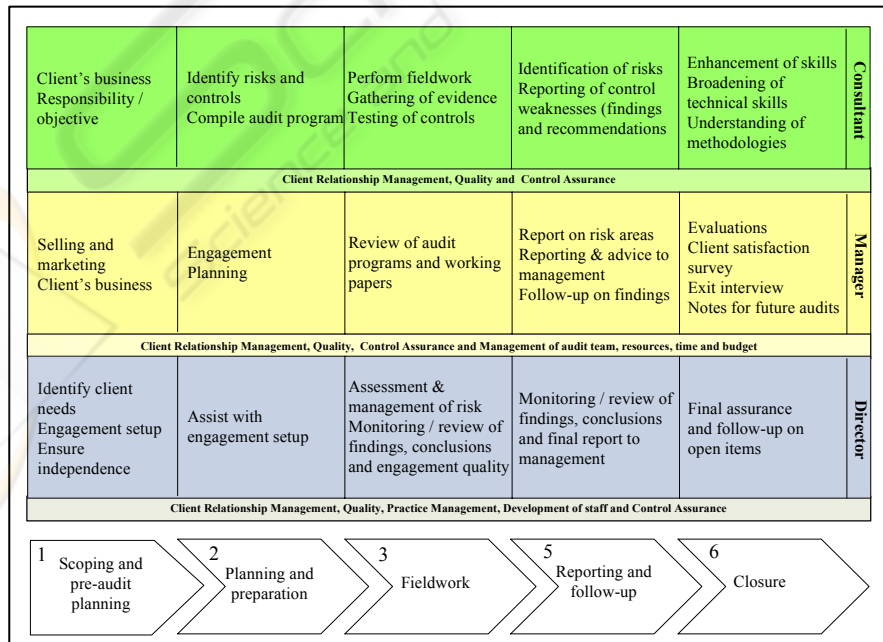

Client's business Responsibility / objective	Identify risks and controls Compile audit program	Perform fieldwork Gathering of evidence Testing of controls	Identification of risks Reporting of control weaknesses (findings and recommendations)	Enhancement of skills Broadening of technical skills Understanding of methodologies	**Consultant**
Client Relationship Management, Quality and Control Assurance					
Selling and marketing Client's business	Engagement Planning	Review of audit programs and working papers	Report on risk areas Reporting & advice to management Follow-up on findings	Evaluations Client satisfaction survey Exit interview Notes for future audits	**Manager**
Client Relationship Management, Quality, Control Assurance and Management of audit team, resources, time and budget					
Identify client needs Engagement setup Ensure independence	Assist with engagement setup	Assessment & management of risk Monitoring / review of findings, conclusions and engagement quality	Monitoring / review of findings, conclusions and final report to management	Final assurance and follow-up on open items	**Director**
Client Relationship Management, Quality, Practice Management, Development of staff and Control Assurance					
1 Scoping and pre-audit planning	2 Planning and preparation	3 Fieldwork	5 Reporting and follow-up	6 Closure	

Figure 1: An IS auditor's roles and responsibilities.

risk" may be applied in the IT knowledge area, "information security" which will entail the risk associated with information security being defined, for example: 1) Unauthorised access to application data and physical assets and resources (e.g. servers); 2) Unlicensed versions of software loaded on the entity's machines; and 3) Resources and data are unprotected against virus attacks.

Given the reasoning of audit knowledge being applied to IT knowledge, individuals coming from an auditing background have an advantage, since these individuals understand the auditing concepts and are able to easily identify the impact of risks. However, individuals originating from an IT background have the advantage of understanding the more technical and complex IT concepts and can therefore easily identify risks and controls within the IT knowledge areas.

The challenge of people coming from different backgrounds presents the gap between the IT and auditing professions. Individuals are forced to interact with each other within the working environment to transfer some knowledge and skills especially if the employees are from different professional backgrounds. Extensive additional training is also recommended to bridge the gap.

Table 1: IT and audit knowledge.

IT knowledge	Audit knowledge
Application programs / ERP systems	Understanding of the concept of risk
Basic Information Systems and Information Technology general concepts	Know about applicable standards and best practices
Programming languages and procedures	Audit planning (understanding the objectives of the audit, the scope of the audit and the areas of significance)
Computer communications and Networks (including routers, switches and internet)	Audit testing methods (including compliance testing, substantive testing and analytical review procedures)
Data structures and database	Understanding of the concept of control
Information security (physical and logical access)	Understand basic accounting principles
Information Systems Management / IT Governance	Business understanding
Operating Systems	Obtaining and interpreting relevant audit evidence
System analysis, design, development, testing, implementation and maintenance (SDLC)	Independence
Business Continuity and Disaster Recovery planning	
Information Systems Operations	
Specialised areas	

The IT and audit knowledge required from IS auditors is considered to be the enabler for the process of performing an IS audit.

