The influence of artificial intelligence on the future of the internal auditing profession in South Africa

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DECLARATION

I, Shuaib Ahmed Jooman, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

..............................

Shuaib Ahmed Jooman

Signed at .................................................................

On the ........................................ day of .............................. 20.....
DEDICATION

To my family, for their unconditional love, unwavering support and encouragement.
ACKNOWLEDGEMENTS

There are many who I am grateful for and indebted to:

My Creator, for granting me the strength, motivation and perseverance for completing this research.

My family, for their unwavering support, unconditional love and encouragement.

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ABSTRACT

Purpose – The purpose of this research was to explore the influence of artificial intelligence (AI) on the future of the internal auditing profession in South Africa (SA). This was conducted by focusing on three objectives; namely, investigating the current state of the use of AI within the internal auditing profession in SA as experienced by Chief Audit Executives (CAEs), determining the possible application of AI in conducting internal audit engagements, and exploring the future state of the internal auditing profession as perceived by CAEs.

Design/methodology/approach – The research adopted a qualitative approach using semi-structured interviews. A purposive sample of 12 CAEs spread across various industries was selected. Each participant held a professional qualification and/or designation coupled with the requisite work experience demonstrating that a certain level of competency and proficiency had been achieved. This was to ensure depth from the semi-structured interviews leveraging experiences, insight and foresight. Thematic analysis was used to analyse the data.

Findings – The research findings suggest that the current influence of AI on the internal auditing profession within the SA context is still in its infancy and internal auditors do not yet understand and appreciate the capabilities of AI. However, more of an uptake will be seen in the foreseeable future. In addition, all participants expressed the view that the profession will not be made redundant but rather internal auditors will utilise AI as a tool or enabler to enhance, complement and facilitate internal audit processes in providing more meaningful insights in a more efficient, effective and economical manner. Moreover, where control complexity is low to moderate on structured or routine processes, these could possibly be automated when juxtaposed to control complexity being high and internal audit required to use professional judgement, professional scepticism and decision-making abilities. Further, the view was that the internal auditor of the future should be a well-rounded professional and needs to possess and demonstrate both technical and soft skills.

Research limitations/implications – The extant literature specific to the SA context is limited hence extrapolation from research conducted abroad was required. In
addition, this study included the expert opinions, views and perceptions of CAEs across various industries, experience and exposure. As a result, in certain instances, diverging views were identified. Furthermore, an inherent limitation of a qualitative study is that it may not be inferred to a wider population as any findings identified through the research are not tested in order to establish if they are statistically significant or a matter of chance.

**Originality/value** – A study of this nature has not been conducted within the internal audit and SA context. A skills matrix has been crafted which was a synthesis of skills proposed by CAEs for internal auditors to adapt, remain relevant and continue to add value. Moreover, a model was developed showing complexity of processes/controls and the extent of automation and human intervention for controls therein.

**Paper type** – Research paper

**Keywords** – Internal audit, internal auditing, artificial intelligence, South Africa
### ABBREVIATIONS

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<td>AI</td>
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<td>Chartered Accountant South Africa</td>
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<td>CAE</td>
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<td>CoE</td>
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<td>IPPF</td>
<td>International Professional Practices Framework</td>
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<td>IT</td>
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CHAPTER 1: INTRODUCTION

1.1 Context of the study

The fourth industrial revolution is imminent and has been described as the integration of emerging technologies which blurs the lines amongst the physical, digital and biological spheres (Schwab, 2017). Recently, the world has borne testament to the disruption of entire industries by non-conventional competitors (Allen, 2015). Uber has disrupted the taxi industry without owning a single vehicle (Drahokoupil & Fabo, 2016) while Airbnb continues to disrupt the hospitality industry without owning any real estate (Bongaerts, Kwiatkowski, & König, 2017). Organisations are therefore compelled to continually scan the environment and strategically position themselves to effectively respond to these disruptions (Johnson, 2016). Of equal importance, is the discovery of innovative ways to extract and unlock additional value for stakeholders by enhancing efficiencies through the automation of processes (Bessen, 2018) and transformation of business models (De Jong & Van Dijk, 2015).

The progress and advancements in Artificial Intelligence (AI) brings with it a plethora of opportunities, innovation and new technologies (Gunning, 2017). For instance, AI can be used to predict heart attacks, convert an image of food into a listing of ingredients, lip-read, outsmart world poker champions (Frey, 2018) and provide customer service (Daugherty & Wilson, 2018). AI was identified by PWC (2018b) to have a significant impact globally. This includes automating processes previously viewed as far too complex for antiquated technologies, the creation of value by identifying trends from historical data, and enhancing the decision-making process by taking a more forward-looking approach. Agrawal, Gans, and Goldfarb (2017) found that organisations are more frequently showcasing AI capabilities in their product and service offerings as well as acquiring AI start-ups to facilitate and accelerate innovation.

Against the backdrop of these advancements is a key societal implication; namely, the displacement of professions (Buchanan, 2005). Researchers predict that professions will be transformed across the globe (Brynjolfsson & McAfee, 2014) and that
professions which are primarily routine or predictive in nature are not the only ones that may be at threat (Ford, 2015).

1.2 Research problem

According to Ford (2015), skilled professionals such as lawyers, pharmacists and scientists are at risk of being made redundant. Consequently, other professions which require professional judgement, such as internal auditing, could be made redundant and therefore displaced. Manyika et al. (2017) showed that although the labour market could be disrupted, new skills may be required.

Wix (2017) suggested that internal auditors should be concerned about the impact that AI could have on their role but concedes that the profession will endure if internal auditors adapt to these technologies. Hence, internal auditors may potentially need to transform their skills to be relevant in the fourth industrial revolution.

In contrast, industry experts predict that AI cannot replace internal auditors as creativity and deep knowledge is required in the evaluation of risks, and AI produces results based on its inputs and algorithms (IIA Inc., 2017a). Moreover, AI will change what audit professionals do, and as technical knowledge becomes commoditised, audit professionals will be expected to provide more meaningful insights to remain relevant (Agnew, 2016; Rapoport, 2016).

Therefore, the research problem that this study aims to address is to explore the influence of AI on the future of the internal auditing profession in South Africa (SA) as experienced by Chief Audit Executives (CAEs). The IIA Inc. (2017c, p. 21) describes a CAE as “the role of a person in a senior position responsible for effectively managing the internal audit activity in accordance with the internal audit charter and the mandatory elements of the International Professional Practices Framework (IPPF). The CAE or others reporting to the CAE will have appropriate professional certifications and qualifications. The specific job title and/or responsibilities of the CAE may vary across organisations.”
1.3 Objectives of the study

In attempting to address the research problem, the focus areas included three objectives:

- Investigate the current state of the use of AI within the internal auditing profession in SA as experienced by CAEs;
- Determine the possible application of AI in conducting internal audit engagements; and
- Explore the future state of the internal auditing profession as perceived by CAEs.

1.4 Research question

The research question has been formulated as:

What is the influence of AI on the future of the internal auditing profession in SA as experienced by CAEs?

1.5 Assumptions

Throughout this text, the term ‘AI’ is used broadly as an overarching term that encompasses automation, machine learning, computerisation, deep learning, artificial neural networks and cognitive computing and technology, as these terms are inter-related and in certain instances inter-dependent.

In addition, CAEs were interviewed from in-house, outsourced and co-sourced functions within SA organisations. The classification of sourcing bears no impact on the study.

1.6 Delimitations of the study

The participants of this study were CAEs from the SA private sector. Due to the exploratory nature of this research, the results include their professional, expert opinions, views and perceptions of the questions posed during the semi-structured
interview process. As such, the views of stakeholders from other disciplines and geographies were not considered.

**1.7 Limitations of the study**

The extant literature specific to the SA context is limited, hence extrapolation from research conducted abroad was required. In addition, this study included the expert opinions, views and perceptions of CAEs across various industries, experience and exposure. As a result, in certain instances, diverging views were identified. Furthermore, an inherent limitation of a qualitative study is that it may not be inferred to a wider population as any findings identified through the research are not tested in order to establish if they are statistically significant or a matter of chance (Atieno, 2009).

