A case study: an exploration of the implications of computer-assisted audit techniques on the audit approach in terms of the key elements of an assurance engagement.

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I Declaration

I hereby declare that this research report is my own unaided work. It is submitted in partial fulfilment of the degree of Master of Commerce in Accounting at the University of the Witwatersrand, Johannesburg. It has not been submitted elsewhere for the purpose of being awarded another degree or for examination purposes at any other university.

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II List of abbreviations and acronyms

Abbreviation or acronym	Explanation of abbreviation or acronym
ARM	Audit risk model
BRA	Business risk audit
CAATs	Computer-assisted audit techniques
DOS	Disk operating system
IAASB	International Auditing and Assurance Standards Board
ISA	International Standard of Auditing
ISQC	International Standard on Quality Control
IT	Information technology
POB	Public Oversight Board
SAICA	South African Institute of Chartered Accountants
SAP	Systems, Applications and Products. SAP is well known for Enterprise Resource Planning and data management.
SSA	Strategic-systems audit

III Abstract

Not only has IT become more prominent in the business environment, but it has also expanded the available tools at the auditors' disposal. These tools are more commonly known as CAATs. The implications of CAATs have not been addressed adequately in the academic environment. As a result, this leads to the purpose of this research report: to illustrate the implications of introducing CAATs in the audit process on the five key elements of an assurance engagement. A case study methodology has been selected to explore this audit approach in great detail by focusing on one client and its audit firm. This methodology has been chosen to illustrate the context of a computerised audit and its specific consequences over a period of time. As a result, this study has managed to demonstrate the benefits from introducing CAATs throughout each key area of the audit process. In order to achieve these benefits, the auditor needs to consider several matters to ensure an efficient IT-based audit is realised.

Key words: CAATs, data analytics, audit approach, IT-based audit, case study

Chapter 1: Introduction

1.1 Purpose, context and significance of the study

1.1.1 Purpose and context of the study

Auditing professionals need to consider that, as IT continually advances, traditional business structures and systems will need to be modified to align with new technologies (Barac et al., 2016). Consequently, the auditing profession needs to adapt at a similar pace or traditional audit methods will not be adequate in the context of audits of modern corporations (Abou-El-Sood et al., 2015). Nevertheless, new audit technologies are not without challenges. In particular, Knechel (2007) and Curtis and Turley (2007) showed hesitance in adopting new audit approaches when aligning the audit process with emerging IT technologies. This idea becomes relevant with an IT-based audit because prior research has shown some challenges with the implementation of a fully computerised audit. As a result, audit partners and managers should prioritise how they address these challenges so their audits are as effective as possible.

Research has been undertaken to draw conclusions about introducing new audit technologies over the decades and how the key components of the audit process have been affected (Curtis and Turley, 2007, Khalifa et al., 2007, Knechel, 2007). This leads to the main research question of this report:

> **How does the introduction of CAATs in the audit process influence the purpose and outcomes of the key elements of an assurance engagement?**

In order to address the main research question effectively, three sub-questions are presented to supplement the main results:

> **Is the basis of the audit function still integral to a computerised audit?**

> **What are the benefits and challenges which arise from the perspective of the auditor and client following the introduction of CAATs?**

> **What effect do CAATs have on the role of the client in the audit process?**

These questions intend to address a significant statement in prior literature: CAATs should be integrated into the audit process when clients have IT-based business environments (Bierstaker et al., 2001, Kotb and Roberts, 2011). Bierstaker et al. (2014) show that the integration of CAATs in the traditional audit is limited. This means that the benefits of CAATs may only be realised in certain circumstances. The absence of CAATs in the audit process is one of the contributing factors towards a deficiency in an auditor's IT knowledge (Bierstaker et al., 2014). This not only impacts the auditors' risk assessments but also the audit planning phase. This means the auditor should be aware of the effects on the nature, quality and sensitivity of their risk analysis and response (Low, 2004).

1.1.2 The significance of the study

This research provides evidence of the areas of the audit which have been significantly affected by the introduction of CAATs. Practitioners can consider what should be incorporated in their audit plan to manage a fully computerised audit. This includes providing insights into the benefits and challenges of new audit technologies. The consequences of a fully computerised audit can provide standard setters with a basis of how CAATs may lead to an adaption of the auditing standards. To date, the ISAs have had a mainly traditional approach.

1.2 Structure of this research report

Chapter 2 discusses prior literature which forms a basis for this research report. With the use of academic and professional literature, Section 2.1 summarises the key elements of an assurance engagement. Section 2.2 details the implications and challenges of new audit technologies. Section 2.3 discusses prior research about data analytics and other CAATs. This section also discusses the background of disciplinary power in the accounting environment and its possible existence in the context of auditing. Lastly, Section 2.4 summarises key themes addressed by this case study approach. Chapter 3 describes the case study methodology which has been applied in executing this research report. Chapter 4 highlights the significant findings according to a technical review of the implications of CAATs. Chapter 5 summarises the results extracted from Chapter 4 and provides suggestions for recommendations and further research.

1.3 Assumptions

The sample of interviewees has been purposefully selected. The sample includes key audit members who are involved in significant areas of the audit process. These interviewees are assumed to have a comprehensive understanding of the entity and its environment. The inclusion of experienced senior personnel ensures that the quality of the responses enhances the quality of the results (Creswell and Creswell, 2017, Maroun, 2017).

It has been assumed that the selected participants do not represent all views of audit team members who have engaged in a fully computerised audit. Other individuals may share different views on the subject matter as their own experiences would influence their outlook on the use of CAATs.

The interview process has included all audit members involved on the engagement and all relevant case entity contacts to collate a comprehensive picture of the experience on the audit engagement. Furthermore, the participants in the interviews have responded truthfully to the respective questions of the interview agenda (see Annexure A, B and C) (Creswell and Creswell, 2017, Yin, 2018).

The above assumptions have had an impact on the research report in terms of the following:

- The findings are only representative views of the interviewees. Their own experiences with CAATs on the audit engagement have had a certain influence on their response and conclusions.
- CAATs and data analytics are likely to have a unique effect on an audit engagement. This is dependent on the understanding, nature and extent of CAATs. The case study focuses on one client and audit firm which limits the ability to extrapolate findings on a general population.

In order to address the assumptions of the research report, the following have been incorporated in the research methodology:

- Data sources have been collected from external sources to increase the reliability of internal information. This has the potential to allow a possible interference on general populations.
- The effects of CAATs cannot be refined to a single audit engagement. From an experience point of view, any effects from a revised audit approach can only be observed after continuous use. The interview questions directed participants to include their observations of the changes over a number of engagements to establish a pattern of effects over time.

1.4 Scope and limitations

This research report uses a case study methodology (see Section 3). While this provides detailed findings, results may not be generalised because some conclusions may have implications beyond the specific case. As a result, any generalisations and further implications are considered speculative (Leedy and Ormrod, 2010). An example of this is disciplinary power in an accounting and audit environment. This has been included in prior literature for completeness purposes but it is not the primary focus of this research report.

The design of the case study approach is influenced by the researcher. The principles seen as significant to one researcher may not be so for another (Meyer, 2001). Furthermore, as interviews are the main source of data collection, the data and any results will be affected by the individual's perceptions. This results in an inherent level of subjectivity (Yin, 2018).

The observation of the audit of the case entity and access to working paper documentation of the audit firm have been considered. Because of potential confidentiality issues, the researcher had not been granted permission to access these data (see Section 3.3).

1.5 Definition of terms

BRA – an audit approach introduced in the late 20th century. It requires the auditor to obtain a comprehensive understanding of the client. With this audit approach, the auditor should be able to identify management fraud and business failure risks (Curtis and Turley, 2007, Knechel, 2007).

SSA – this audit approach views the audit as an "evidence-driven and belief-based assessment" (Peecher et al., 2007 p. 464). Under this approach, auditors are required to perform ongoing risk assessments and, if risks change, the auditor needs to adapt the audit approach accordingly. For example, if the risk assessment for a particular account is high, the auditor would increase the extent of substantive procedures to address the risk appropriately (Peecher et al., 2007, IAASB, 2009g).

CAATs – "include any use of technology to assist in the completion of an audit" (Braun and Davis, 2003). The use of technology in the context of an audit can range from the use of formulas in Excel to sophisticated data models designed for a particular revenue contract.

Data Analytics – techniques which benefit from current technologies. Auditors can use these techniques to extract and evaluate information. Examples include pattern analysis and detection of abnormalities which assist the auditor with the planning and performance of the audit. As these techniques are a form of technology, they are a subset of CAATs (Schneider et al., 2015, Eimers, 2016).

'Big Data' – this most commonly refers to a large volume of information. Other characteristics include the access to real-time information, variety of data, and data authenticity (Yoon et al., 2015).

Chapter 2: Literature review

2.1 Defining the key elements of the audit risk model

The modern audit has been influenced by the strategic-systems and business risk audit models (Peecher et al., 2007, Schultz Jr et al., 2010). Schultz Jr et al. (2010) and Robson et al. (2007) highlight the importance of including business risk in the risk of material misstatement assessment. This allows the auditor to undertake a more holistic approach when assessing risks per ISA 315 (Low, 2004, Robson et al., 2007, IAASB, 2009e, Schultz Jr et al., 2010). The use of the SSA and BRA in the modern audit process is driven by three factors: risk assessments, evidence gathering and professional judgement and scepticism. This means the current audit model is representative of a system which responds to features of the audit environment (Peecher et al., 2007).

The audit environment is governed by the ARM (Low, 2004, IAASB, 2009a). It can be described as a function of the level of inherent, control and detection risk (Houston et al., 1999, Peecher et al., 2007, IAASB, 2009a). The ARM is considered to be one of four aspects of the modern audit environment as described in Peecher et al. (2007). This model has become an essential guide for the planning of the audit and acts as a benchmark for individual engagements to maintain high levels of audit quality control (Basu and Wright, 1997, Peecher et al., 2007, IAASB, 2009j). These above-mentioned aspects support the key elements of an assurance engagement summarised in *Figure 1*.

Overall objectives of conducting an audit (ISA 200)
Quality control for firms and over the financial statements (ISQC 1 and ISA 220)

Professional judgement and scepticism
Human resources
Effects on audit quality
Engagement performance
Monitoring of the firm's quality control policies
and procedures

Planning the audit (ISA 300) and Materiality (ISA 320)

1. Prior to identification and assessment of risks the following is to be performed:
- Determination of materiality according to ISA 320
- Involvement of experts

2. The overall audit strategy which includes the scope, timing and direction of the audit and includes:
- Nature, timing and extent of resources
- Consider factors which influence professional judgement.

3. The audit strategy is affected by the audit plan and the level of materiality. The strategy includes the following:
- The nature, timing and extent of planned risk assessment procedures per ISA 315 and ISA 320
- The nature, timing and extent of planned further substantive procedures at the assertion level per ISA 330 and ISA 320.

Responses to risk assessed and gathering of evidence (ISA 330 and 500)

1. Design and implement overall responses to the addressed risk of material misstatement at an overall financial statement level.

2. Evaluate the extent of test of controls and substantive audit procedures which depend on:
- The risk assessment of the client (inherent risk)
- Whether the auditor can reply on the controls (control risk)
- Cost-benefit decision of a combined or substantive only approach.

3. Perform procedures to gather appropriate and sufficient audit evidence. Evaluate the evidence on a regular basis to determine whether it is according to ISA 500.

4. Determine the suitability of samples to draw conclusions (ISA 530)

5. Continuously monitor the selected audit approach and adapt procedures as necessary to meet the acceptable level of audit risk.

Identifying and assessing risks of material misstatement through understanding the entity and its environment (ISA 315)

1. Gain an understanding of the client – an auditor's expertise and experience on the client's business and its industry are vital for the audit team.

