

An Information Systems Auditor's Profile

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Abstract

The increasing dependence upon Information systems in the last few decades by businesses has resulted in concerns regarding auditing. IS auditing has changed from auditing “around the computer” to auditing through and with the computer. However, technology is changing 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. The aim of the study is therefore to define the roles and responsibilities expected from IS auditors, based on the different types of audit assignments and the steps involved in performing an IS audit assignment. It will also describes the basic IT and audit knowledge required from IS auditors based on the roles and responsibilities identified, discusses the soft skills required from IS auditors to successfully perform an IS audit assignment and define the main types of IS audit tools and techniques used most often to assist IS auditors in executing IS audit roles and responsibilities. The study finally presented a suggested IS auditor's profile.

Introduction

The increasing dependence of organizations on computerized systems in recent years has led to concerns and challenges. Some of these concerns and challenges include security vulnerabilities, fraudulent activities and the speed of transaction processing. Watne and Turney (2002:5-6) argue that the concerns have an influence on the auditing process since data and programs are stored internally, modifications and manipulations can be made to data and programs, the diminishing of audit trails, the transmission speed of processes and the rapid emergence of artificial intelligence. Hall and Singleton (2005) argue that recently developments in Information Technology (IT) had an impact on the field of auditing. IT has inspired the reengineering of traditional business processes to promote more efficient operations and to improve communications within the entity and between the entity and its customers and suppliers. Auditors therefore, need both computer and task proficiency to perform their daily tasks efficiently and effectively (Bedard, Jackson, Ettredge and Johnstone, 2003).

It has been noted that it is no longer possible to meet the expectations of users of financial and other business performance information without using IT (Ahmed, 2003:20). Although the objectives of an audit remain relatively unchanged, the process an IS auditor follows in executing the audit has been affected as shown from the above statements. Doughty and O'Driscoll (2002:33) support this by explaining that a fundamental requirement for effective auditing is to provide an opinion to the executive team and the board audit committee on the adequacy of the internal control framework operating within the organisation's IT and telecommunications (IT&T) environment.

With the increasing use of IS by most organisations and the problems encountered in the auditing profession a new challenge emerged. Two, once independent, professions need to be integrated into a new emerging impartial profession, relying on the knowledge, skills, expertise and experience from both the audit and IT professionals. The integration of the two professions is supported by Pathak (2004) stating that IT auditing has been accepted as a distinct profession carved out of two distinctly separate professions of IT based data communications and auditing.

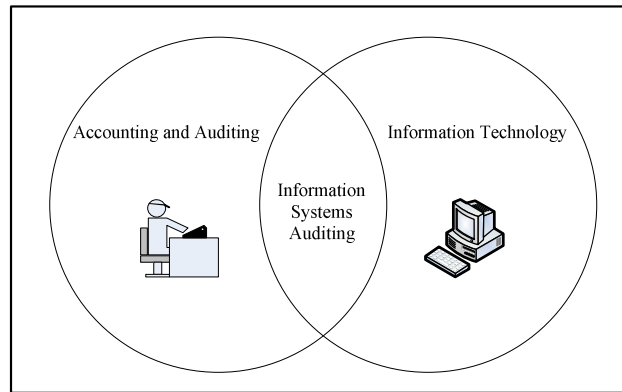


Figure 1: *Integration of two auditing professions*

Fink (1997:21) states that organisations rely on auditors to evaluate and improve the integrity of their IS. A specialist group of IS auditors has emerged to deal with systems which have become technology complex and diverse. This is explained by Hall and Singleton (2005:3) who state 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 faced with the challenge of being involved in the planning and organising of IT projects, implementation of proposed solutions, delivery and support of IS and the monitoring of the process, controls, assurance and evaluation (Kimpton & Martin, 2001:49). Previously, auditors have audited “around the computer” by auditing manual processes and controls. This is no longer effective and it is essential for auditors to follow an approach of auditing through and with the computer. Internal auditors focus on the testing of IT processes and controls mitigating identified business risks and although also true of external audits. External IT auditors’ focus on the testing of controls related to the fair representation of the financial statements. It is therefore necessary for IS auditors to engage in learning and obtaining knowledge of both IT and auditing to be successful.