**1.8 Structure of the research paper**

Chapter 2 provides a systematic literature review covering relevant aspects of internal audit and AI. Thereafter, Chapter 3 sets out the research methodology detailing the data collection and data analyses processes. Next, Chapter 4 articulates a coherent narrative of the research findings and discussion. The research culminates with Chapter 5 highlighting the conclusion, recommendations and offers suggestions for future research.
CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

A comprehensive systematic literature review was followed for critically assessing and evaluating studies and other literature relevant to the research topic (Onwuegbuzie & Frels, 2016). This approach was deemed most appropriate in identifying and evaluating existing literature to inform the research question and owing to the exploratory nature of the study (Engelbrecht, Yasseen, & Omarjee, 2018; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004).

This chapter is presented in two sections. Firstly, the internal auditing profession is discussed followed by a discussion of AI. The internal auditing profession outlines the background of internal auditing, its positioning and internal audit within the SA context. Next, future competencies required of internal auditors and the transformation from a manual to an automated internal audit approach is highlighted. The AI section includes a background discussion and key definitions, AI and employment, and concludes with AI and the auditing profession.

2.2 Internal auditing

2.2.1 Background

Sawyer (1993) asserts that internal auditing is considered a true profession as it fulfils two criteria. Firstly, a profession requires technical ability with the requisite skills being acquired through studying and training. Moreover, a certain level or standard of competence must be demonstrated to a professional body. Secondly, it requires that an individual display proficiency beyond technical ability and uphold moral values.

To demonstrate the above criteria, The Institute of Internal Auditors South Africa (IIA SA) (2018) prescribes that to be classified as an internal audit professional, one requires an academic qualification, membership to an institute, completion of an internship training programme and successfully completing tests of competence which
includes the Certified Internal Auditor (CIA) designation. In addition, the IPPF promulgated by The Institute of Internal Auditors Inc. (IIA Inc) (2017) is the conceptual framework providing mandatory and recommended guidance for internal audit effectiveness. The mandatory elements consist of: **Core Principles** for the professional practice of internal auditing, the **Definition** of internal auditing, the **Code of Ethics** (CoE), and the **International Standards for the Professional Practice of Internal Auditing**.

The internal auditing profession has evolved since it grew in prominence from the 1940’s through regulatory requirements and increased demand in improved governance structures and processes (Ramamoorti, 2003). In SA, the profession was formalised in 1984 with the establishment of the SA chapter of the Institute of Internal Auditors (Yasseen, 2011). Like other professions, it continues to evolve (McGaghie, 1991), and internal auditors are expected to stay abreast with the pace of change within the environments in which they operate (PWC, 2018b).

The internal audit function (IAF) is an integral component of good corporate governance (Gramling, Maletta, Schneider, & Church, 2004). The IAF provides assurance to the board and management that risks are being managed effectively, and promotes and supports good governance practices (Ruud, 2003). The definition of internal auditing encapsulates what the profession entails (Cascarino & Van Esch, 2007):

> Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organisation’s operations. It helps an organisation accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes (p.5).

### 2.2.2 Legitimising the internal audit function

The value of an IAF has been legitimised through corporate governance codes and frameworks and has been made mandatory for listed companies and public-sector organisations within various geographies both in SA and across the globe (Janse van
Rensburg, 2014; Raiborn, Butler, Martin, & Pizzini, 2017). Moreover, in SA, the private sector has a preference in using a “Big 4” firm\(^1\) as an outsourced service provider compared to the public sector; however, there are no other significant differences in terms of sourcing (Papageorgiou, 2013; Papageorgiou, Yasseen, & Padia, 2012).

With reference to the three lines of defence model, Luburic (2005) explains that line management, who are the risk owners, are regarded as the first line of defence tasked with the responsibility of mitigating risk through the implementation of effective internal controls. The second line of defence assists the first line in an oversight role through the identification, monitoring and reporting of risks e.g. the risk management or compliance function. The third line of defence provides assurance on the design adequacy and effectiveness of the internal control environment, e.g. the IAF. Contemporary combined assurance models position the IAF as the third line of defence (Huibers, 2015). Furthermore, the distinguishing characteristic between the third line of defence and the first two lines is that the third line is an assurance function which exhibits a higher level of independence and objectivity (Anderson & Eubanks, 2015).

The Institute of Directors Southern Africa (2016) King IV Report on Corporate Governance for SA (King IV) expands the three lines of defence model to five lines of assurance. Consequently, the IAF is identified as the fourth line of assurance. Moreover, Principle 15 of the report states: “The governing body should ensure that assurance services and functions enable an effective control environment, and that these support the integrity of information for internal decision-making and of the organisation’s external reports” (p.68). The report, under the recommended practices, highlights the significance of the IAF. Whichever framework is applied\(^2\), internal audit is positioned as an independent assurance and consulting function (Florea & Florea, 2013).

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1 The “Big 4” refers to four of the largest audit, tax and advisory firms across the globe; namely, Ernst & Young (EY), KPMG, Deloitte and PricewaterhouseCoopers (PwC).

2 For the purpose of this study, internal audit is viewed as the third line of defence.
2.2.3 Future competencies of internal auditors

Ramamoorti (2003) predicates that with the increasing demand for their services, internal auditors should equip themselves with a multiplicity of skills, attributes and competencies. Ratliff and Reding (2002) assert that 21st century auditors should prepare themselves to audit everything. Chambers and McDonald (2013, p. 10) added that to succeed in the long term, internal auditors need to be “agile, flexible, resilient, empathetic and diverse learners” and that the internal auditor of the future possesses broad non-technical attributes in addition to deep technical expertise. Rose (2015) found that CAEs place a premium on personal skills such as communication and critical and analytical thinking, while also recognising the importance of technical skills. PWC (2018b) suggests that for internal auditors to stay abreast, investments in training, development and resources are essential. The iKutu Research Report by Erasmus et al. (2014) found that in SA highly skilled internal auditors are scarce and therefore in demand.

2.2.4 Transforming from a manual to an automated approach

Coderre (2009) and Omoteso (2012) explained that due to the proliferation of information systems and the definitive notion that information technology is a business enabler, there has been less use of paper audit trails as information flow is becoming electronic. As a result, to remain relevant, internal auditors utilise various computer assisted audit techniques during their engagements to perform tasks that would otherwise be laborious or even impossible. These technologies have allowed internal auditors to be more critical and focus their efforts as opposed to being limited to manual reviews and tedious audit programmes (Rapoport, 2016).

PWC (2018a) suggests that controls are essentially repetitive in nature which facilitates them being easily automated. What logically follows is that the testing approach will need to evolve, translating to greater efficiencies. This allows internal auditors to test entire populations rather than samples, providing stakeholders with greater confidence and assurance that controls are adequately designed and more importantly, operationally effective. McCuaig (2017) accentuates that organisations have reached limits of control effectiveness testing and internal auditors cannot add
value by continually assessing them. Rather, internal auditors could enhance value by advising on control automation design. In addition, together with other technologies, AI is being used as a more cost-effective solution for the identification of control failure (Hasheminejad & Salimi, 2018) which traditionally required an element of professional judgement (Frey & Osborne, 2013).

Chambers and McDonald (2013) found that in the past, once the annual IA plan had been approved, it was very rarely updated. However, with the constant pace of change, these plans need to be reviewed frequently due to emerging risks.

Chan and Vasarhelyi (2018, p. 6) describe that the “Standardisation of data collection and formalisation of internal control policies” is necessary for the automation of audit procedures which will allow little or no auditor involvement. They explain that the lack of standardised data would require manual intervention and offset the benefits of automation.

2.3 Artificial Intelligence

2.3.1 Background

AI relates to the concept of machines having the ability to perform tasks which are considered “smart” while machine learning is an application of AI based on the idea that data should be provided to machines in order for them to learn by themselves (Marr, 2016). This learning occurs through algorithms which are instructions or rules built into AI programs that facilitate the learning process (Davis, 2017). An artificial neural network is a learning model which attempts to emulate a human brain and solve more complex tasks which a traditional computer cannot (Krogh, 2008).