2. Evaluation of the client including business and strategic analysis.

3. Understand the internal control environment and its control activities and design system diagrams.
- The COSO Framework guides the structure of the internal control process.
- Thorough understanding over risks and control over information systems.
- Possible reliance on internal auditors as it aids the assurance by external auditors (ISA 610)

4. Perform a risk assessment on the overall and assertion levels. The risk assessment is a continuous process.

Documentation

Primarily governed by ISA 230, however, various ISAs state additional documentation in excess of ISA 230. These include:
- Frequent communication between auditor and client management
- Internal control documentation because different structures have an impact on the data collection and documentation process
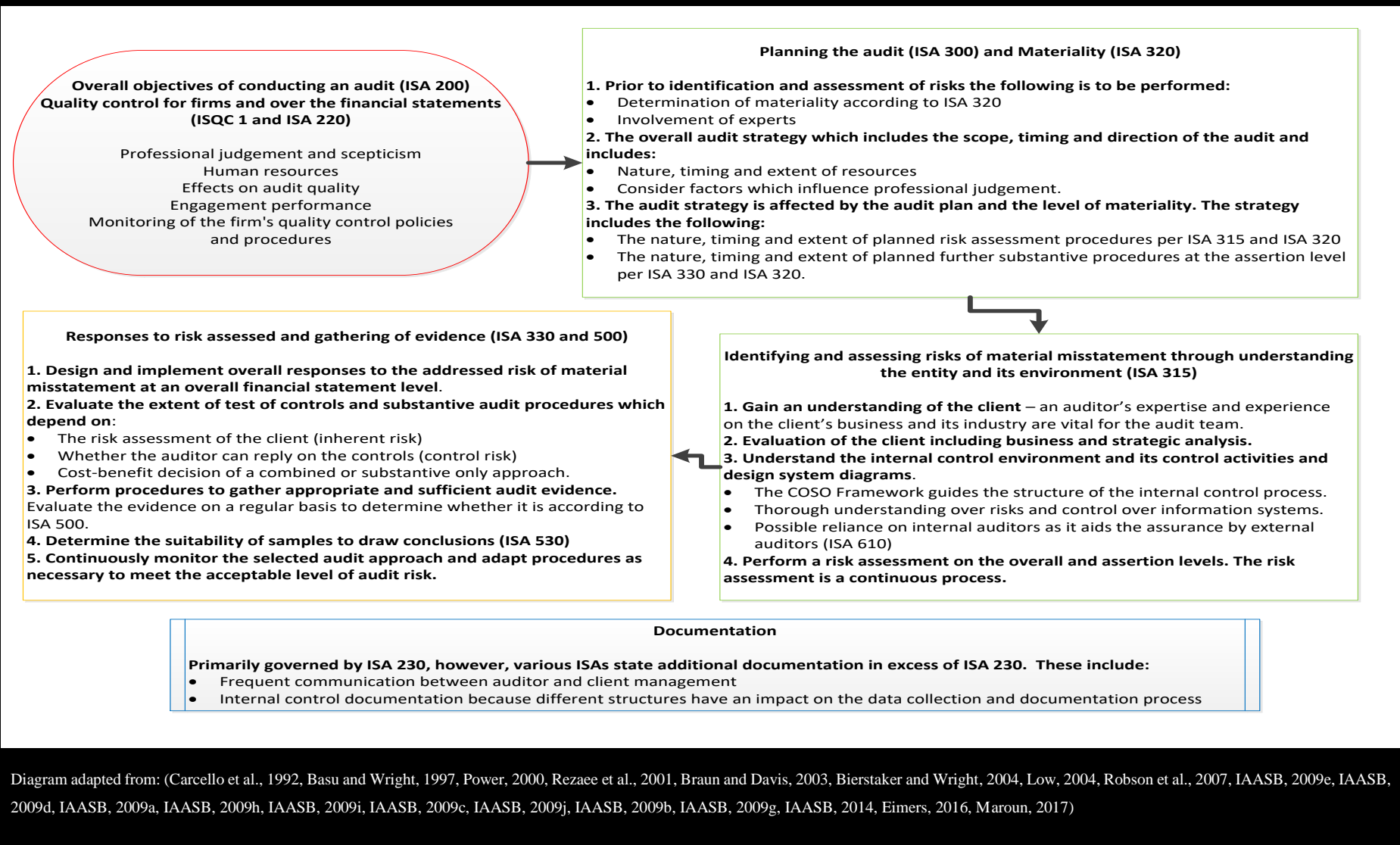
Diagram adapted from: (Carcello et al., 1992, Basu and Wright, 1997, Power, 2000, Rezaee et al., 2001, Braun and Davis, 2003, Bierstaker and Wright, 2004, Low, 2004, Robson et al., 2007, IAASB, 2009e, IAASB, 2009d, IAASB, 2009a, IAASB, 2009h, IAASB, 2009i, IAASB, 2009c, IAASB, 2009j, IAASB, 2009b, IAASB, 2009g, IAASB, 2014, Eimers, 2016, Maroun, 2017)

The foundation of the ARM is materiality. Materiality is fundamental in establishing reasonable assurance over the financial statements. This means materiality affects all elements of the audit process. According to the *Framework,* IAASB (2009f) explains materiality as both a quantitative and qualitative value (Houston et al., 1999, Peecher et al., 2007, Schultz Jr et al., 2010). Risks of material misstatement (influenced by inherent and control risks) are assessed and the auditor adjusts the audit approach in order to maintain an acceptable level of audit risk (Budescu et al., 2012). This adjustment is represented by the auditor changing their level of detection risk to achieve this level of audit risk (Houston et al., 1999, IAASB, 2009a, Budescu et al., 2012).

2.2 New audit technologies: implications and challenges

2.2.1 The principles of the business risk audit

BRA was a fundamental change in the scope of auditing, introducing business risk in the risk assessment process (Bierstaker and Wright, 2004, Curtis and Turley, 2007, Robson et al., 2007). Bierstaker and Wright (2004) showed a higher use of internal control testing under BRA as the audit became increasingly focused on business processes. It may be argued that the changes in audit technologies is a reconstruction of 'what constitutes an audit' according to societal expectations (Curtis and Turley, 2007, Khalifa et al., 2007, Robson et al., 2007). Power (2003) indicates when there is an introduction of a new audit approach, there are some cases where the approach becomes more of a supplementary feature, rather than a substitute. Similarly, Curtis and Turley (2007) show how a new approach will take time to be incorporated. This was particularly evident with practitioners showing reluctance to change to a controls-based approach as they conclude reliance on controls was insufficient (Curtis and Turley, 2007). This shows the difficulty of a new audit technology – reluctance to adapt from "the existing rituals of the traditional audit" (Knechel, 2007 p. 383). Despite the reluctance, the primary goal of the auditor is to modify traditional audit methods to conform to the 'social practices of auditing.'

2.2.2 The social practice of auditing

Audit technologies develop to reduce the socially contested meaning of the audit. This addresses the ambiguity of the nature of auditing (Sikka et al., 1998). Rezaee et al. (2001) highlight a significant number of emerging audit technologies in the assurance engagement to legitimise changes in the audit process. Notable additions include automated audit software, continuous auditing techniques which reassess key aspects of the engagement (refer to *Figure 1*) and integrated test facilities in the audit approach (Rezaee et al., 2001, Braun and Davis, 2003, IAASB, 2009g, IAASB, 2014). This has streamlined the audit process to meet societal expectations (Schultz Jr et al., 2010). From a social perspective, the practical implementation of contemporary audit methods should first be understood about its development and possible consequences (Barrett et al., 2005, Peecher et al., 2007). The SSA,

for example, has been built upon the principles of the BRA in developing a more contemporary audit (Peecher et al., 2007, Schultz Jr et al., 2010). Given the rise of e-business in the economic environment, computerised audit tools have become increasingly relevant in modern audits and, as a result, the auditors need experience when managing these types of audits (Abou-El-Sood et al., 2015, Barac et al., 2016).

In the context of computerised audits, Braun and Davis (2003) highlight the POB's Panel on Audit Effectiveness questioning auditor's expertise of information systems and related controls in an IT environment (Abou-El-Sood et al., 2015). The introduction of CAATs in the audit model is a likely occurrence when e-business is being normalised in corporations (Kotb and Roberts, 2011, Abou-El-Sood et al., 2015). Auditors revise their technical knowledge so that it is relevant to current audit expectations. For example, auditors are currently improving and refining their IT skills with the aim of increasing their individual specialisation on computerised audits (Braun and Davis, 2003).

2.3 What is the future of conducting the audit function

Auditors should continually increase their individual specialisation within their audit team to manage complexities in the modern business environment (Braun and Davis, 2003, Barac et al., 2016). For this reason, audit firms should align the audit function with the innovations in the business environment (Abou-El-Sood et al., 2015). CAATs, and particularly, data analytics are the driving force of the current audit environment (ACCA, 2010, Barac et al., 2016). Currently, data analytics present auditors with the opportunity to create additional value by means of a continuous auditing approach (Rezaee et al., 2001, Schneider et al., 2015). Data analytics have been seen as a main consideration for the modern audit environment. This allows the auditor to create an efficient and effective audit to address the public interest (Braun and Davis, 2003, Dowling, 2014, Eimers, 2016).

2.3.1 Computer-assisted audit techniques: data analytics and 'Big Data'

Generally, the ISAs are based on principles, rather than on specific elements adopted in current practice (Eimers, 2016). CAATs have been briefly mentioned in the ISAs such as in ISA 330 (IAASB, 2009g). The extent that the ISAs discuss CAATs are limited, despite these techniques becoming more integral to the audit process. Research shows that computerised audits are able to maintain high-quality audits because computerised audit tools have been embedded in the planning and completion phases of the audit (Stoel et al., 2012, Abou-El-Sood et al., 2015). Data analytics present the auditor with a method to obtain a "more effective and robust understanding of the entity and its environment, enhancing the quality of the auditor's risk assessment and response" (Eimers, 2016 p.7). For example, the auditor can obtain more detailed results from risk assessments (Schultz Jr et al., 2010, Eimers, 2016). This supports the importance of professional judgement and scepticism even though there has been a rise in automated

testing and analysis of large populations (Francis, 2011, Eimers, 2016). The challenge for larger populations, particularly with Big Data, is filtering out unnecessary information (Schneider et al., 2015).

ISA 500 requires the auditor to collect sufficient and appropriate evidence to form a basis for providing the audit opinion. Big Data contributes to the audit gathering process and particularly to sufficient and reliable evidence per ISA 500 (IAASB, 2009h). Large volume and real-time generation of data support sufficient evidence which is detailed and complete. Given that the auditor can access Big Data directly, the reliability of audit evidence is increased due to greater data protection against tampering from unknown sources (Schneider et al., 2015, Yoon et al., 2015). Prior research on CAATs shows the integration of computerised techniques with the traditional audit. Given the increase in the need for accurate data and recognition of all underlying economic events, these and other factors influence the reliability of financial statements and decisions of corporations (Dowling, 2009).

2.3.2 Prior research on CAATs influence on the audit process

Computerised auditing has slowly been integrated into the audit process with a number of consequences. Generally, financial and IT auditors have reached a consensus that e-business has created discomfort in the auditing profession (Kotb and Roberts, 2011). The traditional financial audit practices and techniques are no longer adequate for conducting an entire audit. Implementing a computerised audit has become a driving force behind taking the audit function in new directions (Kotb and Roberts, 2011, Abou-El-Sood et al., 2015). According to ISQC 1, quality control policies and procedures are an important matter and an important consideration for the effects of CAATs. Auditor productivity levels have shown significant improvements after the implementation of IT in the audit function (Banker et al., 2002). Furthermore, Dowling (2014) showed a rise in audit effectiveness in terms of preparer and reviewer interactions. Results seem promising but the integration of CAATs is complicated because auditors may need a period of time to understand computerised techniques fully (Dowling, 2009).

An example of a negative consequence of the introduction of CAATs concerns the auditors' behaviour and interactions with the audit teams. Dowling (2014) found lower independent judgements of the preparer. This could have negative effects on a firm's quality control system and the design and implementation of the audit plan. Research also shows auditors who lack relevant training and expertise of IT reduce quality of the audit. (Brazel and Agoglia, 2007, Abou-El-Sood et al., 2015). If auditors do not address these factors, this can lead to negative implications on all areas of the audit process.
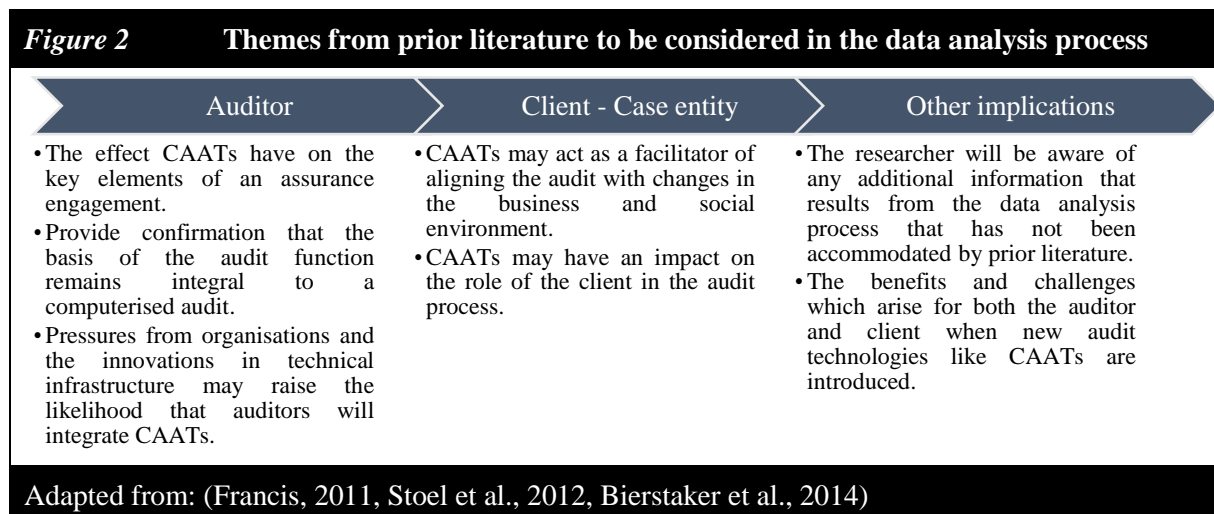
Francis (2011) explains that judgement and decision-making play a vital role in the planning, collection, and analysis of evidence. Even in the context of IT, planning and the methodology of the audit are significant determinants of audit quality (Stoel et al., 2012). ISA 300, 315, 330 and 500 describe key consideration of planning, collection and analysis of evidence (IAASB, 2009d, IAASB, 2009e, IAASB,

2009g). This is a confirmation that the basis of the audit function remains integral to new audit technologies. CAATs, as a result, facilitate a changing audit. Bierstaker et al. (2014) support this notion as there are pressures in organisations and the continuous enhancement of technical infrastructure. These circumstances increase the likelihood that auditors will integrate CAATs in their audit model (Dowling, 2009).