In the past research has 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, and the inclusion of audit software in the curricula for undergraduate and postgraduate students. A limited number of studies were done to define an IS auditor's profile as a search by Google Scholar has proved. The main objective of the study will therefore be to determine an IS auditor's profile.

The paper's layout is as follows: It starts with a background study and the research methodology, then it disussed the data collected, create a profile based on the literature and then it recommend how the study can be applied and end with a brief conclusion.

Background

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). IS are defined as an arrangement of people, data, processes, information presentation, and IT 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).

According to the South African Auditing Standards (SAAS) 200, the objective of an audit of financial statements is to enable the auditor to express an opinion as to whether or not the financial statements fairly present, in all material respects, the financial position of the entity at a specific date, and the result of its operations and cash flow information for the period ended on that date, in accordance with an identified financial reporting framework and or statutory requirements.

Traditional auditing objectives as defined above are influenced by the impact of IT and 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. 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 (ICT). 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 IS auditing as a tool for ensuring:

- ✓ Reliability and integrity of information;
- ✓ Compliances with IT policies and procedures;
- ✓ Safeguarding of IT assets;
- ✓ Economical and efficient use of IT resources; and
- ✓ Accomplishment of established IT objectives and goals.

It can be concluded that IS Auditing is the examination of an IS and surrounding procedures to express an opinion as to whether or not the data involved in processing, is fairly represented at a specific date. It is also done 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.

Bagranoff and Vandrzyk (2000) argue that the evolution in audit and IS 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. In the early stages, IS auditors were actually financial auditors with some interest in IS. They note that the auditors conducted a review of IS-related controls and have reported on the strengths or weaknesses. Financial auditors had little understanding of the work done by the IS auditors and IS auditors did not always understand the implications of control weaknesses on the financial statements (Bagranoff & Vandrzyk, 2000:33).

According to Bagranoff and Vandrzyk (2000:33), IS audit is largely supportive of financial audit, but started to spend time at developing and of-

fering client services such as security, IS consulting, business continuity planning and technical reviews and risks assessments. IS Auditors began to understand that IS can be used to their advantage and used as a tool rather than be seen as an adversary. IS reached the point where auditors could no longer audit around the computer and were forced to use computers as the target of their audit, since all information was processed internally which increased processing speed and storage capacity and was utilising artificial intelligence. With emerging technologies the work for IS auditors kept on increasing, and so is the specialised knowledge and skills needed by IS auditors.

Taken the above into account, it can be concluded that IS auditors need to understand the process flow of transactions or information in IS, 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 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 the IS auditing profession as they are unlikely to have both the required IT and auditing knowledge.

Research Methodology And Data Handling

From the literature review and the background a research question was set: What are the IT and audit knowledge and soft skills required from an IS auditor, for an IS auditor to optimally perform his or her daily roles and fulfil his or her professional responsibilities?

To define the IS auditor's profile, a qualitative research approach was followed, based on a combination of non-empirical (literature survey) and empirical studies (structured interviews). The qualitative research data consists of two main sources. Firstly secondary information was derived from the available body of knowledge through a literature review. The construction research method was followed to obtain, analyse and present a summary from the literature survey. Secondly, an IS auditor's profile was designed following a survey approach based on an empirical study method. The re-

sponses from the structured interviews were regarded as qualitative responses (non numeric data) and were used as the preferred data collection method for this study.

The interviews were conducted with respondents based on a distributed judgmental sample selection. The sample selection adhered to the following criteria: Background (IT or Auditing); Years experience in IS auditing (4 or more); Level (Management or higher); and Type of audit role (External or Internal).

Ten interviewees were selected based on an equal split between the different business sectors and whether the company performs internal or external audits (five internal audit and five external audit companies). The interview population included the following business industries containing IS auditing divisions: Audit Firms; Government Departments; Retail Industry; Banking Industry; and Telecommunications Industry.

The primary data obtained through structured interviews were interpreted and compared to the secondary data obtained by means of the literature review. The aim was to combine primary and secondary data to define an IS auditor's profile. The interpretation, comparison and combination of the primary (interview response) and secondary data (literature review) is presented according to characteristics such as Roles and Responsibilities of IS auditors; Knowledge; Soft Skills; and IS Audit Tools and Techniques.