The benefit of algorithms is that they are not subjected to certain human biases such as a fall in productivity or performance which is essentially a comparative advantage when juxtaposed to human intervention (Frey & Osborne, 2013). However, a risk arising is that AI generates outputs only on what it has been programmed to do (Brennan, Baccala, & Flynn, 2017). The quality and integrity of the data is also crucial to the output (Visengeriyeva, Akbik, Kaul, Rabl, & Markl, 2016).
Research in AI is focused on designing and refining systems that perform tasks requiring human intelligence (Thórisson, Bieger, Thorarensen, Sigurðardóttir, & Steunebrink, 2016) and to reproduce human cognition (Erb, 2016). A key opportunity that AI presents is the ability to utilise data that one already possesses to generate new information, trends or additional insights (Agrawal et al., 2017).

2.3.2 AI and employment

Widespread concern exists that AI will lead to significant unemployment during the next decade and beyond (Bessen, 2018). A survey of 4,135 respondents conducted in the United States reported that 77% of Americans believe that it is ‘realistic’ for AI and automation to one day replace work currently performed by humans while 20% indicated that its ‘extremely realistic’. The survey also revealed that only 6% of workers were impacted by automation thus far (Smith & Anderson, 2017). Similarly, PWC (2018b) analysed 29 countries and predicts 3% of jobs may be at risk of automation by 2020. A later report by PWC (2018a) suggests that 45% of work activities is susceptible to automation, consequentially resulting in workforce savings of USD 2 trillion.

Frey and Osborne (2013) examined the susceptibility of jobs to automation over 702 professions. This was facilitated by an online platform containing detailed information on 903 professions which allowed the researchers to rank professions according to characteristics such as knowledge, skills and tasks. The study found that 47% of total employment is at risk and the expectation is that this may be as soon as the next decade. The auditing profession which was grouped together with accountants had a probability of 0.94 of being automated while another category which grouped bookkeeping, accounting and auditing clerks scored a probability of 0.98.

Beaudry, Green, and Sand (2016) argued that even though there has been a greater supply of higher education workers within the last decade, their demand has fallen. They also point out that these higher skilled workers are now performing work historically conducted by lower skilled workers. This predicament shifts lower skilled workers further down the occupational ladder and in certain instances creates
unemployment by pushing them out of the labour market altogether. This was later concurred by Ramaswamy (2018).

In their framework on the implications of AI and automation on employment, Acemoglu and Restrepo (2018) emphasise the displacement effect which is a decrease in the demand for labour as a result of automation. In addition, they highlight counteracting forces which could offset the displacement effect and may even increase employment. Firstly, substituting cheaper technologies for human labour creates a productivity effect i.e. as the cost of automation is reduced, the economy grows which has a positive effect on the demand for labour in unautomated tasks. The productivity effect increases employment in the sector being automated or in other sectors that have not yet been automated. Secondly, capital accumulation which results from additional automation and increases the demand for capital, also has a positive effect on employment. Thirdly, the deepening of automation, which is essentially the increased productivity of automation, creates a productivity effect. Lastly, the most significant counteracting force is the creation of new tasks which is termed the reinstatement effect, where humans have a comparative advantage over machines. In contrast, Acemoglu and Restrepo (2018), posit that we are far from an acceptable understanding of how technology could impact employment and that mainstream media and academics have sparked debate around a false dichotomy i.e. the alarmist view that advancements in AI and automation would displace jobs altogether whilst economists hold the view that technological progress in the past was followed by subsequent increases in employment. Ramaswamy (2018) adds that on aggregate, automation does not cause job losses and that demand for newer skills will be required. Yet, there is a trend amongst professionals across occupations on the importance of developing skills which are not susceptible to automation e.g. interpersonal or soft skills (Manyika et al., 2017).

In SA, Accenture (2018) found that 72% of executives are of the view that as early as the next two years, AI will work together with human beings as a co-worker, collaborator and trusted advisor. Daugherty and Wilson (2018) agree that AI will not replace humans but rather complement and augment their capabilities. Gustein and Sviokla (2018) point out that certain skills such as the ability to communicate
effectively, deep and broad subject matter expertise, the ability to contextualise understanding, emotional intelligence and possessing strong moral judgement and ethical values cannot be replicated by AI.

2.3.3 AI and the auditing profession

An earlier study by Vasarhelyi (1984) examined the evolution of the auditing profession in line with technological developments and found that improvements in hardware and software would significantly impact the profession. The central theme of the study dealt with efficiencies in processes which was later advanced by Espinel, O’Halloran, Brynjolfsson, and O’Sullivan (2015). Issa, Sun, and Vasarhelyi (2016) posited that the auditing profession will transform with the application of AI.

The advancements in technology has led the auditing profession to undergo significant change hence substantial investments are being made by major auditing firms in the use of AI (Kokina & Davenport, 2017). In addition to AI being focused on automating manual tasks (Rapoport, 2016), the proliferation of big data and computing power (John Walker, 2014) has rendered traditional audit procedures obsolete and expectations are being shaped where using AI will become imperative in keeping the profession relevant (Issa et al., 2016). AI, automation and data analytics, are threatening the auditing profession’s employment model (Agnew, 2016). A survey of 816 information and communication technology (ICT) professionals revealed that by 2025 around 30 percent of audits could be conducted by AI through the automation of processes (Espinel et al., 2015).

Auditing by its very nature, involves assessing risks of largely repetitive, structured, semi-structured and unstructured tasks (Kokina & Davenport, 2017), thus providing incentive for leveraging the capabilities of AI (Baldwin, Brown, & Trinkle, 2006). To establish which audit areas may be impacted the greatest by AI, Kokina and Davenport (2017) proposed decomposing an audit into separate tasks and identifying those that are most structured. The extensive evidence-based research by Abdolmohammadi (1999) revealed that out of 332 audit tasks (comprising six audit phases and 50 sub-phases), 38% of tasks were structured, 41% semi-structured and 20% unstructured.
According to Brennan et al. (2017), the acquisition of data is at the centre of the audit process and as most organisations store data electronically, the benefits of AI can be realised by inputting this data into AI capabilities coupled with the correct algorithms thereby streamlining processes. AI can expeditiously sift through large volumes of data and identify any anomalies and patterns; however, only a human being can interpret the meaning behind the outputs (Brennan et al., 2017) and make informed decisions (Rapoport, 2016). These informed decisions exclude potential bias and/or omissions which could have occurred in a manual process (Omoteso, 2012).

Chan and Vasarhelyi (2018) add that the traditional audit approach is out-dated and should evolve to real-time assurance through continuous auditing by leveraging technology. They propose that continuous auditing is synonymous with audit automation where technology is utilised to perform audits without human intervention. It is suggested that such an approach is more frequent, proactive, focused on exceptions, achieves simultaneous monitoring of controls and testing, populations are tested, and data analytics/modelling is used for testing. Li, Dai, Gershberg, and Vasarhelyi (2018) demonstrated that the use of analytics improves the performance of internal auditors.

AI technology will replace many of the routine tasks of an audit which would allow auditors to focus their efforts on other issues ultimately expanding the scope of audit coverage, hence more meaningful conversations can be held between auditors and auditees (Agnew, 2016; Issa et al., 2016). Chan and Vasarhelyi (2018) argue that the automation of manual audit procedures alleviates its labour and time intensiveness; however, full automation may not yet be feasible as some procedures may still require complex judgement and professional scepticism. They hypothesise that AI may someday have the capability to provide complex judgement and professional scepticism.

Brown and Phillips (1991) found that AI has been successful in reviewing large transactions for errors, fraud and omissions which translates to increases in revenue and reductions in cost. This is due to (i) greater coverage; (ii) real-time results; (by providing assurance as a transaction occurs hence fraud can be prevented as well as
detected); and (iii) breadth (by incorporating the skill and knowledge of several individuals).

Cangemi and Taylor (2018) assert that AI can be harnessed for providing real time intelligence and enhance detective controls by analysing an entire population swiftly and accurately as opposed to antiquated manual methods. Further, the AI algorithms can be improved over time through learning and observation.