The integration of CAATS into the audit model, as it becomes more widely used, may be described as a 'functional' accounting technology. van Zijl and Maroun (2017) iterate that the incorporation of 'functional' accounting technologies is not limited to changes in economic circumstances. This expands the notion of the audit as a product of social and political environments in addition to economic considerations (Sikka et al., 1998, Mock et al., 2009, Porter et al., 2012). This is similar to the principle behind the adoption of SSA and BRA in contextualising the integration of new audit technologies. This may imply that systems of accountability, such as auditing, have developed secondary roles[1]. This is based on insights into the concept of audit regulation on the relationship between disciplinary power and systems of accountability (Watts and Zimmerman, 1983, Maroun and Atkins, 2014).

The purpose of auditing, as an accountability mechanism, is to assure the shareholders are confident in the role and function of the assurance engagement (Maroun and Atkins, 2014, van Zijl and Maroun, 2017). Current innovations in CAATs allow the auditor to conduct the audit with a better understanding of the client, a continuous auditing approach and detailed audit procedures (Rezaee et al., 2001, Schneider et al., 2015, Eimers, 2016). Consequently, this codifies an auditing process which is subtly present at the client on a daily basis and this creates a 'disciplinary effect' (Watts and Zimmerman, 1983, IAASB, 2009j, van Zijl and Maroun, 2017).

2.4 Synthesis: literature review

Figure 2	**Themes from prior literature to be considered in the data analysis process**	
Auditor	Client - Case entity	Other implications
• The effect CAATs have on the key elements of an assurance engagement. • Provide confirmation that the basis of the audit function remains integral to a computerised audit. • Pressures from organisations and the innovations in technical infrastructure may raise the likelihood that auditors will integrate CAATs.	• CAATs may act as a facilitator of aligning the audit with changes in the business and social environment. • CAATs may have an impact on the role of the client in the audit process.	• The researcher will be aware of any additional information that results from the data analysis process that has not been accommodated by prior literature. • The benefits and challenges which arise for both the auditor and client when new audit technologies like CAATs are introduced.
Adapted from: (Francis, 2011, Stoel et al., 2012, Bierstaker et al., 2014)		

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[1] Any supplementary aspects found in relation to the case study are discussed in a limited manner in Chapter 4 as these implications are beyond the scope of this research report.

Chapter 3: Methodology

3.1 Method

This research uses a qualitative case study methodology in keeping with its exploratory nature[2] (Yin, 2018). It replicates the approach followed by O'Dwyer et al. (2011)[3] and McNally and Maroun (2018). Additionally, the explanatory perspective of this research report is inspired by a grounded theory approach[4] (Leedy and Ormrod, 2010, Bloomberg and Volpe, 2012). The explanatory perspective is supported by data sources which are external to the audit engagement under review. Data from various sources (see Section 3.3) have been used to determine whether or not there are links between CAATs implementation and the key assurance elements in a real-life assurance engagement (Baxter and Jack, 2008, Yin, 2018). The case study methodology is suitable for evaluating the effects of CAATs within one audit engagement as a result of the following:

1. Case studies are designed to focus on a particular area of interest (what are the effects of CAATs on the audit approach). In turn, the researcher can examine the contextual realities of a phenomenon to synthesise specific results under set conditions. The case study focuses on one audit engagement with certain areas of the audit where CAATs has a certain use.

2. The results from the case study can form the foundation for possible further research that expand on the context and nature of any unusual findings or whether the final results can be extrapolated for a general population.

3. Case studies often follow a structured framework to guide the research process. This creates a function where (1) the data collection process of various data sources is streamlined and (2) identification of common themes or inconsistencies to address research questions as discussed in Baxter and Jack (2008) and O'Dwyer et al. (2011).

3.2 Case entity and audit firm[5]

In the recent audits, the extent of CAATs has increased significantly. This presents a primary opportunity to evaluate the key changes in an assurance engagement through comparisons before and

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[2] A case study approach allows for a detailed analysis for the researcher to understand the effects of CAATs in an assurance engagement. Furthermore, case studies involve replication of prior theoretical conceptual frameworks (Perry, 1998, Meyer, 2001, Baxter and Jack, 2008, Bloomberg and Volpe, 2012, Yin, 2018). This research approach is consistent with the idea of providing context to a specific phenomenon which offers an opportunity for the researcher to understand its complexity and evaluate each individual component (McNally and Maroun, 2018, Yin, 2018).

[3] The O'Dwyer et al. (2011) article has been purposefully chosen as it is published in one of the top international accounting journals. This aids the validity of this research report's methodology as the published journal article is well-known and regarded in the accounting environment (Creswell and Creswell, 2017).

[4] The objective of this research report is not to develop a new theory but to build a theoretical foundation on the effects of a predominantly computerised audit. This is a primary reason for the selection of a grounded theory approach. The use of this approach adds to the body of theoretical knowledge because there is limited prior research on the application of computerised audit technologies.

[5] The information on both the case entity and the audit firm is limited due to confidentiality issues (refer to Section 1.4).

after the IT-audit implementation. The researcher chose to study this case entity and audit firm because the audit firm has performed CAATs on this particular engagement since 2013. This provides a well-established case for the researcher to analyse.

3.2.1 Case entity

The case entity is a significant operating subsidiary of a well-established business incorporated in the late 1990s. The business model of the case entity involves managing the surplus capacity of its parent company. Consequently, the case entity is seen as a dedicated channel to process raw materials purchased by its parent. The parent company is a listed entity on the Johannesburg Securities Exchange (JSE) in South Africa. The case entity forms part of a large organisation with the parent company's ownership structure that ranges from trust funds to individuals from the general public. This illustrates the size and ownership structure of the case entity's group and operations.[6] The parent company of the case entity authorised a complete overhaul of its IT system in between 2012 and 2013.

The first phase of IT implementation at the case entity was a DOS-based system. This system, according to the respondents at the case entity, was functioning prior to 2013. A notable feature of this system was that it had been coded for a specified purpose. Despite its limited sophistication, the personnel at the case entity preferred the compartmentalisation of its functions for ease of use. From 2013, the case entity's IT system transitioned to a SAP-based accounting system. This decision was approved by the parent company.

The goal of the holding company was to have a recognisable accounting system which provided a central location for all information for the group to have readily available access. The previous system was difficult to access by the holding company: there was a perception that the case entity was an independent from the group. It appeared as if the case entity would run without supervision and be unable to interact with the other companies. As a way to eliminate this, the holding company believed the new system would sustain a more streamlined process because the company is of the perception that the SAP accounting system has more flexibility and module capabilities.

One notable difference between the DOS-based and the new accounting system was the ability of the auditor to extract data from the system when needed. This was the stepping stone for the incorporation of CAATs from the auditor's perceptive. With all of this in mind, the personnel of the case entity have a comprehensive knowledge regarding the implementation of their SAP accounting system which is

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[6] Even though the case entity is not a standalone business, this is not viewed as a limitation to the study. The entity is a fully functional statutory entity in its own right which does not conduct minor operations despite managing the surplus capacity of its parent company. This does not limit the parameters of the research report and the information collected from the various sources is sufficient for the researcher to synthesise conclusions from the findings.

further explained in Chapter 4. These individuals communicated with the auditors during audit engagements which involved and did not involve CAATs.

3.2.2 Audit firm

The audit firm has been the auditor of the case entity for a number of years (over 25 years). For most of this period, a traditional audit approach has been followed, involving limited use of CAATs. Before the SAP implementation, the audit process was a manual, paper-driven process. The respondents stated that the audit had a procedural aspect with a 'tick-box' exercise and relied heavily on agreeing financial reports to physical source documents to obtain sufficient appropriate audit evidence. The audit was described as 'hard, manual labour' employed by the team. Despite this traditional manual process, the auditors strived for a control-based approach even before the assistance of CAATs (refer to Section 4.3 and 4.5):

> "… We tried over the years to **implement additional control reliance procedur**es where we can rely on some of the inputs because **it is a report driven process more than anything else**…" (*Interviewee 5, emphasis added*)

3.3 Data collection

Data have been collected from different sources. The first 'level' of data collected includes the following: (1) interviews, (2) the review of periodicals and manuals of the audit firm and lastly, (3) attendance at workshops accredited by SAICA[7]. The main purpose of providing these two levels of data is to formulate a discussion in order to reach conclusions from an internal and external perspective. The reasoning behind the second 'level' of data is to add further perspectives amongst different categories of interviewees. Each category presents a different outlook on the interview agenda (see Annexure A, B and C) and presents an opportunity to develop an argument to contribute to the purpose of this research paper (Leedy and Ormrod, 2010, Yin, 2018). Consequently, the interview process has been divided into three distinct groups of respondents: the audit team, the IT technical function at the audit firm and personnel at the case entity. The data sources are summarised in *Table 1*.

Table 1: A breakdown of the data sources applicable for the case study

Internal data sources to the assurance engagement under review			
Data source	**Description of data source**	**Level**	**Duration of interview**
Interviewee 1	Current audit manager of the audit of the case entity	1 and 2	45 minutes

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[7] These workshops were attended by the researcher throughout the course of the year. Topics of these workshops included the audits in the digital age and the future of the audit profession.

Interviewee 2	Former audit trainee of the audit of the case entity	1 and 2	45 minutes
Interviewee 3	Former audit manager of the audit of the case entity	1 and 2	75 minutes
Interviewee 4	Current audit partner of the audit of the parent company and case entity	1 and 2	30 minutes
Interviewee 5	Current audit manager of the audit of the parent company and case entity	1 and 2	50 minutes
Interviewee 6	Client	1 and 2	Collective interview undertaken – 90 minutes
Interviewee 7	Client	1 and 2	
Interviewee 8	Client	1 and 2	
Interviewee 9	IT technical team	1 and 2	20 minutes
Technical Report 1	Understanding a financial statement audit	1	Not applicable
Technical Report 2	Value of data analytics	1	
Firm Report 1	The firm's new audit approach	1	
Firm Report 2	Blockchain in auditing	1	
External data sources to the assurance engagement under review			
Data source	**Description of data source**	**Level**	
Conference Report 1A	Auditing (and accounting) in the digital age	1	Not applicable
Conference Report 1B		1	
Conference Report 1C		1	

3.3.1 Interviews

The primary source of data collection is semi-structured interviews (shorter case study approach) (Leedy and Ormrod, 2010, Yin, 2018). Leedy and Ormrod (2010) and Yin (2018) recommend a purposeful selection to be undertaken in a case study methodology. Perry (1998) states that a purposeful selection approach is central to a methodology like a case study approach. Yin (2018) emphasises that the selected participants need to be chosen within the context of the study. This means interviewees should be part of the audit team or the case entity to provide relevant information about this assurance engagement.

With this in mind, participants of the audit firm are the core human resource on the case entity's audit engagement (O'Dwyer et al., 2011). Audit partners and managers were involved in implementation and execution of the policies and procedures of the auditing firm, structuring the audit planning process and assisting in gathering audit evidence (IAASB, 2009j). The technical personnel assisted in the procedural aspects such as the implementation of CAATs and managing possible challenges during the audit. The personnel of the case entity were present at the case entity for several years and provided insightful details about their IT systems[8].