4.3 Soft Skills

IS auditors need to adapt to the different circumstances and client personnel or client environments to effectively and efficiently perform IS audit functions. Having the required IT and audit knowledge and IS audit tools and techniques is not sufficient for an IS auditor to successfully executes an IS audit assignment. In order to define the IS auditor's profile, a basic set of soft skills needed by IS auditors should be defined.

Based on the interview responses, soft skills are imperative, especially to obtain supporting evidence, to observe processes, to document conclusions and findings and to interview staff. The soft skills required from IS auditors may however differ according to level of employment, personality, circumstances, the client environment and the specific IS audit assignment. The soft skills preserved as most important from the interview responses, include the following:

Table 2: Soft skills needed by an IS auditor.

Soft Skills
Analytical / systematic
People's person / people knowledge
Communication skills (both written and verbal, including interviewing techniques, persuading, presentation, managerial communication and negotiating)
Initiative
Managing people, resources, time and budgets (leadership)
Resilience
Good listener
Passion for auditing
Understand client environment / business
Team player
Conflict resolution
Constant learning / seeking new knowledge
Decisive / Judgement
Diligence and detail
Establish rapport
Inquisitiveness
Punctual
See the "bigger picture"
Strength of character
Tact
Tenacity

To illustrate: to be able to successfully complete step 5 ("reporting and follow-up" – Figure 1) in the audit process, it is essential that the IS auditor utilises the following soft skills: 1) Conflict resolution: unresolved findings are usually a trigger point for conflict; 2) Communication skills: both verbal and written; 3) Understanding the client

business or environment: clients are quickly annoyed by auditors when recommendations are not practical to their business environment; and 4) Strength of character: it sometimes takes strength of character to stand up to the pressure from a client or to be tenacious in completing the audit despite distractions such as a high reliance on the client to provide information and audit evidence.

The soft skills provided is only a guideline and only focused on the basic levels of skills required from IS auditors.

4.4 IS Audit Tools and Techniques

IS audit tools and techniques are part of the solution to the increasing complexity of applications, software and networks. IS audit tools and techniques also enable the auditor to audit through the computer rather than auditing around the computer (as in traditional methods).

To define an IS auditor's profile, it is essential to list the features which enable the IS auditor to perform an IS audit assignment. IS audit tools and techniques are vital in assisting the IS auditor to evaluate and assess complex detailed transactions in the fraction of the time of normal manual evaluations. The following main categories of IS audit tools and techniques are presented based on the interpretation of the primary and secondary data: 1) Generalised audit software: includes CAATs used for data analysis purposes (e.g. ACL, IDEA); 2) Specialised analysis tools: these include security analysis tools (e.g. Sekchek) and application analysis tools (e.g. analysis tools interrogating SAP and Oracle applications); 3) Audit methodologies, standards, guidelines and audit programs: assisting the auditor in executing IS audit assignments (e.g. COBIT, COSO framework); 4) General Applications: these applications include document management, planning and audit software and enable IS auditors to create work papers, write reports and create any other related documents (e.g. Microsoft office, AuditPro, MyClient).

5 AN IS AUDITOR'S PROFILE

In conclusion, taking the above defined main characteristics into account and the reasons for their importance to the IS audit profile, a framework was developed, illustrating an IS auditor's profile (Figure 2).

Audit knowledge needs to be applied to IT knowledge. Knowledge is regarded as the enabler

for the execution of an IS audit, since an IS audit assignment cannot be completed without the individual having adequate knowledge. The roles and responsibilities of an IS auditor are presented based on the main steps performed in an IS audit per responsibility level. Soft skills are regarded as the drivers of the audit to ensure successful completion and are applicable across all responsibility levels. Soft skills though, are usually more mature at director level than, for instance, at consultant level. The audit tools and techniques are regarded as the supporting functions available to assist the IS auditor in performing IS audits (per the defined audit process).

It is important to note that the IS auditor's profile as presented in this paper, is not the only or optimum IS auditor's profile, since the characteristics may differ according to person and business or educational institution. The profile provided is only a guideline and focused on the basic level of IT and auditing skills, soft skills, audit tools and techniques and roles and responsibilities.

Future studies may focus on defining the IS auditor's profile in more detail, or establishing more than one or optimum profiles. Consideration could also be given to the following questions: 1) Could people with different profiles be successful IS auditors? 2) Is it realistic to expect all these characteristics from one person (depending on the level)? 3) Given the global shortage of IS auditors, where do we usually compromise on the ideal profile?