Roles and Responsibilities

The roles and responsibilities vary according to the level of responsibility. For the purpose of this study, the roles and responsibilities were divided into three responsibility levels, namely: Consultant; Manager; and Director. The roles and responsibilities of an IS auditor are perceived as very important attributes of the IS auditor's profile and 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 IS audit tools and techniques are required to enable and assist the IS auditor to perform these responsibilities and a certain set of soft skills are needed to drive the successful completion of the audit (also supported by Weber, 1999 and Hall and Singleton, 2005). The roles and responsibilities defined for the IS auditor's profile is presented in Figure 2.

1. Scoping and pre-audit planning	2. Planning and preparation	3. Fieldwork	4. Reporting and follow-up	5. Closure	P R O C E S S
→					
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	C O N S U L T A N T
Client relationship management (CRM), 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 interviews; Notes for future audits	M A N A G E R
CRM, quality, control assurance and management of audit teams, 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 open items	D I R E C T O R
CRM, quality, practice management, development of staff and control assurance					

Figure 2: An IS auditor's roles and responsibilities

It can be concluded that roles and responsibilities consists of the IS audit process and the roles and responsibilities according to a responsibility levels (consultant, manager or director) (e.g. during the "planning and preparation phase" (step 2 - Figure 2), a manager's responsibilities will include engagement planning. Engagement planning includes (according to the inter-

view responses): Establishing and agreeing on purpose and objective of audit and clearly communicate to audit team; Prepare client requirements; Manage timing of the audit (scoping, available time, people and budget), etc.

Knowledge

The basic knowledge required from an IS auditor to ensure the execution of the assigned roles and responsibilities were defined using the common entry routes into the IS auditing profession and employment requirements obtained during the interviews. These common entry routes/employment requirements were found to be from either the IT/IS or auditing/accounting backgrounds. The knowledge required of 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 (on the next page).

In understanding the concepts of IT and audit knowledge and the relationship between them, it can be concluded that audit knowledge should be applied to IT knowledge to enable an IS auditor to execute his or her daily roles and responsibilities (Lucy, 1999) (e.g. to help clarify the statement that audit knowledge should be applied to IT knowledge: an audit knowledge concept, “understanding of the concept of risk” should be applied to a specific area of IT knowledge depending on the scope and objective of the audit).

The auditing concepts of (understanding the concept of risk) may be applied in the IT knowledge area, information security which will entail the risk associated with information security being defined (e.g. (i) Unauthorised access to application data and physical assets and resources (servers); (ii) Unlicensed versions of software loaded on the entity's machines; and (iii) Resources and data are unprotected against virus attacks).

Another example is the auditing concept of obtaining and interpreting relevant audit evidence. To ensure that IT strategies and policies and procedures are aligned to business objectives (IT knowledge area: IS management/IT governance), the ICT strategy, policies and procedure document should be obtained from IT management. The document should be evaluated

and compared with mission, vision and objectives statements (usually stated in minutes of a steering committee meeting or power point presentation).

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	

Table 1: *IT and audit knowledge*

Given the logic of audit knowledge being applied to IT knowledge, individuals from an auditing background have an advantage because these individuals understand the auditing concepts and are able to identify the impact of risks on the financial statements. Individuals from an IT background have

the advantage of understanding the more technical and IT concepts and can identify risks and controls within IT knowledge areas.

The challenge of people 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 knowledge and skills especially if the employees are from different professional backgrounds. Extensive additional training is also recommended to bridge the gap (see also Kimpton & Martin, 2001). The IT and audit knowledge required by IS auditors is considered to be an enabler for the process of performing an IS audit, because an individual who does not understand the auditing or IT concepts will not perform the required audit steps, especially steps 3 and 4 (refer to Figure 2).

Soft Skills

IS auditors need to adapt to the different circumstances and environments to perform IS audit functions. Having the required IT and audit knowledge and IS audit tools and techniques is not enough for an IS auditor to execute an IS audit assignment. In order to define the IS auditor's profile, the soft skills needed by IS auditors should be defined. Information obtained during the fieldwork phase (step 3 - Figure 2) needs interaction of the client and the audit team. Soft skills are needed to obtain supporting evidence, observe processes, document conclusions and findings and interviewing staff (Lucy, 1999).