All interviews have been digitally recorded to enhance accuracy and allow further analysis. Consent to record interviews was obtained prior to conducting the interviews (Leedy and Ormrod, 2010, O'Dwyer et al., 2011). Interviews have been organised according to the schedule of the interview participants and were conducted between 1 June 2018 and 31 August 2018. Each interview has been transcribed and, during the discussions, notes were made to summarise responses (Leedy and Ormrod, 2010, Maroun, 2017, Yin, 2018). It is noted that the aim of this process was not to generalise any of the responses or extrapolate any findings but to document each respondent's own perceptions. Here, these responses in their original form could provide a conceptual explanation for the researcher to interpret the results effectively (O'Dwyer et al., 2011, McNally and Maroun, 2018).

Participants were invited by e-mail detailing the general nature and purpose of the research (O'Dwyer et al., 2011, McNally and Maroun, 2018). This is an opportunity to reflect on their own experiences (O'Dwyer et al., 2011, Creswell and Creswell, 2017, Maroun, 2017). The researcher was able to guarantee anonymity and scheduled a time with each participant, according his/her schedule (O'Dwyer et al., 2011, Maroun, 2017, Yin, 2018).

At the beginning of each interview, the researcher stated that the respondents could respond openly and emphasised that there was no "correct" or "incorrect" answer. Despite the questions varying in order and phrasing, the established themes were consistent throughout the interviews (McNally and Maroun, 2018). The questions were phrased not to direct the participants towards a specific answer nor restrict them from providing a range of responses (Maroun, 2017, Yin, 2018). Consequently, the participants led the discussion (Baxter and Jack, 2008). In maintaining a semi-structured interview approach, the respondents had the freedom to respond without interruptions. When it was necessary, the researcher asked the respondents for further explanations, rephrasing of particular statements or providing examples. This process aided the detail the researcher incorporated in the data analysis (Maroun, 2017, Yin, 2018).

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[8] It has been specified that for a purposeful sampling approach, it is necessary for all the selected participants to have experience of the phenomenon being studied (Creswell and Creswell, 2017).

3.4 Data analysis

The analysis results from the data sources were categorised into groups such as common themes or single instances (Bloomberg and Volpe, 2012, Yin, 2018). These common themes were either exact words from the interviewees and the other data sources (periodicals and manuals of the audit firm and the information gathered from the workshops) and were grouped under 'code headings' developed by the researcher (McNally and Maroun, 2018). Here, pattern identification is an important step to aid the main results. The final step in the analysis process includes synthesising all results and interpretations for an overall summary (Leedy and Ormrod, 2010). This assisted with the format of the results analysed from all data sources (level 1 and 2): examination of results in single discussion within Chapter 4 of the research report.

To make sense of the data, the researcher segmented the data for further analysis and reconstructed that analyse to reach conclusions (Bloomberg and Volpe, 2012, Creswell and Creswell, 2017). This was done by coding. The data analysis process in this qualitative research supplements both the validity and reliability of this case study (Leedy and Ormrod, 2010). The coding process is presented to explain how interview data (level 2) has been analysed. The process was also modified and applied for level 1 data. This allowed findings from both types of sources (Level 1 and Level 2) to be contrasted in forming cohesive conclusions.[9]

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[9] Use of the term is not intended to suggest a scientific/quantitative analysis technique.

3.5 Validity and reliability of the study

Validity and reliability strategies are essential to a high quality study and have been incorporated in this research to ensure the study is reliable and valid (Creswell and Creswell, 2017, Yin, 2018).

Validity

Variety of data sources which support similar conclusions is an important consideration in qualitative research. This provides the researcher with a more definitive answer that the results are accurate (Leedy and Ormrod, 2010, Creswell and Creswell, 2017). As discussed in Section 3.3, the data sources were segregated into two levels including external sources to validate the results from the respondents of the case entity, the audit firm and the IT team. For instance, the researcher confirmed major themes and interpretations with workshops accredited by SAICA.

The collection of detailed descriptions of key effects arising from the implementation of CAATs' effects was essential, for example, through discussions with the different types of respondents (Creswell and Creswell, 2017, Yin, 2018). Moreover, additional details were obtained by reviewing documentation such as *Technical and Firm Reports* of the audit firm as mentioned in Section 3.3.

Reliability

The reliability safeguards included the review of transcripts after each interview to confirm whether any obvious mistakes had been corrected and the documentation of all research procedures had a logical approach throughout the data collection and analysis processes (Creswell and Creswell, 2017).

The interview questions were newly designed for the purposes of this case study approach. Leedy and Ormrod (2010) and Yin (2018) emphasise that these interview questions are required to be pilot tested. The researcher pilot tested the questions with the first two interviewees. During these interviews, the interviewees felt the questions were clear and did not lead to any misunderstandings. As a result, the researcher was able to conclude that the interview agenda (see Annexure A, B and C) was appropriate for the subsequent interviews.

In order to enhance the reliability and validity of this research report, ethics clearance has been provided in order to conduct interviews. Ethical clearance ensures that the undertaking of a qualitative research method is suitable under research guidelines and common practice. Refer to Annexure D for the full ethics clearance.

Chapter 4: Technical review – the effects of CAATs on the key elements of an assurance engagement (results of the case study)

After discussions with the respondents of the audit team and inspections of several key documents, three main data analytics have been considered on the case entity's audit engagement. *Table 2* explains further:

Table 2: The significant data analytics used to conduct the audit on the case entity since the 2013/2014 financial year

Data analytics	Explanation of the data analytic
Descriptive analytics	These analytics can provide a visual representation of data available at the case entity. Examples include graphs, interactive diagrams and flow charts (*Technical Report 2*).
Diagnostic analytics	These data analytics explain the nature and purpose of the case entity's data by deconstructing complex processes. In the 2016 financial year, the auditing firm introduced a diagnostic tool called *Jupiter*[10]. Its key purpose is used to analyse the journal processing system at the case entity. In its initial implementation, there was hesitance for the audit team to use this tool. For the audit firm, the tool was a relatively new auditing technique and it had a high implementation cost. After numerous reassessments and cost management, *Jupiter* became a core data analytic in the 2016 and 2017 financial statement audits (*Interviewee 5*).
Reperformance or recalculation analytic	This data analytic requires the data extracted from the case entity's system. Two steps were followed in this process. Firstly, the underlying data and the integrity of the client's system needed to be verified. Once this was confirmed, the auditor could use this data to 'reconstruct' significant line items from an independent perspective. There are specifically designed models that assist the auditor with this recomputation (*Interviewee 1, 2 and 3*).

Conference Report 1B outlined that techniques build on previous advancements which have already been established. Similar to the principle highlighted in Power (2003), the introduction of new audit approaches normally undertake a supplementary role. Re-inventing the basic foundation of the audit may not be practical (discussed further in Section 4.2 and 4.5). Discussions with the interview participants involved in the audit and inspection of documentation listed in *Table 1* (Section 3.3) have highlighted the importance of the key elements outlined in Section 2.1. *Table 3* describes the significance of each key element established according to prior literature.

Table 3: Assessment of the importance of key elements of an assurance engagement

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[10] For the purposes of this research report, this diagnostic auditing tool will be referred to as *Jupiter* because of possible confidentiality issues. Jupiter is a diagnostic analytical tool developed by the audit firm for journal entry testing. Journal entries (particularly manual entries) are normally considered an area of significant risk. The auditing tool is subject to an automated process in the extraction of journal entries for the auditors. This not only reduces the time allocated on journal entry testing but focuses the auditor's attention to what would be of audit interest. The nature of the entries has particular characteristics of audit interest which assists the auditors pinpoint areas of more significant concerns.

Colour code	Importance rating
	Not stated
	Stated without clarity of importance
	Fairly important
	Important
	Critical to the conduct of the audit

Key area / Data source	Overall objectives of the audit (Section 4.2)	Planning the audit (Section 4.3)	Understanding the entity and its environment (Section 4.4)	Responding to risk and gathering of audit evidence (Section 4.5)	Documentation (Section 4.6)
Interviewee 1	Stated without clarity of importance	Critical to the conduct of the audit	Important	Stated without clarity of importance	Fairly important
Interviewee 2	Stated without clarity of importance	Critical to the conduct of the audit	Important	Fairly important	Critical to the conduct of the audit
Interviewee 3	Important	Critical to the conduct of the audit	Important	Important	Fairly important
Interviewee 4	Stated without clarity of importance	Critical to the conduct of the audit	Important	Stated without clarity of importance	Not stated
Interviewee 5	Stated without clarity of importance	Critical to the conduct of the audit	Critical to the conduct of the audit	Fairly important	Not stated
Technical Report 1	Important	Stated without clarity of importance	Important	Important	Not stated
Technical Report 2	Not stated	Not stated	Not stated	Fairly important	Not stated
Firm report 1	Not stated	Important	Fairly important	Stated without clarity of importance	Not stated
Firm report 2	Not stated	Not stated	Not stated	Stated without clarity of importance	Not stated
Conference 1A	Stated without clarity of importance	Not stated	Not stated	Not stated	Not stated
Conference Report 1B	Stated without clarity of importance	Stated without clarity of importance	Important	Stated without clarity of importance	Not stated
Conference report 1C	Stated without clarity of importance	Not stated	Not stated	Stated without clarity of importance	Not stated

Table 3 summarises how the various data sources prioritise the key areas of the audit process. These data sources provide evidence that the basis of the audit function does not change, even though computerised systems have been introduced (Stoel et al., 2012). Accordingly, the basic principles of the

audit are still relevant in a modern computerised audit[11]. Each component has been analysed to draw conclusions on the implications of CAATs in an assurance engagement so the researcher can address the research questions highlighted in Section 1.1.1.

4.1 The implementation of CAATs

One of the main drivers of the incorporation of CAATS in this case entity's assurance engagement is the auditor's curiosity to experiment:

> **"[The CAATs approach] was done, I think out of natural curiosity**. We wanted to experiment. It was almost a case of, we had difficulties with the client, there were a lot of technical issues that had to be resolved and we got over those technical hurdles and once that had been done, **we sat down – how are we actually now going to improve [the audit**]." (*Interviewee 3, emphasis added*)

The implementation of CAATs has become a major feature of the audit and is in line with the principles of the ISAs. The audit team has always been inclined to find techniques which lead to more efficiencies (*Interviewee 3 and 5*). More recently, a major concern for the auditors has been the implementation of stricter audit timelines. To address this, the auditor needs to invest time in exploring alternate methods:

> "**[The audit firm] acknowledges that the direction of the audit is IT**. But it is more of let's see if it works, can it recalculate, is there a possibility? We sit many times with our IT department – this is our story and what can you guys do for us? If they say yes then you can go ahead and see what the outcome of that is…" (*Interviewee 5, emphasis added*)

New technologies arise on a regular basis which is why the audit firm is aiming to utilise IT to the best extent possible. The auditors are willing to experiment with different audit approaches such as IT-driven audits even if the approach may deliver unexpected results. The auditors can adapt the audit in response and, at the same time, determine why an unexpected outcome occurred. *Conference Paper 1C* details how in these circumstances, the auditor should perform his/her responsibility over and above a mere compliance exercise (see Section 4.5 for further explanations):

> "In their own mind, they don't seem to realise that there is a **personal investment and you, as the auditor, need to be passionate**... **And you need to take the initiative to do the testing**. And when something goes wrong, don't just go and select something else – **find out why it is going wrong**." (*Interviewee 3, emphasis added*)

Conference Report 1A states that innovation is a constant. However, before these could be used for the purposes of the audit, they needed to be evaluated (*Interviewee 5)*. The implementation of CAATs in

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[11] The evaluation and concluding phases of the audit have been considered for the purposes of this research report. Under due consideration, the use of CAATs would not lead to a change of the auditing principles under the evaluation and concluding ISAs nor do CAATs create any additional value for the auditor or client in these areas. As a result, the focus of the research report is to explore the areas of the audit function that would provide illustrates of practical applications of CAATs.

this assurance engagement has provided evidence of several benefits which can be realised. On the other hand, there are potential costs which arise and may not be intended. Benefits and costs identified by various data sources are summarised in *Figure 3*.

Figure 3   Benefits vs the costs of the implementation of CAATs in the assurance engagement

Realised benefits of the CAATs implementation

- The auditor understands the case entity better from a business perspective as the auditor has a complete overview of the whole business. This links to the concept of the BRA integrated in the risk assessment. The auditor has the ability to outline how the business and IT systems function. There was additional coverage of certain sections of the case entity that in previous engagements had not been assessed. This links to the concept behind the selection of necessary and relevant data.
- The risk response applied by the auditor was more appropriately applied in comparison to previous engagements.
- There is a higher coverage of the balances and transactions in the case entity.
- There is an accelerated time management of the audit - there is a higher recovery of the audit fee.
- The managerial aspect of the engagement improves. Prime examples include overtime for trainees becomes non-existent, the overall pressure of the team is reduced and the atmosphere is more pleasant with less complaints.
- The efficiency and time management of an IT-based audit allow trainees to manage their time more effectively. For example, trainees on the audit team had excess time to complete files and review their notes of their other clients during the audit engagement. In summary, this relieves pressure placed on auditors because the efficiencies of the planned audit approach free the audit team's time allocation.