6 RECOMMENDED USE OF THE PROFILE

By determining the roles and responsibilities and the concepts applicable to IS auditing, the knowledge and skills required and the IS audit tools and techniques used in supporting the IS auditor, the following institutions and individuals can benefit by the established IS auditor's profile:

▪ Educational institutions can incorporate the concepts presented in the IS audit profile in the curricula of students, especially the concepts related to IT knowledge, audit knowledge and the IS audit tools and techniques as listed in Figure 2. These terms or concepts can be used to establish the minimum level of IT and audit knowledge requirements. The IS audit tools and techniques, especially the generalised audit software (e.g. ACL or IDEA) could also be used as a guideline
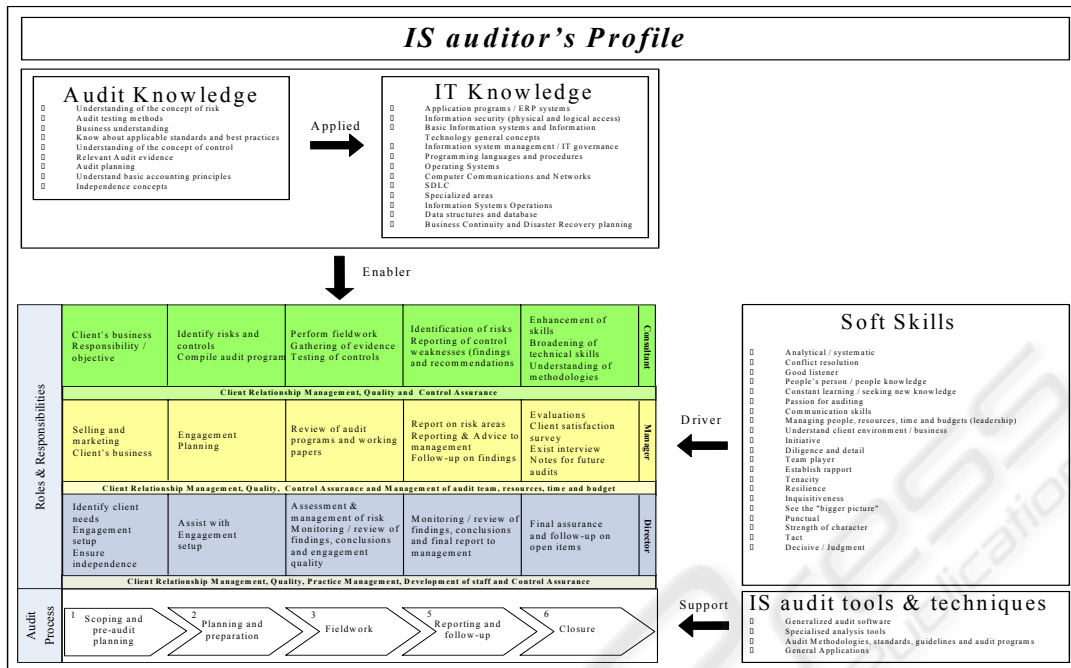
Figure 2: An IS auditor's profile.

as to what types of IS audit tools are available and mostly utilised by organisations (according to the interview responses);

- The auditing profession should be able to utilise the profile to assess employees and benchmark them against their progress according to the defined concepts. For example: according to the responsibility matrix, it is required that an IS audit manager reviews audit programs and work papers during the fieldwork phase (step 3, refer to Figure 2). To enable the manager to perform a review, the necessary audit knowledge (e.g. "Understanding of the concept of risk"; "Audit testing methods used"; "Business understanding"; "Know about application standards and best practise"; "Understand the concept of control"; and "Relevant audit evidence") should be applied to the relevant IT knowledge area (as per the scope and objective of the audit defined in the planning phase (steps 1 & 2) (e.g. "Application programs / ERP systems"). The following IS audit tools and techniques are applicable for step 3 (review of work papers by manager): 1) Generalised audit software (since it is an application review, ACL, IDEA or SQL queries can be used to perform data analysis which the manager should review); 2) Audit methodologies, standards, guidelines and best practise (the manager should ensure that the work performed adheres to audit methodologies and meets all audit

objectives. Findings can also be compared to best practise to identify weaknesses (e.g. Password settings should be 6 characters or more); and 3) General application (document management applications (ensure version control of working papers) and Microsoft office (Word and Excel) for work paper documentation). The soft skills (e.g. "Communication skills" (verbal and written); "Managing people" (audit team); "Diligence and detail" (to ensure accuracy, completeness, validity and timeliness of work papers); "See the bigger picture" (see audit as a whole and not as isolated parts per working papers); and "Decisive / Judgment" (decide and make judgment calls on weaknesses or risks identified and reporting to management) drive the manager to successfully complete step 3 in the audit process;

- Professional institutions should also be able to use the IS auditor's profile to recruit employees based on the required level of knowledge and skills. They can also use the roles and responsibilities illustrated to define the job descriptions of employees at the different responsibility levels; and

- Individuals in the IS auditing profession can define their roles and responsibilities to successfully execute audit assignments and benchmark themselves in the IS auditing profession (refer to the example above). They can use the knowledge and skills base to evaluate their

current knowledge and skills, identify gaps and work towards the desired level.

7 CONCLUSION

In this paper we reflected on a qualitative study done where we defined the IS auditor's profile according to the roles and responsibilities, knowledge, skills and IS audit tools and techniques needed by IS auditor's to successfully execute an IS audit assignment.

This reflection on the auditor's profile contributes to the existing body of knowledge by means of enhancing the definitions related to the roles and responsibilities, knowledge, skills and IS audit tools and techniques available and through insights into the relationship between these concepts as illustrated by the IS auditor's profile.

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