### 2.3.4 Artificial intelligence and the role of internal audit

The Institute of Internal Auditors Inc. (2017) released a thought leadership publication on the role of internal audit in AI. It proposes that internal audit professionals must be prepared to participate in their organisation’s AI initiatives by developing and enhancing their competencies. This will enable them to provide AI related advisory and assurance services. In addition, it asserts that internal auditors are adept at assessing and evaluating risks which may affect or impede the achievement of organisational objectives. It outlines five key activities relating to internal audit’s role:

- Including AI in the organisation’s risk assessment, and if relevant, inclusion in the internal audit plan;
- Involving internal audit in AI projects from inception, in an advisory capacity. It is however imperative to ensure independence and objectivity;
- Providing assurance on the underlying algorithms and data that empowers AI;
- Ascertaining whether any moral or ethical issues are effectively addressed; and
- Providing assurance on the governance structures.

Following the thought leadership publication, IIA Inc. (2017b) drafted an AI auditing framework which consists of three broad components; namely, AI strategy, governance, and the human factor. This is broken down into seven components including: cyber resilience, AI competencies, data quality, data architecture and infrastructure, measuring performance, ethics, and the black box3

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3 The black box includes advanced AI technologies with complex algorithms which are not easy to decipher.
AI skills are rare and if the internal audit function is to be effective in this area, these skills should be acquired or developed (The Institute of Internal Auditors Inc., 2017). AI was identified by PWC (2018b) to be one of eight emerging technologies said to have a significant impact globally. They advise that expectations have and continue to be created on internal auditors who should have a view on risks emerging from these new technologies and the controls required to mitigate those risks. Moreover, IAFs must update their methodologies to a more continuous, real time mode of audit to respond to disruptive technologies such as AI.

2.3.5 Conclusion

The IA profession is evolving and so are the advancements in AI. The profession has already recognised the need, importance and role of internal auditors to be involved in their organisation’s AI initiatives (IIA Inc., 2017b). Absent from the literature is whether the profession will endure and embrace these changes which is what this study aims to establish.
CHAPTER 3: DATA COLLECTION AND ANALYSIS

3.1 Methodology

A quantitative approach was considered; however, the researcher aimed to explore the influence of AI on the future of the internal auditing profession in SA as experienced by CAEs. Quantitative approaches do not allow for an understanding and description of meaningful social action but rather on repeatable precise observations (Neuman, 2013) which would not have addressed the research question.

Therefore, the researcher adopted a qualitative approach using semi-structured interviews. Such an approach was most suited as themes were developed from the data collected through semi-structured interviews (Creswell & Creswell, 2017). Moreover, there is insufficient information in the extant literature on the influence of AI on the future of the internal auditing profession in SA, hence a qualitative approach can assist in formulating hypotheses based on experiences and perspectives by CAEs which may subsequently be tested using quantitative methods (Bricki & Green, 2007).

In addition, qualitative studies are conducted within an interpretivist paradigm (Collis & Hussey, 2013). This approach was deemed appropriate to address the research question which is focused on how CAEs experience the potential influence of AI on the future of the internal auditing profession in SA. As such, the research question demands an exploration of experience which implies the philosophical acceptance that multiple realities exist (Graneheim & Lundman, 2004) which are socially constructed based on the lived experience of an individual (Creswell, Hanson, Clark Plano, & Morales, 2007). The internal auditing profession is not static and continues to evolve (Ramamoorti, 2003) thus further validating the proposed qualitative approach.
3.2 Methodological approach

3.2.1 Semi-structured interviews

Interviewing is a common method of gathering data in qualitative research (Willig, 2008). A qualitative research interview may be defined as "an interview, whose purpose is to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena" (Kvale, 1983, p. 174). Rowley (2012) suggests that interviews are useful when experiences and opinions are required and/or when information on the subject is lacking. The aim of an interview is to view the research question from the perspective of the interviewee and obtain a deeper understanding of how and why they hold such a view (Cassell & Symon, 2004). This corresponds with the interpretivist approach (Thorne, 2016).

Harrell and Bradley (2009) outline various types of interviews on an interview continuum which includes unstructured, semi-structured and structured. Due to the exploratory nature of this study, a semi-structured interview approach was deemed adequate as the primary data collection method. This allowed the researcher to cover certain key areas coupled with a fair amount of flexibility to probe further (Harrell & Bradley, 2009; Willig, 2008) and the ability to better contextualise responses. Moreover, Cohen and Crabtree (2006) assert that semi-structured interviews provide reliable and comparable qualitative data.

A pilot interview was conducted which assessed the lucidity of the interview agenda. No ambiguities existed thus amendments or refinements were unnecessary (Turner III, 2010). Refer to Appendix A for the interview agenda.

Telephonic and email introductions were made with potential interviewees where the research and interview processes were communicated. Next, a formal meeting request was sent via email reiterating the process that was to be followed. The interview agenda was shared with each interviewee as part of the meeting request which allowed interviewees to prepare for the interview.
Interviews were recorded on an electronic device and then transcribed for analysis (Baker, Edwards, & Doidge, 2012). Prior to the commencement of each interview, consent was obtained for the recording thereof. It was conveyed that the recording was to ensure accuracy of the interview and it was stressed that confidentiality will be maintained (O’Dwyer, Owen, & Unerman, 2011). The average duration of each interview was around 30 minutes.

Once the transcript had been prepared, it was forwarded to the interviewee for review (O’Dwyer et al., 2011). All participants reviewed their transcripts for validity and accuracy. Some participants made amendments to their transcripts using track changes. The final approved versions were used for the analysis of the data.

3.3 Data collection sample

3.3.1 Sample type and criteria

Purposive sampling was used which entailed selecting a sample from the population with the most information on the subject of interest (Hoeber, Hoeber, Snelgrove, & Wood, 2017). The sample chosen is essential to the quality of data received, thus interviewees should be competent and reliable (Tongco, 2007). The disadvantages of a purposive sample are twofold; namely, one cannot measure or control variability and bias, and results from the data cannot be generalised to the population (Acharya, Prakash, Saxena, & Nigam, 2013).

The criteria of the sample included interviewing CAEs of in-house, co-sourced and outsourced IAFs. Holding a professional qualification was preferable, such as Certified Internal Auditor (CIA), Chartered Accountant South Africa [CA (SA)] or an equivalent designation. A further criterion was that participants have at least six years post-qualification experience. Holding a professional qualification and/or designation coupled with the requisite work experience demonstrate that a certain level of competency and proficiency has been achieved. The rationale for this sample is to obtain depth from the semi-structured interviews leveraging experiences, insight and foresight. The last criterion was that the sample be spread across various industries.
3.3.2 Sample size

The size of a purposive sample is dependent on the concept of saturation (Guest, Bunce, & Johnson, 2006) and is highly debatable (Mason, 2010). Saturation is attained when sufficient data has been gathered (Kerr, Nixon, & Wild, 2010) or no additional information or themes are identified (Guest et al., 2006). There is no method for approximating the size of a sample to reach saturation (Kerr et al., 2010); however, not reaching saturation could impact the quality and validity of the research (Fusch & Ness, 2015). Guest et al. (2006) found that saturation occurs within the first twelve interviews. Other researchers suggest that there is no specific number of interviews and that data collection is unnecessary once saturation is reached (Baker et al., 2012).