Possible costs to the CAATs implementation

- The incorporation of IT experts on the audit team is an additional cost to the firm. The firm needs to evaluate its budgets to allocate costs to these specialised personnel.
- The audit firm needs to ensure it has enough budget to incorporate time to experiment and possibly implement new technologies. Innovations are inherently expensive to design and implement as indicated by the premium cost of IT experts.
- A notable drawback to CAATs is, if during the audit, the application of computerised techniques are not sufficient or appropriate, time pressure is created to change the audit approach. This places pressure on the recoveries of the audit fee.
- There is a steep learning curve for trainees to apply their mind in an IT-based audit. Additionally, audit technical may not fully understand the entire audit process incorporated with concepts of IT techniques.
- The regularity body of the profession often encourage IT-driven audits, yet the body itself cannot explain how an audit team should conduct the audit in order to gain comfort over the system and what the expectations of the audit should be.
- On an international scale, sometimes data can be accessed only through cross-border transmissions. This means audit firms need to consider whether there are any data restrictions such as laws in these countries.

Data extracted from respondents from the audit team, case entity and IT team, *Technical Report 2* and *Conference Paper 1A*.

4.2. Objectives of external auditing

An audit grounds the trust and obligation of stewardship between those who manage a company and those who own it or otherwise have a need for a 'true and fair' view (*Technical Report 1*). These individuals are the stakeholders (*Interviewee 3* and *Technical Report 1*). In the earlier years of the CAATs' implementation, the audit firm experienced difficulties in two areas: the auditors' interactions with the case entity's IT-systems and technical issues of a revised audit approach. In order to manage these difficulties, the auditors referred to the objective of external auditing and how to provide value to the case entity. *Table 4* summaries the findings.

Table 4: Core principles of value on a client engagement with the integration of data analytics

Core principles	Explanations on 'value' extracted from *Conference Report 1C*	Corroboration with other data sources
Outputs	Users of the case entity's financial statements such as shareholders, should be able to draw reasonable conclusions from the audit opinion. As a result, there should be an impact on the business as the financial statements have been given reasonable assurance that the financial statements have been prepared correctly in all material aspects.	The auditors and *Technical Report 1* specified that the primary objective for an assurance engagement is to provide confidence to shareholders: "I don't mean adding value to the client. I think the whole purpose of external auditing **is not to add value to the client**. The purpose of external auditing is to **give the shareholder confidence that the financial statements are correct**." (*Interviewee 3, emphasis added*) As a result, if the auditors focus on providing value to shareholders, they can realise the full benefits of a computerised audit.
Timeliness	Information from the audit is usually generated months later. In the long run, this information has minimal to no value for the case entity. Data at the case entity does expand on a regular basis. This presents an opportunity for the use of data analytics. The auditor has the ability to pinpoint relevant data (an example of what continuous auditing entails). As most of the data at the case entity have a digital footprint, data sharing becomes instantaneous and increases the time efficiencies during the audit.	The concept of remote access and the ability to extract the case entity's data allow the auditor to execute a continuous audit approach. The design of the SAP system facilities the process: "This [SAP] integration has definitely helped a lot especially now with the audits because **you guys, have access to SAP and you go and find your own things** – no longer coming to me to fetch reports and have to print… **You have remote access.**" (*Interviewee 6, emphasis added*) As there are stricter timelines for audit opinions, *Interviewee 5* encourages auditors to find alternate methods to increase efficiencies so that they can meet these deadlines. The auditor is able to provide value to the client's shareholders as information is provided sooner rather than later.
Focus	Data analytics present an opportunity to explain the detail of data extracted from the case entity. The main challenge, especially with Big Data, is to determine the level necessary and relevant. This is dependent on the audit	*Conference Report 1B* outlines that the benefit of CAATs includes the enhancement of the overall quality of the entire audit cycle: "We have a data dump out of the system and you can **isolate transactions based on certain risk**

Core principles	Explanations on 'value' extracted from *Conference Report 1C*	Corroboration with other data sources
	firm's understanding of the case entity and its environment.	criteria. **It allows a targeted focus if the criteria are set right**. **Huge benefits out of it affecting the whole cycle.** We can test 100% population with it." (*Interviewee 4, emphasis added*) The use of data analytics allows the auditor to expand on the existing audit process – not only is the auditor able to extract more data but can also focus on relevant detail for the audit (*Technical Report 1*, *Conference Report 1B* and ISA 200.7[12]).
Relevance	The data and information arise on the audit engagement are at a large volume. This means that the auditor needs to be selective because there may be an overload of information. The business of the case entity should be understood beyond the code of the system to determine what is relevant.	*Technical Report 2* illustrates how data analytics build hierarchies of data. To validate relevant data, data analytics should be used in colloboration with interactions with the case entity: "Now the auditors sit independently auditing on the computer and you have access to SAP **but you don't have that interaction.** Remember in a case like this, something could happen – **I don't have the opportunity to guide you**" (*Interviewee 6, emphasis added*) The case entity can provide context to auditors so the auditors only use evidence which is important. In this way, auditors avoid an overload of information because the auditor only has relevant evidence.
Perspective	In fulfilling his/her primary role, the auditor is viewed as an independent external party. Any other benefit or enhancement for the client is coincidental. It may appear that the auditor is imitating the role of an external business advisor. This role is only a secondary role.	What benefits the client is viewed as a supplementary feature of the audit. Furthermore, *Conference Report 1B* and *Technical Report 1* indicate that the auditor should use the most efficient means of conducting the audit. The choice of the audit approach has a major influence on the evidence gathered and ultimately, the quality of the audit (*Interviewee 1 and 5*).

4.3. Planning the audit

Planning should be the focal point of the audit process:

"**At least 40% to 50% of your costs spent should go to planning the audit…** if 40% to 50% of your costs are invested in **understanding your audit, understanding the client, understanding the processes, identifying where the risks are then that should result in a better audit, more credible audit**. [In comparison to] now, the bulk of the costs are sitting in the actual execution part where it technically shouldn't – what are you executing if you don't understand… the client?" (*Interviewee 5, emphasis added*)

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[12] (1) Identify and assess risks of material misstatement based on an understanding of the entity and its environment; (2) obtain sufficient, appropriate audit evidence about whether material misstatements exist; and (3) form an opinion on the financial statements based on conclusions drawn from the audit evidence obtained.

If the auditors do not consider key factors in the planning phase, there is a greater chance of an inefficient audit. As a result, the auditors should plan the audit earlier to guide the remaining stages of the audit process (*Technical Report 1*). To avoid any potential issues, the audit team should devote a significant amount of time to ensure CAATs are feasible to test material balances and transactions. This involves pilot studies:

> "**From the risk perspective, during planning, you actually have to see would this work**. So, what we usually do is, during interim, we would go in and **start testing the actual system to make sure that we can rely on the system and all the outputs from the system**. Then we get the IT auditor to actually come in to do a preliminary test to see if that actually works…" (*Interviewee 2, emphasis added*)

These pilot studies assist the management of the audit firm's costs. In the first year of the CAATs implementation, it was difficult to manage costs efficiently because there are unavoidable activities to be undertaken. For example, it was unavoidable to reduce the hours spent by the audit team familiarising themselves with the case entity within the first year of implementation. This is where the firm's audit software aids the core audit team to improve efficiencies over time. The in-house software can assist the core audit team to understand the technicalities of IT. The software has an embedded process which begins with the planning phase and guides the auditor throughout the whole IT-audit (*Interviewee 9*). This facilitates the technical feasibility process in the initial stages of CAATs. Once the feasibility has been assessed, the audit team should consider further planning matters. These are summarised below.

The resistance to change in an audit approach

One particular finding from the interviews is that managers and partners are usually comfortable with what they already know. In other words, there may be resistance to changing an audit approach even though another method (such as CAATs) may be more suitable for a client:

> "But I think it **will be more manager dependent [and not client dependent]**. I think it depends on the manager in charge of actually performing the audit [as to whether they] understand where they can use CAATs and how they can use CAATs to create efficiencies. **Short of that, you are not going to find somebody going out of their way to teach themselves what CAATs are, how they can incorporate it and be willing to spend that time because it is an investment**…" (*Interviewee 1, emphasis added*)

Usually when a person is faced with something different, there is some hesitance. New audit methods require attention and time to understand their capabilities fully (*Interviewee 1, 2, 3* and *Technical Report 1*). If a senior member is unfamiliar with different techniques, the audit team will not have proper guidance (*Technical Report 2*). For example, when the auditors introduced *Jupiter,* there was initially hesitance to use it:

"Then [the audit firm] realised there was **hesitation from auditors because people have always used the manual way**. **They are reluctant to try something new.** This thing is going to increase our risks if this system does not make sense to them. There was a lot of resistance at first." (*Interviewee 5, emphasis added*)

The objective of the auditors is to maintain and improve the quality of the engagement. If the auditors resist the change to a new audit method, then a successful integration of computerised techniques on the audit will be practically impossible. Instead, the audit team had an issue with how they could manage a different approach with an uncertain outcome:

"**The issues were not the resistance to change** but with 'I bet you that they have left something out and there is something I have done which was very important in my mind was not there.' **Double checking information until I was satisfied.** After satisfaction, I am now happy to use it." (*Interviewee 3, emphasis added*)

A new audit approach may not seem to be a suitable fit in its initial implementation and, as a result, it creates a different expectation for the auditor. The best way to address this is for the auditors to familiarise themselves with the new approach and create reasonable expectations. By applying professional scepticism and judgement to address unexpected outcomes, the auditors can assess the new approach for its use as a viable audit method for future audits (*Interviewee 3 and 9*).

Who is involved in the audit?

It is important for the entire audit team (including the IT technical team) to have a positive attitude for a successful change to be planned (*Interviewee 6*). The audit partner and manager are critical in this regard because their approach is crucial to the audit planning and reviews. Their application of the firm's policies and procedures guides the team (*Interviewee 1*). The respondents of the case entity emphasised that, if they view an auditor's enthusiasm and propensity to learn, there is an increase in a perceived audit quality. The capacity to invest additional time in discovering the reason why an anomaly occurred or how an event transpired is critical when adapting the 'dynamics' of the audit process (*Interviewee 3*).

Due to the increased reliance the auditors have on IT, the role of the audit firm's IT risk assurance is essential. The respondents of the IT technical team mentioned that they are significantly involved in testing IT-related controls (general and application controls), business processes and providing audit support to the core audit team (such as confirming the validity, accuracy and completeness of the case entity's reports) (*Interviewee 9*). This is how the core audit team understands the intricacies of the case entity's IT system. As a result, the introduction of CAATs decreases the number of core audit staff members and presents a change to the composition of the team:

"**The manual approach I think lent itself to more staff so it would have a bigger staff complement**. Seeing that we have now **moved away from the manual process, we have less staff…** A staff complement of two which is down from three to four in my first year of articles [2015 audit engagement**]. I am already seeing that as we are relying more on IT… So yes, we have just replaced the one staff member with another being the IT person**." (*Interviewee 1, emphasis added*)

These comments are iterated by *Conference Report 1C* – data analytics have the potential to unlock real value but the audit team needs to adapt its composition to incorporate personnel who have the necessary expertise and knowledge. This is why the IT technical team has effectively replaced members of the audit team. Nevertheless, there is a common misconception by incoming trainees that firms expect them to understand how these audit technologies function:

"**People are stressing about now your function** must be a) to design a system like *Jupiter*, b) to code it and make the program interface and c) able to use and apply it and interpret all the data that comes out of that analysis… **Trying to merge the auditor and IT expert into a super package.**" (*Interviewee 3, emphasis added*)

In reality, planning accommodates inclusions on the audit team where the audit team and the firm's IT technical team work together to conduct the audit:

"**There is a risk that sometimes it is difficult to follow what the IT team has done**. They speak IT jargon. They don't necessarily speak auditing jargon and therefore, when you try to reconcile or try to understand what they have done, it becomes very difficult. **So that is why it is important to have these planning meetings where you discuss what we required of them, how you want to see it, what you expect them to do…**" (*Interviewee 2, emphasis added*)

"Where there are areas where IT has assisted us, we begin our audit under planning and [in previous audits we would] suddenly involve our IT halfway through the audit and then it becomes very difficult for [the IT team] to catch up on what is happening. **So, if you never involve them in the first place from the beginning, it becomes very difficult for them to get to the same point [as the auditors]** … That is where the miscommunication is." (*Interviewee 5, emphasis added*)

At times, there are language barriers between the IT team and the auditors. As a result, communication channels need to be created to transfer the IT code into accounting and auditing implications. These discussions include understanding what the expectations of the audit regarding budgets, scope of testing and reliance auditors need of the IT team (*Interviewee 9*). The idea of 'shared intelligence' in *Technical Report 2* expands on this concept – the collaboration of the IT team and auditors improves efficiencies. There is a reduction in pressure when time is set aside for understanding the shared outcomes from the use of CAATs (*Interviewee 2, 5 and 9*). From this, auditors should involve the IT technical team earlier in the audit process, rather than requesting the IT team's assistance midway. More than that, these discussions become a consistent practice throughout the audit process, building and amending what has

been discussed during planning. This illustrates how the audit function is a dynamic, iterative process (*Interviewee 3, 5 and 9*).