To complete step 4 ("reporting and follow-up" – Figure 2) in the audit process, it is essential that the IS auditor utilises the skills such as: (1) Conflict resolution: client management may not accept that business processes are not operating as intended and may disagree with findings; (2) Communication skills: verbal for client meetings and written for report; (3) Not understanding the client business or environment; and (4) Strength of character: it sometimes takes strength of character to stand up to pressure from a client not to publish negative audit findings (Pathak, 2004). The relevant soft skills, as detailed in the literature review and interview responses, are illustrated in Table 2.

The soft skills provided in this study are only a guideline and only focused on the basic levels of skills required. It can be concluded that an IS

auditor's soft skills are the drivers towards successfully completing an IS audit assignment.

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

Table 2: *Soft skills needed by an IS auditor*

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 enable the auditor to audit through the computer rather than auditing around the computer (as in traditional methods) (see also Doughty & O'Driscoll, 2002).

IS audit tools and techniques are essential in assisting the IS auditor to evaluate and assess detailed transactions in the fraction of the time of normal manual evaluations. The following categories of IS audit tools and techniques are presented based on the interpretation of the primary and secondary data:

- Generalised audit software: includes CAATs used for data analysis purposes (e.g. the most popular applications are: ACL, IDEA, Microsoft Excel and in-house developed SQL queries and scripts);
- Specialised analysis tools (e.g. security analysis tools (e.g. Sekchek and ESM) and application analysis tools (e.g. analysis tools interrogating SAP and Oracle applications));
- Audit methodologies, standards, guidelines and audit programs: assisting the auditor in executing IS audit assignments. According to the interview responses, the following standards and guidelines are used by IS audit organisations and professionals: COBIT (100% response); In-house developed methodology (70% response); COSO framework (60% response); Internal auditing standards (60% response); International auditing standards (50% response); Itil (40% response); and ISACA guidelines and frameworks (40% response);
- General Applications: these applications include document management, planning and audit software and enable the auditor to create working papers, reports and other related documents.

According to the interview responses, the types of applications often used by IS audit organisations and IS audit professionals are: Microsoft office (Word, Excel, Visio, Power Point, Projects and Outlook); AuditPro (auditing software); MyClient (Teammate – auditing software); and Peoplesoft (billing and project management). Generalised audit software (e.g. ACL) (as defined under IS audit tools and technologies) can be used during a data analysis audit (as defined under IT and audit knowledge). The audit software will enable the IS auditor to identify duplicated journals or unapproved journals.

An IS Auditor's Profile

Audit knowledge needs to be applied to IT knowledge (as illustrated in Table 1). 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 steps performed in an IS audit per responsibility level (as shown in Figure 2). Soft skills are regarded the drivers of the audit to ensure successful completion and are applicable to all responsibility levels (as per Table 2). 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). For examples per category refer to the above section.

It is important to note that the IS auditor's profile as presented in this study, 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 has focused on the basic level of IT and auditing skills, soft skills, audit tools and techniques and roles and responsibilities. For a graphical presentation of this profile see Figure 2.

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 may 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. The terms and concepts as listed in Figure 3 can be used to incorporate these terms or concepts in the curricula for auditing students to ensure that they meet 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 be

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

The auditing profession will be able to utilise the profile to assess employees and benchmark them against their progress according to the defined concepts (e.g. according to the responsibility matrix, it is required that an IS audit manager reviews audit programs and working papers during the fieldwork phase (step 3)) (refer to Figure 3). 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 applications (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 communication with consultants and written communication in review notes and the report); "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 will 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.

- Individuals in the IS auditing profession can define their roles and responsibilities to execute audit assignments successfully and benchmark these 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.

Conclusion

This article has defined the IS auditor's profile according to the following main characteristics: roles and responsibilities; knowledge; skills; and IS audit tools and techniques. This study 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 to provide insight to the relationship between these concepts as illustrated by the IS auditor's profile.

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