Following the above recommendations and applying the stated criteria, a total of twelve participants were selected. The table below summarises the profile of the CAEs interviewed:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Type of IAF</th>
<th>Total years working experience(^4)</th>
<th>Total years of internal audit experience</th>
<th>Qualification(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAE 01</td>
<td>In-house</td>
<td>17</td>
<td>10</td>
<td>CIA</td>
</tr>
<tr>
<td>CAE 02</td>
<td>Outsourced</td>
<td>21</td>
<td>21</td>
<td>CIA</td>
</tr>
<tr>
<td>CAE 03</td>
<td>Outsourced</td>
<td>38</td>
<td>28</td>
<td>CA (SA)</td>
</tr>
<tr>
<td>CAE 04</td>
<td>In-house</td>
<td>25</td>
<td>9</td>
<td>MBA</td>
</tr>
<tr>
<td>CAE 05</td>
<td>In-house</td>
<td>20</td>
<td>17</td>
<td>CA (SA), CIA</td>
</tr>
<tr>
<td>CAE 06</td>
<td>Outsourced</td>
<td>19</td>
<td>10</td>
<td>CA (SA)</td>
</tr>
<tr>
<td>CAE 07</td>
<td>In-house</td>
<td>39</td>
<td>16</td>
<td>CA (SA), CIA</td>
</tr>
<tr>
<td>CAE 08</td>
<td>In-house</td>
<td>18</td>
<td>16</td>
<td>CIA</td>
</tr>
<tr>
<td>CAE 09</td>
<td>In-house</td>
<td>18</td>
<td>18</td>
<td>CIA</td>
</tr>
<tr>
<td>CAE 10</td>
<td>In-house</td>
<td>26</td>
<td>22</td>
<td>CA (SA), CIA</td>
</tr>
<tr>
<td>CAE 11</td>
<td>In-house</td>
<td>18</td>
<td>8</td>
<td>CA (SA)</td>
</tr>
<tr>
<td>CAE 12</td>
<td>Co-sourced</td>
<td>11</td>
<td>7</td>
<td>MBA</td>
</tr>
</tbody>
</table>

In addition, the CAEs interviewed had experience and exposure to the following industries: financial services (banking, insurance, asset management, and pension, provident and retirement funds), transport and logistics (freight, passenger and

\(^4\) It is worth noting that most participants have some external audit experience.
aviation), hospitality (casinos and hotels), media and advertising, petroleum, retail, healthcare, pharmaceutical, telecommunications, consumer goods, mining, manufacturing, information, communication and technology, and real estate. Therefore, the calibre of interviewees was deemed adequate and appropriate due to the wealth of experience, qualifications and diversity of industries exposed to.

3.4 Data validity and reliability

A qualitative researcher should be concerned about validity and reliability throughout the various stages of the research process (Patton, 2002) which can be conceptualised as “trustworthiness” (Golafshani, 2003). According to Lincoln and Guba (1985), trustworthiness in qualitative research involves the establishment of: 

**Credibility** (results are believable and inspire confidence), **transferability** (applicable to other contexts), **dependability** (repeatability and consistency of results) and **confirmability** (results are impartial and supported by participant responses). To achieve trustworthiness, the following techniques were adopted which have been posited by Lincoln and Guba (1985) and widely advanced by other qualitative researchers:

**Credibility:** Each respondent was requested to review and agree to the information transcribed during the interview process (Shenton, 2004). In addition, triangulation enhances the validity and reliability of qualitative research (Golafshani, 2003) and was achieved through the interviewing of various CAEs across organisations and industries i.e. multiple sources of data within varying contexts (Pandey & Patnaik, 2014; Patton, 1999).

**Transferability:** The data was captured verbatim through audio-recordings and transcribed.

**Dependability:** Each step of the research was documented in detail which will allow an external party to validate the process and reach similar conclusions.

**Confirmability:** An audit trail of all data and information used throughout the research process has been maintained and stored.
3.5 Ethics

Approval and ethical clearance for the research was obtained from Wits Business School (WBS). The protocol number is WBS/BA0407882v/993. In addition, consent was obtained from interview participants for the recording of interviews (Easton, McComish, & Greenberg, 2000). It was articulated that the recording was essentially to ensure accuracy of the interview (O’Dwyer et al., 2011). Participants were given the right to withdraw from the study at any point (Orb, Eisenhauer, & Wynaden, 2001).

The confidentiality of each interviewee has been maintained (Bricki & Green, 2007) by ensuring that interviewee names or any information that may link interviewees to the responses provided do not appear on any supporting documentation whether manual or electronic (Parry & Mauthner, 2004). Electronic data has been password protected and interviewees are code-named e.g. CAE 01, CAE 02, etc. Furthermore, data will be stored on a password protected laptop for a period of ten years and permanently deleted thereafter.

3.6 Data analysis

Thematic analysis was used to analyse the data. Braun and Clarke (2006) proposed a thematic analysis approach which has been widely cited and used to analyse transcribed data thematically. The approach adopted by the researcher involved the following six recursive phases as proposed by Braun and Clarke (2006):

**Familiarisation of the data:** The researcher commenced analysing the data with a complete reading of the approved transcribed interview notes in order to gather thoughts, orientation and analytical strategies. This included re-reading the data when necessary.

**Generating initial codes:** The researcher coded salient and important features of the entire data set in a systematic manner.

**Searching for themes:** The researcher organised the codes into meaningful patterns (themes) that were common amongst interview participants. This assisted in comparing and analysing differences and similarities in relation to the research question.
Reviewing themes: The researcher refined and identified relationships amongst the themes. Some themes were collapsed together or separated. Others which were deemed irrelevant were discarded.

Defining and naming themes: The researcher documented a detailed analysis of each theme, the crux or essence of the theme and labelled the theme.

Drafting the report: The researcher documented a complete narrative of the data in a coherent, succinct manner and attempted to articulate a compelling argument to address the research question.
CHAPTER 4: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter outlines the research findings and discussion in a thematic manner and sequential order moving along a continuum from the current state to the future state in the context of the influence of AI on the future of the internal auditing profession in SA. Refer to Figure 1 for the outlay of this chapter.

Figure 1. Outlay of the findings

Themes were identified and analysed from the approved transcribed interview notes as set out in Section 3.6 and integrated under the headings and sub-headings below to present a coherent narrative that addresses the research question as articulated in Section 1.4. Firstly, the status quo is analysed and discussed. Next, the views and perspectives of respondents on the possibility of AI conducting internal audit engagements are outlined. Lastly, the perception and views of respondents on the future of the internal auditing profession in SA are articulated.

To further reinforce a theme, certain direct quotes from the approved transcribed interviews were included in italics in the research findings and discussion that follows. To maintain confidentiality, the CAEs were labelled with an alias i.e. CAE 01, CAE 02, etc.

Where participants’ views were similar, supported or different from what has been stated in the literature review, references have been integrated into the discussion of the findings.
4.2 The status quo

Interview participants were of the view that the current influence of AI on the internal auditing profession within the SA context is still in its infancy and thus has not made an impact in a meaningful way, if at all. Consensus is that there will be a significant change in the foreseeable future as it is a topic that has been gathering momentum and piquing interest from the internal audit community as well as the organisations they serve. The significant change to the auditing profession was previously proposed by Vasarhelyi (1984) and later advanced by Espinel et al. (2015) who posited that around 30% of audits could be conducted by AI through the automation of processes.

“I think it’s a topic that’s getting a lot of interest at the moment in the profession. The reality though is, it’s a buzzword, and a lot of people are talking about it but they haven’t quite implemented anything.” CAE 05

Industry players are aware of it and are starting to consider its possibilities. There is however uncertainty as to how AI can be practically embedded within the internal auditing profession. In addition, going forward, more of an uptake will be seen with these types of “disruptive technologies”. This is based on the premise that data, both structured and unstructured, is a big play in almost every industry as was also asserted by John Walker (2014), with financial services at the forefront coupled with other data rich industries such as freight and logistics and manufacturing. Laggards include those industries which are more manual or labour intensive in nature.

“I’m quite aware of one in the transport industry at the moment where there’s talk about using AI in the transport industry. I would assume banking, probably financial services. Then there’s also elements of AI that’s advancing in general manufacturing.” CAE 05

Furthermore, internal audit reviews the processes and systems within the organisations they service, hence internal audit is expected to stay close to developments within their organisations, and if the organisation itself has not reached a level of maturity in terms of adopting AI capabilities then internal audit cannot lead on AI matters if the organisation itself is lagging.
4.2.1 Transforming to an automated internal audit approach

Interviewees have a wealth of experience within the internal audit field and have seen many transformations in their tenures from laborious and tedious manual internal auditing approaches to largely sophisticated and efficient processes. In their research, both Coderre (2009) and Omoteso (2012) also showed that the use of computer assisted audit techniques assisted in performing tasks which would have otherwise been arduous or impossible. Notable enhancements identified by participants include:

- The use of automated working papers which facilitates the audit fieldwork and review processes, expedites audit report preparation, and creates an electronic database of past engagements which is easily accessible for future reference.