Time to realise benefits

Firm Report 1 supports a culture of continuous improvement. This means the period of time in which the benefits are realised from the time of implementation till the end of the audit is important to consider. *Interviewee 1, 2 and 3* mentioned the audit recovery rate as an important unit of measure. On this audit engagement, the usual recovery rate was 70% prior to the integration of CAATs. *Interviewee 1 and 3* indicated that this rate was more efficient than the industry average of 40% to 50%:

> "It is actually good because I think that is why you managed to get leeway in the first place. **If you had a terrible recovery beforehand, [the change in the audit approach] wouldn't have happened**" (*Interviewee 1, emphasis added*)

This means low recovery rates would not have permitted some experimentation because the audit needs to be completed by agreed upon and/or legal deadlines. However, actual hours in the first year may be more than hours billed – there is a learning curve to find the most efficient way to test in a new audit approach. In this engagement, five years after its implementation, the recovery rate exceeds 150%. This means experimentation does not have immediate consequences as the audit should be viewed as a long-term mechanism (*Interviewee 1 and 3*).

4.3.1. Quality control of the engagement

The elements of quality control have not been addressed explicitly by the respondents of the audit team but for the purposes of this research report, the researcher has used numerous responses to address quality control requirements according to ISA 220.A1. The most significant requirements which were evident from the data sources include (1) leadership responsibilities for quality within the firm, (2) human resources, (3) engagement performance and (4) monitoring and review (IAASB, 2009b). This provides evidence of what an auditor should contemplate to ensure a successful integration of CAATs. These requirements are discussed further for the remainder of this section.

Leadership responsibilities on the audit team

Experience in terms of incorporating CAATs should be a top-down approach. Audit partners and managers should have a reasonable and appropriate level of competence and authority to facilitate an effective and well-managed audit team. This means leadership on the audit should provide sufficient guidance to the audit team to ensure they understand the process and do not follow blindly:

> "There is always a risk that someone would follow a procedure blindly. **It is up to partners, managers, coaches to make sure that doesn't happen**. **So, they fully understand something before they go out**

and go about doing it. Basically, it is up to the individuals doing the work and the reviewers afterwards to revise the section to ensure everything is in line." (*Interviewee 4, emphasis added*)

This leads to what should comprise of good quality control:

- The partner and manager should be heavily involved in the planning activities as they need to have direct involvement in gaining an understanding of where and when CAATs could be used. The managers are able to identify what and why CAATs are an optimal choice to conduct this particular audit engagement (*Interviewee 1, 3 and 4*) and
- The managers and trainees are primarily involved in the testing phase which encompasses the use of CAATs (*Interviewee 1, 2, 3 and 4*).

What was particularly important for the increase in the effectiveness of the audit is due to the comprehensive knowledge of CAATs managers should have. In this way, the managers have the capacity to engage with trainees and provide practical guidance (*Interviewee 9*).

Succession planning on the audit

Succession planning is vital as explained by the prior audit manager of this assurance engagement:

> "But that's why we have always… if I might say so, is why I think it is **so important to have properly planned handover from one manager to the next**. I used to sit agonising about who will be the next manager to inherit this thing – [*Interviewee 1*]." (*Interviewee 3, emphasis added*)

The requirements of ISA 220.A11[13] emphasise the importance of new managers (and also partners) leading the whole engagement team and ensuring the team has the appropriate competence and capabilities. Consequently, managers have a major impact on the planning and review process. There are two significant matters under ISA 220.A11 which are especially relevant for the audit engagement:

- **The audit team's understanding and practical experience with similar audit engagements** – the value of data analytics is driven by first understanding the meaning of data. Clients of the audit firm have different data stored and are used in a variety of ways. If partner or manager is exposed to a diverse range of clients then he/she has more practical experience to evaluate what data should be required for the audit. The data has an impact on the nature of data analytics which should be used (*Conference Paper 1C* and *Interviewee 2*).
- **The team's technical expertise** – The managers should be able to identify the reasoning behind the implementation of CAATs because their understanding of IT needs to be at the appropriate

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[13] (1) Understanding of, and practical experience with, audit engagements of a similar nature and complexity through appropriate training and participation; (2) understanding of professional standards and applicable legal and regulatory requirements; (3) technical expertise, including expertise with relevant information technology and specialised areas of accounting or auditing; (4) knowledge of relevant industries in which the client operates; (5) ability to apply professional judgement and (6) understanding of the firm's quality control policies and procedures.

level (see the earlier section discussing *Leadership Responsibilities on the Audit Team*). Their IT knowledge may not need to be as extensive as an IT-specialist but with a basic understanding, the auditors in this engagement managed to conceptualise the use of CAATs. This knowledge is central to future managers and needs to be transferred during succession planning (*Interviewee 1 and 3*).

The capabilities of audit trainees

The auditors said that the trainee's knowledge of IT ranged from none to comprehensive knowledge:

> "Trainees… I mean it is very difficult there. **Some trainees come in with good IT experience. Some don't…** So, if you are looking at it, I mean, trainees vary. **Most trainees don't have any knowledge. It is very difficult to train them**." (*Interviewee 1, emphasis added*)

In terms of training, courses in IT were not used to communicate the required knowledge to trainees. The auditors emphasised how costly training can be in monetary and non-monetary terms. For example, training programmes need to be tailored to and modified for different experience and knowledge levels (*Interviewees 2*). In response to these issues, the managers felt that trainees should rather 'learn while doing' following a continuous process during the initiation of the CAATs approach:

> "**… There was supervision from the manager…** From our perspective, whenever we would ensure [that the whole audit team would be comfortable with the use of CAATs]**, we would all sit together and try to solve the problem to see how we could reach a conclusion**. It was a **continuous discussion amongst all the audit team members to make sure everybody is on the same page**." (*Interviewee 2, emphasis added*)

> "**I don't think when you walk in as a first-year clerk you have that ability** [to understand a CAATs approach in full] – you may have the tool set to get there but **that will come with experience and this is where the guidance from a manager is important** – putting the process together, deciding on the targets, what the outliers that risk relate are…" (*Interviewee 4, emphasis added*)

There were regular group discussions to address any uncertainties in the implementation of the new audit approach. The auditors created an environment of continuous supervision and review. *Firm Report 1* validates the approach because the audit firm's newly constructed 'execution framework' promotes a team-based method. This becomes more effective than regular training because team-based discussions pave the way for transformative, long-term considerations for integrating a culture of continuous improvement. Individuals are able to co-operate in communities to solve problems and develop solutions (*Interviewee 2 and 9* and *Firm Report 1*). To complement these discussions, there may be a way to facilitate improvements in a trainee's IT knowledge before he/she commence his/her traineeship programme:

"Well, from the very beginning, the trainees should have had more Excel skills to start off with. **To actually understand how the coding works, how you actually go about developing these models and what goes into the thought process**. Another thing, I think that they needed to have was training on **actually how to audit using computers**. Especially going through a computer, testing the actual processing capabilities of the computer… **If you had that advanced IT knowledge it would be easier for you to do this**" (*Interviewee 2, emphasis added*)

There is an indication that the scope of auditing complicated IT-related information is refined to IT risk assurance as a specialist area. A Chartered Accountant may never attain the extent of knowledge and skill for this specialist area (*Interviewee 1*). However, the basics of the IT environment and its components should become common knowledge so that trainees can communicate with IT-specialists assigned to an audit. According to *Interviewees 1 and 2*, universities have an important role here:

"What we are looking for is **basically what is on the system, how does the system work, how does it operate, and teach them the general principles** that should be there in each one of these different areas" (*Interviewee 2. emphasis added*)

The comment above can form the foundation trainees need prior to the commencement of their traineeship programme. In light of this, the auditors and *Conference Report 1C* emphasise more should be done in addition to teaching IT knowledge at university. Hands-on learning cannot be overlooked due to inherent difficulties when trying to conceptualise a CAATs approach. In earlier audit engagements, the trainees might not be efficient but, over time, the trainees will be exposed to practical use of CAATs to facilitate their understanding (*Interviewee 1 and 9*).

Supervision and review

All of the respondents agreed that supervision and review are essential for implementing the new approach. This includes a managerial review of the logic of the testing performed by team members. Quality reviews are carried out by the firm on the audit team's work:

"In terms of quality control… You need to have a basis for explaining how you got there.… **That, of course, leads to the issue of a quality review**… [they are] **obviously checking for compliance, so the documentation is driven by me to ensure compliance, but again they also going to check your documentation because they want to see that you have explained your rationale** – so you are not just getting a data analytic that just works by accident" (*Interviewee 3, emphasis added*)

The purpose of the internal process is to provide guidance and feedback on the quality of the audit engagement. As a result, this feedback presents evidence on whether or not the implementation of CAATs will raise the efficiency and quality of the engagement when compared to previous traditional engagements. The reviews can provide constructive criticism to the auditors. The respondents of the

audit team described that they needed to prepare explanations to assist the reviewers to assess the following:

1. The reasons for the implementation of CAATs in this audit engagement as it is a more detailed and onerous audit approach;
2. What plan or process is implemented by the audit team to achieve the final product;
3. A description of the issues which may have arisen or any obstacles during the course of the audit and
4. Whether the benefits realised during the engagement exceed the costs of incorporating CAATs.

The audit partner on this engagement encourages an explanation approach for the team to justify their rationale. This method demonstrates whether the team understands what audit work they have performed and facilitates a more efficient audit:

> "I like the team to take me through with what they have done and if there are specific high-risk items then I would go into the detail. **But I prefer them to take me through the detail and the working paper – [this is] more efficient than me going through the detail myself**. **Technology has not changed my approach**." (*Interviewee 4, emphasis added*)

The implementation of CAATs in itself does not drive partners (and managers) to change the review process. The issues raised by reviewers are often in relation to the manner of how the audit is undertaken and not the method of the review process. For example, during the initial stages of the CAATs approach, selected reviewers described the audit as inefficient (*Interviewee 1, 3 and 5*). One primary concern of this inefficiency involved the excess amount of control testing on an annual basis:

> "[The reviews described that auditors were] testing controls every year even though they don't necessarily need to test them that often i.e. rather every three years because that is what the ISAs say. **Our response is that the client would view this as a value-adding activity more than anything else** so our client expects us to report on these things because they can fix things as they come along." (*Interviewee 5, emphasis added*)

The issue raised here by the respondents of the audit team was that there are differences amongst the reviewers (*Interviewee 1*). The auditors can have discussions with the reviewers to validate that their audit approach is providing a quality audit. Section 4.5 provides evidence to support how controls reliance is a valuable procedure which not only delivers high-quality evidence but also addresses control deficiencies for the case entity's benefit. After a few engagements, there was an eventual agreement between the reviewers and the audit team. At the end of the day, both of these groups have a common objective which is to ensure the quality of the engagement does not deteriorate:

"Yes, [the reviewers] were happy eventually and yes, matters were raised but nothing significant, nothing worrying. **But they do have in these constant quality reviews, they do help us pick ourselves up**. **And done on an annual basis, rotational basis**. So, **if we did not have those quality reviews, the quality would fall.** So, they help maintain the quality more than anything else. **There will never be a perfect file anywhere**. There is always areas for improvement..." (*Interviewee 5, emphasis added*)

Quality file reviews can never pass without a comment: as there is never a perfect file, the auditors are willing to improve. Even when there are minor issues, the quality reviews are able to present concrete evidence to reviewers on whether contemporary approaches such as CAATs have changed the outlook on how the new audit should be conducted. The reviews on this file showed how the new approach could be replicated with other engagements within the audit firm:

Yes, it did [influence other audits**] because we have evidence that [the CAATs approach] has worked**. **So, it helps to alleviate that reluctance as well when you go to the next partner [or manager]**. I used it on [the holding company] and the IT approach actually works. I suggested 'let's do it here' and then they are more willing to accept and embrace that change whereas **if there is no prior proved record that this actually works and that IT can help us, it is a matter of circumstances**." (*Interviewee 5, emphasis added*)

Overall, the audit engagement with the case entity was used by the audit team as a benchmark so that they could measure success and how their quality control can be used as a standard for other assurance engagements.