  “We have a software package that helps you to document the audit. I mean you save a lot of time, and it enhances the review of work and the ability to do analysis from trends.” CAE 07

- The proliferation and use of data analytics software (e.g. SAS and IDEA) which allows internal auditors to test entire populations instead of selecting samples during audit fieldwork. This is however dependent on whether the data is available as supported by Chan and Vasarhelyi (2018), and that data integrity can be ensured which was argued by Visengeriyeva et al. (2016). The resultant benefits are threefold (i) enhanced assurance coverage and quality with a move to provide absolute assurance within a period under review as opposed to reasonable assurance; (ii) the reallocation of resources in focusing their efforts on other matters as also suggested by Rapoport (2016) or limiting focus to the exceptions and outputs that are derived from the data analytics; and (iii) enhanced audit turnaround and subsequent cost savings as were advanced by Hasheminejad and Salimi (2018) and pointed out by PWC (2018a).

  “We now are more efficient, and we are able to report sooner, and we are able to identify issues. I think the bigger advantage is to reallocate resources to things that matter, where you really need human intervention and proper judgement.” CAE 09
“We’ve got to look at the profession in terms of the outputs, the outputs here would be, I think, would be much better, you’re going to have a lot more data sizes and sample sizes and you’ll be able to give almost 100% assurance to some extent if the budgets allow it and so on. So, I think from that perspective, output, I think it’s going to be fantastic for the profession.” CAE 05

- The integration and adoption of other technologies to enhance audit efficiencies such as drones to conduct stock counts or assist with insurance claims.

  “We use drones to count stock.” CAE 07

- The implementation of continuous auditing methodologies with the idea of moving into real-time assurance which Chan and Vasarhelyi (2018) also put forward.

  “Continuous auditing, in my mind is also an element of AI, where you embed a programme or something that pulls and mines data almost mechanically and on a continuous basis. So that’s an element of AI, to some extent data analytics is, but data analytics requires a lot more manual and human intervention, but if you embed a proper continuous auditing programme, that’s also an element of AI.” CAE 05

The above-mentioned enhancements are limited to internal audit’s budget and resources, and to the extent that the organisation being audited has digitised their processes. The view is that data analytics is the starting point leading into continuous auditing methodologies and eventually reaching the AI spectrum.

  “Certain businesses have changed their business models to adapt to the new environment. So internal audit must adapt. If they don’t adapt, then they’re going to be irrelevant.” CAE 02

Participants were unaware of any AI specific capability that is currently being used for internal audit, but several participants indicated that an AI internal auditing capability is being developed and tested by a large SA organisation. The efficiency of this capability is exponential as what takes four auditors two weeks to review, takes this technology four and half minutes.
In the past, a minor portion of an internal audit plan was given to a subject matter expert such as an IT specialist whereas in recent years, elements of IT are covered in almost every engagement conducted by internal audit whilst around 40% or 50% of an internal audit plan is completed by IT specialists. This demonstrates the significant adoption of IT capabilities and process automation and optimisation by organisations. Chambers and McDonald (2013) previously found that internal audit plans need to be reviewed more frequently.

“If I look at the last 15 years of internal audit. Where we started you might have had somebody that came to look at a computer system somewhere along the line, maybe they looked at the DR [Disaster Recovery] or something, that’s always been around. So, of your plan, maybe 10% was given to the IT person, every second year, whereas now, half of our plan goes to IT because that’s where all the risks actually reside” CAE 03

4.2.2 Understanding and appreciating the capabilities of AI

All participants stated that internal auditors do not yet understand and appreciate the capabilities of AI, from being a possible disrupter of the profession to how it can be leveraged in enhancing work performed by internal audit as well as from an organisation’s perspective.

“I think it’s a very new concept. To be honest if you had to ask the auditors in my team, I think that their views would be light.” CAE 04

Consequentially, internal auditors are not yet equipped to utilise AI within their processes, or from the organisation’s perspective, to identify AI specific or related risks. Participants conceded that risks currently affecting their organisations, at a strategic and operational level, are being reported to the respective committee(s) and board. These risks do not necessarily present as a line item on the risk register titled “AI risks” but are indirectly manifested through other risks reported e.g. the advancements of competitor technologies as a risk to the organisation’s business model, through Information Technology General Controls (ITGC) reviews and other specialist IT engagements.
Some interviewees stated that the role, experience and qualifications of an internal auditor will inevitably change. Other respondents’ views differed in that internal auditors are internal control specialists and not necessarily specialists in other disciplines, hence these specialist skills need to be outsourced or co-sourced. Moreover, internal auditors need to leverage the collective intelligence within their organisations while maintaining independence and objectivity. What this means is that the first, second and other third lines of defence need to be consulted in assisting with risk identification and mitigation strategies. It becomes much easier to sell audit as a value-add by working in collaboration and as a collective. In addition, such processes optimise combined assurance efforts. In sum, to be able to provide an acceptable level of assurance, the right people with the right skills should be a requisite.

“In the past we internal auditors were seen as the main assurance providers, now going forward with combined assurance you’re seeing other players in the market as well, focusing on their specialisations, or specialist areas. So internal auditors should, I feel, be specialised in a specific area so that they can bring that experience and insights, and then you also see the internal audit function working a lot with the other assurance providers so that we can cover a wider spectrum of the risks in the business as a whole.” CAE 02

“We do rely on various specialists and I think specialisation is very important.”

CAE 02

Further, internal audit should be involved in their organisation’s projects by questioning and challenging management on new systems and processes, and the impact that these may have on the overall internal control environment. Assurance can be provided pre-implementation and post-implementation. Two participants added that being involved in these projects affords internal audit the opportunity to gain a deeper understanding of new processes, the controls and whether they are adequate and effective in terms of risk mitigation and achieving its desired objectives.
4.3 The possibility of AI conducting internal audit engagements

Many participants agreed that AI will be more independent, unbiased and impartial in conducting internal audit engagements than humans. If designed adequately, AI provides an enhanced, more efficient output as opposed to an individual who may be fatigued or even distracted during the audit fieldwork process translating to certain instances of control failure or non-compliance being inadvertently overlooked. Frey and Osborne (2013) also support the view that AI is not subject to certain human biases such as a fall in productivity or performance.

“I do believe eventually. It will make the audit a lot better, faster, smarter, and it will enhance how we audit.” CAE 02

They did however caution on the following:

- The AI capability will need to be programmed by a human which may raise independence and objectivity concerns if that individual is not from the third line of defence i.e. an independent third party. The “rule setter” or “algorithm programmer” thus needs to be meticulously vetted and selected.

  “The question is if that element is programmed by anyone that's not in third line, you’ve lost your independence because it was set up by the first or second lines. So, the AI in itself cannot be independent. I still think you'll need to say who controls the rules.” CAE 06

- AI will provide results based on how it was set up. This concern is shared by Brennan et al. (2017) who indicated that a risk arising is that AI generates outputs only on what it has been programmed to do. The question remains, will the algorithms cater for all eventualities? Two participants cited a similar encounter where a manual analysis was compared to an automated analysis (using data analytics software) on the same data set but delivered varying outputs. This was due to certain complexities that could not be predicted by the automated solution while the manual process involved an internal auditor that applied their mind while working through the data and could thus identify exceptions and anomalies along the way.
“If they’re programmed incorrectly... The extent and velocity of errors. So, you need to ensure that the auditor that builds the algorithms and the testing etc. is of the right competency.” CAE 10

- AI can be useful in enhancing the quality of a review which was supported by Agrawal et al. (2017) but at some point, human judgement, due care and professional scepticism will be required to form an opinion or craft a conclusion which is what Brennan et al. (2017) argued.

Other participants who held a diverging view argued that if internal auditors followed the requirements prescribed in the IPPF, there should be no reason that their output would differ to that of an AI capability.

4.3.1 The future of the internal auditing profession in SA

All participants expressed the view that the profession will not be made redundant but rather internal audit will use AI as a tool or enabler to enhance, complement and facilitate internal audit processes in providing more meaningful insights in a more efficient, effective and economical manner. This is in contrast to Frey and Osborne (2013) who found that there was a probability of 0.94 of the auditing profession being at risk and a 0.98 probability of an audit clerk. Moreover, AI being used as a tool or an enabler for an enhanced outcome was suggested by Accenture (2018) and Daugherty and Wilson (2018). Participants did indicate that the competencies of an internal auditor will need to change which Ramaswamy (2018) also supports.

“I don’t think that AI will replace what humans do, I think it will complement what humans do. And I think the value that will come out of the audit report will be a lot better.” CAE 11

“AI is there as a tool to assist the internal auditor, it’s not there to replace the internal auditor.” CAE 05

A participant aptly and succinctly stated that progress and change are inevitable and cited the example of emails replacing postcards. One can now use emails to assist in being more effective and efficient.
The interview discussions centred around four primary reasons why the profession cannot be displaced; namely, independence and objectivity as an overarching concern as well as professional scepticism, professional judgement and the decision-making ability of an internal auditor. Chan and Vasarhelyi (2018) argued that the automation full automation may not yet be feasible as some procedures may still require complex judgement and professional scepticism. They hypothesise that AI may someday have the capability to provide complex judgement and professional scepticism.

“The principle here would be any profession which at its core requires independence or judgement will continue.” CAE 06

“I don’t think AI will replace an internal audit engagement. Much of what we do in internal audit is based on judgement. So, it’s the analysis of the information part, that’s where AI will lead its intelligence or lead in terms of assisting, and it’s how we actually programme and build the rules around the AI but you will never be able to do away from that human judgement that will still remain.” CAE 10

“You still need a decision maker, you still need a person who will sit in the board room and present the results and whatever outcome from each of the audits, which AI cannot do. It should just be seen as an enabler in us coming up with different results but at the end of the day there’s still the need to have that human intervention or someone making those decisions and presenting the results to the board and the audit committee.” CAE 09

“…. conducting engagements will still need an internal auditor to apply their personal experience, their judgement, their scepticism, to make sure that they understand what the risks and exposures are.” CAE 02

However, participants indicated that certain tasks which are more routine and structured in their design could be performed by AI. Moreover, these structured tasks are generally performed by junior internal auditors during the internal audit testing phase and the profession could see a reduction in headcount at that level which is supported by Agnew (2016) and Acemoglu and Restrepo (2018). Another participant added that junior auditors eventually transition into senior internal auditors and
cautioned that if junior internal auditors are to become redundant the next generation of senior internal auditors cannot be developed and trained. This concern was shared by Beaudry et al. (2016) where lower skilled workers may be moved further down the occupational ladder or out of the labour market altogether.

AI will have a major impact on the internal auditing profession. AI will be incorporated into audit methodologies and it is expected that the audit approach will be improved by AI. Furthermore, AI will influence the decisions that internal audit is required to take.

4.3.2 A fully digitised organisation

Participants speculated that if their organisations were fully digitised, i.e. an automated business model including front office and back office automation, that AI, if programmed accurately, could test the control environment as all controls would be automated. This could transform the role that internal audit plays. In such an environment, internal audit would essentially be called in to review controls at the design stage which if concluded to be adequate, the system itself would then handle control effectiveness. Subsequent internal audit work would then include the review of system change controls. McCuaig (2017) concurred with this view that the most value that can be added would be at the control design stage.

“The head of internal audit, and that person is integrated into any process development into first line so that all the control sits at the head of management. The person is literally there to check what the design is. Once the design is signed off and gets programmed, operating effectiveness gets taken care of by the system.” CAE 06

Participants did however highlight that the possibility of a completely automated control environment would be unlikely citing once again that the more structured or routine processes could be automated but not the more complex, ad hoc or unstructured processes. Similarly, Chan and Vasarhelyi (2018) suggested that full automation is not yet feasible and PWC (2018b) pointed out that routine processes could be automated.
The work conducted by internal audit lends itself to how the organisation operates as it is essentially a process that internal audit would be required to provide assurance on. If the organisation is automated and data rich, internal auditing procedures would need to be aligned to those processes. Viewed differently, if control complexity is low to moderate on structured or routine processes, it possibly could be automated when juxtaposed to control complexity being high where internal audit is required to use professional judgement, professional scepticism and decision-making.

Based on the discussion above, the model in Figure 2 has been proposed by the researcher which builds on the work of Kokina and Davenport (2017) and Abdolmohammadi (1999). It points out independence and objectivity as the overarching principles which should be a requisite within any process being reviewed by internal audit. It then shows that structured processes are more easily and more likely to be automated. Moving from left to right, as processes become more ad hoc or unstructured, full automation is less likely and therefore some human intervention is required. On the far right, where professional judgement, professional scepticism and decision-making is required, human intervention is a necessity. This is also demonstrated by the darker green tab which transforms into a lighter hue as one moves from left to right and similarly the lighter red that becomes darker. The arrow at the bottom demonstrates the move from a straightforward process with low control complexity to one that is more sophisticated and/or subjective.

![Figure 2. Model of processes and extent of automation](image-url)
4.4 The internal auditor of the future

Participants suggested that the skillset of the internal auditor will need to be transformed and evolve with internal audit transitioning from the traditional watchdog approach to a trusted advisor or business partner role whilst taking on a more forward-looking approach.

“… more of a business advisor than the traditional role which was more of a just control assurance. You don’t like that watchdog but really it is like the ‘tick and bash’, making sure that you’ve selected your samples, you’ve done your processes and you’ve given assurance over those processes, but it’s always at a point in time backward looking. So now it’s more, how do you provide insights in terms of the business holistically, rather than focus on one specific area and that’s more forward looking.” CAE 02

Participants were asked if they believe that the internal auditor of the future would be those individuals with IT expertise and experience. Some participants concurred with this view.

“It will be more beneficial to any internal audit department to have IT skills and ultimately the internal auditor of the future will come from IT. So, it will probably start to become a prerequisite to say you have background in IT or some IT qualification in order to effectively do your audits as well.” CAE 09

The majority indicated that the value of internal audit lies in bringing together individuals from different backgrounds, expertise and experience to form an opinion on the control environment. It is this diversity and specialisation that enhance insights and perspectives and assist an organisation to ultimately achieve its objectives. Thus, multi-disciplinary teams are the way forward.

“And so, the difficulty is it cannot be the one or the other, which is very clear, you will need both skills. You need a business or functional skill set and you need a tech skill. The problem is finding out what is the way for these two to interact.” CAE 06
Adding to the above, an appreciation of IT should be an integral part of any internal auditor. The terms “holistic auditor” or “integrated auditor” were used or alluded to by some interview participants which has also been supported by Ramamoorti (2003) and Ratliff and Reding (2002) who suggested, respectively, that internal auditors possess a multiplicity of skills and be prepared to audit everything. It was stressed by other participants that internal auditors need not be specialists in multiple disciplines but should have an appreciation or basic understanding of other disciplines within the environment which they operate. In addition, deep industry experience and a thorough understanding of the organisation is what participants strongly viewed as key. This would allow internal auditors to better contextualise the work that they conduct.