4.3.2. The determination of materiality

The significance of materiality is still applicable:

"The concept of materiality is still important to understand what could be seen as material. **Because we understand that nothing is ever done 100% correct**. So, [there] might have been a hiccup in the system and maybe the system processed one of the transactions wrong... **So, we still need this concept of materiality just to assess more the misstatements if there are any... B**ecause we still need to do an efficient audit so we can't now test everything**…." (*Interviewee 2, emphasis added*)

"No, [we cannot provide absolute assurance]. Never. **Because there is always a risk that something had an issue**. Even if we are happy that we are providing absolute assurance, we wouldn't say." (*Interviewee 4, emphasis added)*

The materiality concept is needed as the auditor cannot, even under a computerised audit with full automation, confirm all details of the case entity. The ability to provide complete certainty with absolute assurance to the users of the financial statements is difficult as there is a margin for error. The example provided by *Interviewee 2* considers how system errors can be something beyond the auditor's control. Reasonable assurance provides the auditor with 'protection' under materiality whether there is:

- An error within the control of the auditor (detection risk for possible malfunctions in the auditor's IT system which may prevent, for example, the auditor from detecting an issue) and
- An error not within the control of the auditor (control risk for the case entity's system as the auditor, for example, is unable to evaluate all aspects of the system and these may be an example of transactions not accounted per the financial reporting framework).

The system error example supports the importance of qualitative indicators which usually lead to adjusting the materiality threshold so the auditor is satisfied they are providing reasonable assurance.

4.4. The identification of risks from understanding the entity and its environment

One of the first discussion points from the auditors involved a general perception that the ability to use data analytics efficiently is not dependent on a thorough understanding of the client (*Interviewee 3*). In reality, it is critical for an auditor to gain an understanding of the core areas in line with ISA 315.11 – 24. These core areas extracted from the ISAs and *Technical Report 1* are summarised as follows:

- **The entity and its environment:** (a) relevant industry, regulatory, and other external factors; (b) the nature of the entity; (c) the entity's selection and application of accounting policies and (d) the entity's objectives and strategies.
- **Internal control** – the control environment, entity's risk assessment process, control activities and monitoring of controls (IAASB, 2009e).

The integration of data analytics and conventional audit techniques

Obtaining an understanding of the above core areas refers back to the objective of the audit – if there is a greater number of risks identified and assessed, this assists the audit team to construct more appropriate audit procedures (see Section 4.5). The use of data analytics is able to assist in this regard:

> "A benefit [of data analytics] for me personally, **was that you actually understood the company better from a business perspective. You started seeing how the business actually functions and you can identify other risks that come through that understanding...** And my own understanding, of how the system works, actually improved through that process as well." (*Interviewee 2, emphasis added*)

From the use of data analytics, the auditors became aware of more information regarding the case entity's operations, systems, objectives, and control environment. *Technical Report 2* refers to these data analytics as descriptive analytics. For example, these analytics demonstrated how technology-generated transaction flow diagrams simplify complex business environments:

> "The generated flow diagrams provide **a tangible visualisation that allows the auditor to see the main process and any interconnected sub-processes**. The auditor can observe the stream of transactions from its initiation to where their final outputs are found." (*Conference Report 1B, emphasis added*)

These flow diagrams show a simplified representation of how several permutations can exist for various transactions. Systems analysis is not merely a linear and vanilla process. This is why professional judgement and scepticism of the auditor become critical when the auditor analyes the visual output of data analytics (*Interviewee 5*). There are interpretations of trends, areas of significance, outliers, missing information and anomalies which present possible risks. The auditor then has an expectation of what risks exist at the case entity (*Interviewee 1*).

Data analytics should not be used at the expense of conventional procedures. These procedures include (1) inquiries of management, internal audit, and employees of the case entity and (2) performing system walkthroughs to observe and inspect the practical implementation of the discussions with the client. This shows an integration of people and technology (*Technical Report 2*). *Interviewee 3* further describes:

> "But unless you have a thorough understanding of what is going on at the client and exactly what they were saying to you, if you have taken the time to have a cup of tea with people who are actually working at the client on a daily basis, you are not going to pick up that [much] detail off the SAP system."

When the auditor has discussions with the case entity, the case entity fills in the gaps that data analytics cannot illustrate. In essence, the case entity fills the role of an additional human resource. This is in line with a statement made in *Conference Report 1C*: auditors continually find the best way to facilitate their understanding of the client. The harmonisation of different techniques leads to the completeness of information because data has various sources and permutations (*Firm Report 1* and *Technical Report 2*). In reality, since the introduction of the computerised audit techniques, the respondents of the case entity have observed how the auditor has become more remote to the audit process:

> "**I feel do not really know what you are up to**. I assume if you don't come to me that there are no issues. Where previously there was a lot more interaction. **I had a better feel for the state of the audit and now I don't.**" (*Interviewee 6, emphasis added*)

The respondents of the case entity feel they do not have a central participating role, which they did in earlier audits. From their perspective, their lack of involvement is not necessarily affecting the results or the conduct of the audit but they believe there should be an overlap of responsibility (*Interviewee 6 and 7*). These respondents mentioned they have insight into the major issues which may be relevant to the auditors. The auditors have acknowledged the importance of the client since they have invested time in understanding the case entity in earlier audits which have long-lasting benefits:

> "One of the only reasons we managed to get this thing that we do right, is… **We used to sit for hours with these guys and if I didn't understand something, come back and ask**. I would leave and come back and have discussions until 9 pm – we would basically 'irritate' each other. **But because of that investment in the process and the on-hand direct learning you got, we were then able to sit down**

and construct all the models [data analytics] because we understood what was going on. (*Interviewee 3, emphasis added*)

The face-to-face interactions between the auditor and client have improved the efficiency of the current audit because the current data analytics have been constructed based on a comprehensive understanding. The interactions between client and auditor become fundamental to an IT-based audit because it presents benefits for future audits. The auditor is now able to address risks and provide more quality driven audits.

The importance of understanding a change in IT-based system for an IT-audit

The IT accounting system is an important component of the case entity's operations, internal control, and financial reporting system. This has a major impact on the ability to conduct a computerised audit because the system contains a vast volume of data and functionality needed for an IT-based audit. As discussed in Section 3.2.1, the DOS-based system in earlier years was compartmentalised and the ability for the auditor to integrate with the case entity's systems was problematic:

> So, **it was firstly on [a DOS-based system] and it was very difficult to actually utilise**. It was very confusing and it was very easy to conceal things**. Lots of clients have had issues with the [a DOS-based system] to SAP transfer**." (*Interviewee 1, emphasis added*)

This means an IT-based approach became a reality in the 2013/2014 financial year audit when the case entity completed the implementation of their SAP-based accounting system.   What should be kept in mind is the capability of the auditors to use the system is based whether they can extract data for interpretation and analysis. This is only beneficial if the auditor fully understands how the SAP-based accounting system has been implemented:

> "In addition to [the auditors] struggling to know what is happening with the [new] system, the client itself doesn't know what [the new accounting system] is or how it works." (*Interviewee 5*)

> "… Now you [as the auditor] have to go and understand this system but in some cases, the client even doesn't understand what is going on. The auditor tests it manually and you recreate the whole automated process." (*Interviewee 1*)

A common theme is that both the client and auditors need to invest a substantial amount of time to understand the new system and how it functions. Without this shared responsibility, it becomes difficult to conduct the audit especially if the clients do not understand the system themselves (*Interviewee 5*). This further supports the importance of the role that the client should have in the identification of risks resulting from understanding the case entity and its environment.

Change in the IT-based system of the case entity

The accounting system of the case entity is personalised and tailored. There are specific processes required as a direct result of the business model of the company. There are no standard accounting packages available to manage this form of accounting:

> "SAP is a financial reporting tool but [the case entity's financial reporting] is not a [standard] accounting in terms of financial reporting. So, I am sure income statements and those kinds of things are very standard. **But for us to get to that one line in the income statement is a mission and none of that is a standard SAP**." (*Interviewee 6, emphasis added*)

The case entity's financial reporting favoured the design of the DOS-based system because each module was coded specifically for a particular contract. In comparison, the new SAP-based system is designed to be a centralised system for all contracts. The SAP consultants of the case entity tried to standardise the process (*Interviewee 6, 7 and 8*). A major flaw of this integrated system is that contracts suddenly have an effect on other contracts:

> "**But in terms of SAP, they tried to integrate it.** Whereas all the contracts you would go to the same place but that caused problems when the system would break down when they tried to correct the issue [which] then affects another unrelated contract. **So, Contract A has a problem and now Contract B has a problem**." (*Interviewee 7, emphasis added*)

The main concern raised by the case entity was that the planning stage of the SAP implementation was not executed as intended. The core areas of implementation should have been the central theme of discussion in the early stages of the SAP implementation:

> "I think [the SAP consultants] tried to standardise the financial statements/settlements. **And the old system, it wasn't standardised. Everything was in its own…** None of the contracts is the same. **SAP guys thought that they could now nicely integrate everything and thought that they could give a standard system.** I don't know if it was because they didn't understand the system well when they started building it. **Or they just thought they could show; they are going to make it work [without planning]**." (*Interviewee 6, emphasis added*)

Communication during planning is a significant factor in this changeover process. Instead, there was poor communication which created confusion, delayed the project and increased the possibility of rollover issues remaining unnoticed. The main issue seemed to revolve around unsuitable IT specialists. From the case entity's perspective, the selection of appropriate IT personnel becomes critical to the functioning of the system. *Interviewee 2* further asked, "Are the most appropriate individuals in the case entity being trained to use the systems correctly and programmes efficiently? If this is not the case, could the auditor rely on everything that subsequently follows?"

Secondary effects of the change in the IT system

Given the above challenges, the respondents of the case entity became more mindful of what the system should be producing. The employees gained an understanding of the system processes. The manner in which the auditor executes the principles of ISA 315 is effectively adopted by the employees of the case entity. The employees of the case entity changed their behaviour in a way that imitates the role of the auditor. While a detailed analysis of how observation and review act as change agents is beyond the scope of this research report, it is interesting to note that this was an unexpected theme extracted from the interviews. This case entity has had the audit firm for a period exceeding 25 years and the employees have a sense of the role and responsibility the firm has exercised over the years:

> "**We considered the way the auditors would evaluate the system** – the accounts that need to be reconciled, what is the source of the problem and how could we modify the issue with safeguards so that the issue doesn't happen again." (*Interviewee 6, emphasis added*)

In review, the system change appears as a catalyst for the employees to become more aware of the functionality and purpose of the system (the issues of the new IT system essentially assumed the role of a CAAT). A positive effect is established because the client is working in conjunction with the auditor:

> "On the one hand, it is good. I'm checking my declarations; the same way I did during parallel run and I will never stop doing that while I am still working here… **But maybe it is good to be more vigilant. It is more time-consuming**." (*Interviewee 6, emphasis added*)

The respondents of the case entity feel they have a duty to assume this additional role and responsibility. The users are familiar with their duties and know what should be present. This is indicative of a well-structured control environment which represents the ideal scenario for the auditor.

A common perception of auditors is that they are purposely targeting individuals:

> "**There was a former employee at the case entity who felt this sense of anxiety when the auditors were present at the case entity's premises**. This individual would panic and not feel comfortable with discussions with the auditors." (*Interviewee 3, emphasis added*)

This situation described above may arise due to employees not knowing their designated roles and responsibilities. This is where a secondary role of the auditor becomes evident. This role entails an element of surveillance over the actions of the employees in terms of the following: if employees are (1) capable of performing the work to required standards, (2) competent enough to fulfil their roles and responsibilities, (3) able to complete the work within a deadline and (4) capable of learning from their mistakes. The auditor's conduct may be seen an indirect monitoring control over the performance of the employees of the case entity. This essentially improves the effectiveness of the internal controls relevant to the financial reporting process.

In summary, the audit risk on the overall financial statement level automatically increases when there is a system change. For this reason, an examination of the system is paramount. Once this examination is performed, the use of the SAP accounting system provides an opportunity to view how two different IT environments (case entity and auditor) can interact with one another. The only way this interaction could be effective is through understanding the client:

> "It is to gain an understanding of the entity so that when you perform procedures, **they are aimed at the correct risks**. **You have to do an audit in terms of risk and not just test everything**." (*Interviewee 1, emphasis added*)

This confirms the purpose of the modern audit model – the concept of risk is seen as the foundation of the audit engagement.