“We are looking for auditors to be integrated auditors. People who understand both IT and business.” CAE 01

“My mission is to create a holistic auditor.” CAE 10

4.4.1 Skillset for the internal auditor of the future

The skills matrix tabled below is a synthesis of skills proposed by CAEs for internal auditors to adapt, remain relevant and continue to add value in the future. The view was that to be a well-rounded professional one needs to possess both technical and soft skills which was supported by Chambers and McDonald (2013) The matrix has thus been split into technical and soft skills:

<table>
<thead>
<tr>
<th>Technical skills</th>
<th>Soft skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of the micro environment as well as the broader macro environment within which the organisation operates</td>
<td>The ability to adapt and embrace change, supported by Chambers and McDonald (2013)</td>
</tr>
<tr>
<td>Understanding the flow of processes i.e. functional skills</td>
<td>Inter-personal skills, supported by Chambers and McDonald (2013)</td>
</tr>
<tr>
<td>Industry and sector specific experience</td>
<td>Negotiation skills</td>
</tr>
<tr>
<td>Timely awareness of any changes within the organisation</td>
<td>Conflict management</td>
</tr>
<tr>
<td>Technical skills</td>
<td>Soft skills</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>The ability to synthesise and use various forms of data i.e. obtain data, understand the data and convert the data into value</td>
<td>Communication skills, supported by Rose (2015) and Gustein and Sviokla (2018)</td>
</tr>
<tr>
<td>An appreciation of IT risks and controls</td>
<td>Emotional intelligence, supported by Chambers and McDonald (2013) and Gustein and Sviokla (2018)</td>
</tr>
<tr>
<td>A deep understanding of internal control and internal auditing concepts</td>
<td>Critical thinking, supported by Rose (2015)</td>
</tr>
<tr>
<td>Understanding the organisation that they service (strategy, operations)</td>
<td></td>
</tr>
<tr>
<td>Understanding continuous auditing methodology</td>
<td></td>
</tr>
<tr>
<td>Business acumen</td>
<td></td>
</tr>
<tr>
<td>An appreciation of IT concepts such as machine learning, AI and processes such as IT programming, coding, designing scripts</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3. Skills matrix for the internal auditor of the future**

The following comments were made by some participants:

“Soft skills will remain relevant for an internal auditor.” CAE 09

“We are also looking for critical thinking, so you need a person that can think further than what the data tells them, to look at different sources of data and to pull that together. We are looking for people who have people skills. So, the sad thing is that we are almost going back to soft skills because for a long time we moved away from training on soft skills to training on technical skills and now we see that there is a shortcoming of the soft skills.” CAE 02

“The auditor of the future has to go and be able to see the links between what’s happening in the outside environment and how that would affect the inside.” CAE 08

“You have to have an appreciation of the IT general controls at a minimum.” CAE 09
“… the role and the experience and qualifications of an internal auditor has got to change. It’s no longer going to be purely just a generalist internal auditor; you’re going to end up having to be fairly well versed with IT, digital data and mining of data. I think you’ll have to be very equipped and experienced in the sector of your client or the company that you’re working for. You’ve got to know the business in and out. So, it’s going to become, in my mind, specialised in terms of industry experience and qualification as well as IT and digital.” CAE 05

The interviews touched on whether formal education, CIA board examinations and training institutions are adequately preparing the internal auditor of the future and if industry experts are in conversation with these institutions on adding these skills to their curricula and programmes. The general view is that not enough is being done to equip and upskill internal auditors for the future. Some participants stated that the conversation has started but has not yet evolved to the level that it should be.

“I think we spoke about how important it is to adapt that curricula now to incorporate these sorts of changes that are coming about.” CAE 12

“There’s a lot of talk about it, but we haven’t seen it going through the ranks to realise it yet.” CAE 07

“I have looked very briefly at what the CIA programme is for next year and I am pretty certain that AI is not included at the moment.” CAE 01

For current internal auditors, continuing professional development (CPD) is key which is a mandatory requirement if one holds the CIA or other designation from the IIA. Participants indicated that 40 hours of CPD per year may be insufficient in order to be kept updated and were of the view that learning is very dependent on the individual to remain current and relevant, and that lifelong learning should be an attribute of an astute internal auditor which was also suggested by PWC (2018b).

“I don’t even think CPD is enough because CPD covers the basics, but it doesn’t mean that you must be limited to 40 hours a year because technology changes so fast. It’s important that you, personally, keep up to date by reading
articles, reading thought leadership, making sure that you contribute in terms of your own community that you work around and within, and industry." CAE 02

“You can have as many qualifications, as many certifications, designations as you like, you can’t stop learning and so it’s not necessarily formal learning that you need to be doing but you need to be reading and whether its LinkedIn or the ISACA guides or whatever it is you need to be constantly updated and learn all the time.” CAE 01

4.4.2 Guidance and frameworks from the IIA

The IPPF does not accommodate the advancements in technology in terms of application. Participants indicated that these documents are too generic, vague, broad in nature and outdated. In contrast, some were of the view that they should be purposely broad and generic to make it possible for organisations of varying size, nature and complexity to apply the IPPF to their organisations. Participants did indicate that a significant revision or amendments to the IPPF is essential. Two participants who were more informed on a possible review of the IPPF suggested that amendments are imminent.

“I think it’s purposely vague. What they have done is made it possible for organisations of varying sizes, varying complexity to apply the standards as it suits their business.” CAE 01

“It does require a relook………start catering for some of the technology aspects.” CAE 10
CHAPTER 5: CONCLUSION

In the context of the fourth industrial revolution and based on the research findings, internal audit like many other professions will see significant change. This change is still in its infancy and has not yet made a meaningful impact. As such, internal auditors do not yet fully understand and appreciate the capabilities that AI brings. It is however topical, gathering interest and industry players are aware of it.

Four primary reasons why the profession cannot be displaced or made redundant include; independence and objectivity as an overarching concern as well as professional scepticism, professional judgement and the decision-making ability of an internal auditor which AI cannot replicate.

In the foreseeable future, AI is going to influence the internal auditing profession and internal auditors need to be agile and embrace disruptive technologies and change, which may imply that internal audit needs to first disrupt itself. This is based on the premise that the profession has seen many transformations from largely manual processes to efficient, sophisticated automated processes.

New ways of working through innovation and collaboration need to be sought by leveraging the capabilities that technology brings with the aim of providing more meaningful insights to recipients of internal audit deliverables. This will cement the legitimacy of the IAF as a value-add and a key participant and trusted adviser central to the achievement of organisational objectives.

The significance of this study is that research of this nature has not been conducted within the internal audit and SA context. A skills matrix has been crafted which was a synthesis of skills proposed by CAEs for internal auditors to adapt, remain relevant and continue to add value. Moreover, a model was developed showing complexity of processes/controls and the extent of automation and human intervention for controls therein.
CHAPTER 6: RECOMMENDATIONS AND FUTURE RESEARCH

5.1 Recommendations

The following practical recommendations are proposed:

- Internal auditors need to gain a deeper understanding of AI and how it can be used to facilitate the audit process, enhance efficiencies and bolster audit outcomes.
- Internal auditors need to stay close to the organisations they serve and move together with their organisations as and when emerging or disruptive technologies are implemented. This includes being involved in digital conversations.
- Continuous auditing methodologies should be implemented owing to the rapid pace that technology and business landscapes are evolving.
- Internal auditors need to leverage the collective intelligence within their organisations in gaining a broader view of risks. This includes collaboration by considering the use of multidisciplinary teams and other subject matter experts.
- When using AI technologies, independence and objectivity should be pivotal.
- Internal audit methodologies should be updated to incorporate the use of AI.
- Internal auditors need to reflect on their competencies and engage in lifelong learning over and above CPD requirements and ensure the content is current and relevant.

5.2 Suggestions for future research

This research was conducted in SA which is an emerging market economy and thus not always at the forefront of the latest developments. It may prove useful to replicate this study in a more advanced economy and conduct a comparison or contrast of the results obtained.

Moreover, the work conducted by Kokina and Davenport (2017) and Abdolmohammadi (1999) could be extended specifically to the internal audit context. Each phase of the internal audit process and methodology can be deconstructed in line with the IPPF.
In addition, the skillset of the internal auditor of the future which has been proposed in this study could be tested through a quantitative approach. A quantitative approach could establish statistical significance through opinion and feedback from the broader internal audit community as well as stakeholders that interact with internal audit or are the recipients of internal audit deliverables.

Furthermore, a deeper understanding of professional scepticism, professional judgement and the decision-making ability of an internal auditor could be explored qualitatively which will build on this study. This could identify nuances of these attributes and an argument could be built as to why these can or cannot be performed by an AI capability.
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APPENDIX A: INTERVIEW AGENDA

1. The current influence of AI on the internal audit profession.
2. The transformations that have occurred in the manner internal audits are conducted (manual versus automated).
3. Are internal auditors keeping up with the pace of change?
4. The possible effects of AI on the future of the profession (susceptibility of jobs).
5. The internal auditor of the future (skill set required).