4.4.1. The risk assessment process

The audit team concluded that the approach of using CAATs in the audit process had no bearing on the risk assessment process. The procedure of the auditor evaluating the entity's risk in terms of ISA 315.15[14] is still followed to provide a basis for the design and implementation of audit procedures. Having a different method of testing does not change the basic premise of the audit as this is a separate consideration to the risk assessment process. For example:

> "The assessment of the risk of material misstatement of revenue was still assessed to be high and evaluated as a significant risk given its presumption [in ISA 240.26[15]]. Here, by virtue of its nature, revenue is typically seen as a significant risk. **The intention of the use of CAATs was on no account contemplated as a risk assessment procedure**." (*Interviewee 3, emphasis added*)

Conference Report 1B highlights the components of the risks assessment process in ISA 315 does not differ but the manner in which the risks can be identified can change. The conventional audit approach only considers two factors: the size of the risk and the likelihood of that risk. The auditor then focuses on only the most significant and likely risks at the client. With the complexity of the case entity's business model, it becomes increasingly difficult to limit risk assessments to only two variables:

> "[With enhanced risks assessments,] you can see what accounts were impacted, when it was posted, back dated, forward-dated... **With all these fancy things, you can target something like risks very well**. I think it is crucial… Days of random sampling is gone. **We are in a better position to interrogate the**

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[14] (1) The identification of business risks which are relevant to the financial reporting objectives; (2) evaluating the significance of the risks identified; (3) assessment of the likelihood of the risk occurring and (4) deciding on the actions to take to respond appropriately to those risks.

[15] There is a presumption that there are risks of fraud in revenue recognition. Documentation needs to be provided if the presumption is not applicable in the context of an assurance engagement.

transactions that might have problems and that can be seen as a good step in the future." (*Interviewee 4, emphasis added*)

What should be considered is the idea of a 'dynamic risk assessment'. These risk assessments allow the auditor to divide the entity and its environment into the various dimensions to simplify complex data (*Conference Report 1B*):

1. The dimension of risk which is responsible for providing the momentum for other risks to occur are high-velocity risks. These risks illustrate how they reach and impact other areas of the business.

2. Risks known as clusters or domino risks display how interconnected and ever-changing the effects of risks can be. In other words, when Risk-A influences Risk-B, a secondary risk, Risk-C, is created.

3. The concept of vulnerable risks is established. These risks, similarly to the old-world view, are seen as most significant because they have the most impact on the client if not managed. The other risk dimensions bolster the potential impact vulnerable risks can have.

The increase in sophistication of the risk assessment process provides the auditor with the opportunity to communicate with the client with more detailed discussions (*Conference Report 1B*). From this, the auditors have the opportunity to design and implement better audit responses. If needed, the auditor can revisit his/her findings if the audit responses are not adequate or appropriate to address the risks.

4.5. Responding to risk and gathering of audit evidence

The audit approach undertaken in audits prior to the SAP-accounting system was manually driven:

> "From my understanding from the context I have been provided, **was firstly done very manual driven**. So, everything was done on a manual basis. **It was a lot of ticking; it was a lot of agreeing and it was mainly hard labour** if I can put it in a different context." (*Interviewee 1, emphasis added*)

> It was a **very manual, intensive process**. So, before that, you had to literally calculate everything... We use a lot of reports that come from people... But we **implemented controls over the years to make sure we have comfort over reports** that have been compiled..." (*Interviewee 5, emphasis added*)

ISA 330 provides that the use of CAATs becomes applicable when there is an opportunity to test electronic transactions and account files. In terms of the DOS-based system, utilising CAATs was difficult. This first phase of IT implementation limited the auditor's potential to integrate with the case entity's systems. Once the SAP-based system went live, data on the case entity's system became easily available. This assisted the auditor with a more complete picture of what was available, what data could be used and the data's transaction flow (*Interviewee 5*). Even with all this information, the auditor still

needed to make a choice between tests of control and substantive procedures or a purely substantive approach[16]. The approach needs to maximise the value of the audit opinion (see Section 4.2):

> "So, if you look at ISA 315, ISA 330 – **it says for a significant risk you must do a substantive test of detail.** Some auditors will go and take an account balance that has been tested using control and analytics throw it into a sampling template. It will tell them to go test let's say 30 invoices so they go and test the sample – maybe that gives you 30% coverage of the total of the account balance… But the question is then **what benefit have you actually, or value have you added, not to the client, but what margin evidence have you provided by carrying out the substantive test of detail**… So, I think in that way, it has become **very procedural and people just do it for the sake of demonstrating that they… Complied with the ISAs**... But without the tests of controls to tell us that the database is not correct, still, don't have sufficient evidence." (*Interviewee 3, emphasis added*)

Tests of detail have their benefits in gathering evidence but are confined to assessing a particular transaction or balance at a point in time. As a result, there is a limited coverage range when compared to the potential range of tests of controls. If the auditor can confirm the design, implementation and operating effectiveness of the relevant internal controls and financial reporting system, the auditor can be satisfied that sufficient appropriate evidence has been gathered. Both groups of respondents stated that there was an effort by auditors to perform beyond their responsibilities. Data analytics are the stepping stone for this transition but the auditor needs to invest his/her time in the process.

From an auditor's perspective, the optimal way to audit the case entity is in an unstructured and flexible manner. This is in direct response to complex business environments. In accordance with the auditors, a simple audit and business environment lends itself towards a more simplistic procedural approach:

> "If you have a **very simple audit environment where the auditor is going and following a normal ticking and bash exercise, planning [and execution] becomes more of a ritual, more of a compliance exercise**… You have [to in other instances] invest the time in understanding from the very first source document… So very often, the audit team hasn't gone in and got the thorough understanding **because they see planning as something that is administrative that you have to do before you are allowed to start the real work. They don't actually realise that gaining the understanding is actually the real work."** (*Interviewee 3, emphasis added*)

On one hand, rolling forward all the procedures, modifying dates and updating data based on the financial year in review appears to be more efficient but this procedural approach may not be suitable for the new financial year's events. The unstructured approach refers back to the importance of investing time in planning the audit (see Section 4.3) because the initial phases of the audit drive the quality of

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[16] ISA 330.8 states it is dependent on whether: (1) the auditor is able to rely on the operating effectiveness of the controls which determines the nature, timing and extent of substantive procedures and (2) substantive procedures alone cannot provide sufficient appropriate audit evidence.

the audit. Auditors need to amend the time allocation of the key components of the audit in a way which improves the overall efficiency and performance of the assurance engagement.

Prior to the use of data analytics, a manual and procedural approach was followed. The auditor followed the audit trail of transactions and balances and the focus was on the execution phase:

> "**Because we had an IT-based approach, our focus changed slightly.** So, usually the focus of a normal audit is you go to the source document, and you agree on it or trace it through to a bank statement or the account. So, you basically follow transactions through and you are sampling. So, **there you have your sampling risk and your sampling risk is quite heavy because it comes down to a level of trust and whether you trust the clerk who is sampling to sample correctly**." (*Interviewee 1, emphasis added*)

Seemingly, the concept of sampling was fundamental in providing reasonable assurance. The limited access to automated systems favoured a sampling approach when testing transactions and balances. In comparison to current audits, the auditors are now able to use the whole population for revenue contracts as an example. This is the highest degree of certainty an auditor can have – there cannot be sampling risk. Sampling is a primary component of the auditor's detection risk and, as a result, it decreases substantially in an IT-based audit:

> "**We got 100% coverage over inventory.** And then overall, the revenue in 2015, we got a using a very complicated analytic on Excel, we got ninety, if I remember correctly, **86% coverage over revenue and 92 % coverage on cost of sales**, with an overall difference in both revenue and accounts receivable which was below our overall trivial level." (*Interviewee 2, emphasis added*)

The extent of coverage managed to confirm substantially all of the revenue, inventory, and cost of sales amounts at the case entity. These significant areas are also interlinked, meaning if the auditor tests one area, the other side of the transaction has effectively been tested to a similar extent. *Conference Report 1B* describes how the auditor can further expand the scope of testing in future audits – there is a possibility for the auditor to incorporate a monitoring feature over the case entity's IT controls. This indicates the importance and value of the case entity's internal controls for the auditor.
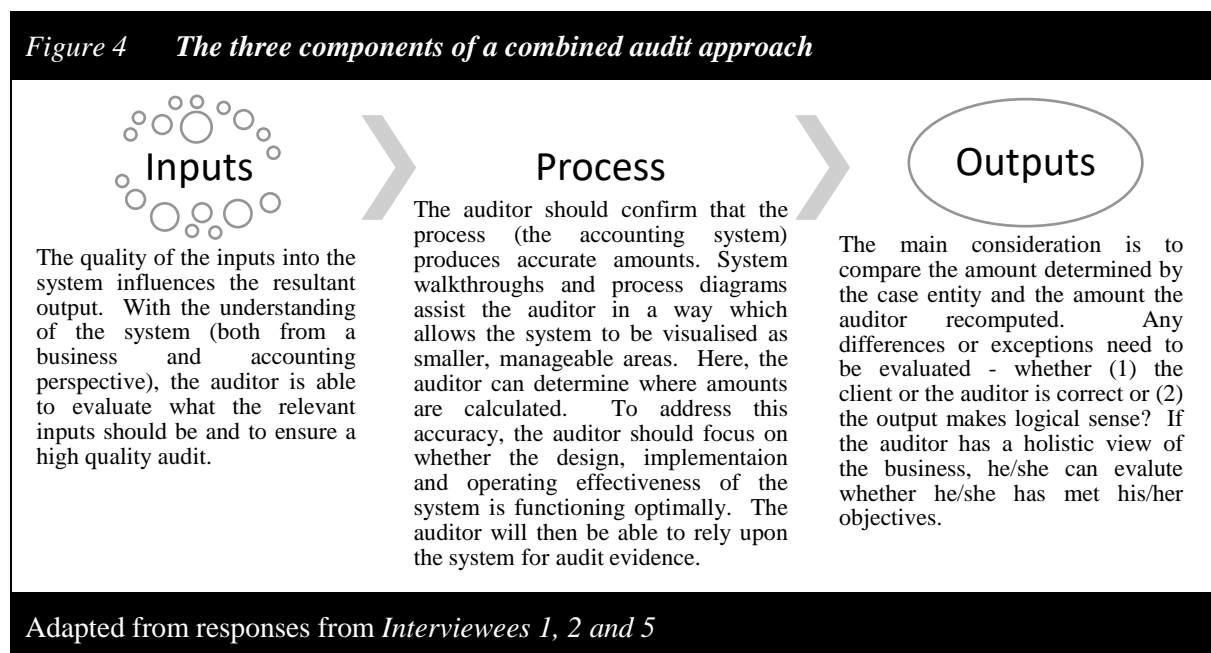
Testing the controls should not be seen as a supplementary feature. The respondents of the audit team discussed that the ISAs create an impression that tests of control are something supplementary to the audit. In reality, the auditors view tests of controls as a central approach to the audit, especially with an audit with the involvement of IT:

> "**Unless you have made that investment, you can't identify all the key controls and even if you do identify, you do not know how to test them**… Now you have gone and identified the controls. But remember the whole purpose apparently is to perform tests of detail… **So once again the controls test is seen as something which I am doing as a supplementary part of the audit because people think most of the evidence comes from the substantive testing**." (*Interviewee 3, emphasis added*)

The attitude of auditors is an important element in the current perception of tests of controls. There is also limited experience with the practical implementation of tests of control and is the reason substantive procedures are favoured. This also explains a resistance to change as discussed in Section 4.3.1. In spite of this, discussions with the auditors emphasised that tests of control should be the foundation of the execution phase with substantive procedures supplementing areas where tests of control are not effective. Performing only substantive testing in this engagement will not ensure sufficient and appropriate audit evidence is gathered. This is due to:

- The high volume of transactions, especially in relation to revenue, inventory, costs of sales and foreign exchange transactions,
- The SAP system is highly automated with application controls and
- There is evidence of complexity in the system (see Section 4.3 and 4.4).

From these factors, the auditors mentioned it would be optimal to break the audit approach up into three main areas show in *Figure 4*:

Figure 4   ***The three components of a combined audit approach***

Inputs

The quality of the inputs into the system influences the resultant output. With the understanding of the system (both from a business and accounting perspective), the auditor is able to evaluate what the relevant inputs should be and to ensure a high quality audit.

Process

The auditor should confirm that the process (the accounting system) produces accurate amounts. System walkthroughs and process diagrams assist the auditor in a way which allows the system to be visualised as smaller, manageable areas. Here, the auditor can determine where amounts are calculated. To address this accuracy, the auditor should focus on whether the design, implementaion and operating effectiveness of the system is functioning optimally. The auditor will then be able to rely upon the system for audit evidence.

Outputs

The main consideration is to compare the amount determined by the case entity and the amount the auditor recomputed. Any differences or exceptions need to be evaluated - whether (1) the client or the auditor is correct or (2) the output makes logical sense? If the auditor has a holistic view of the business, he/she can evalute whether he/she has met his/her objectives.

Adapted from responses from *Interviewees 1, 2 and 5*

The auditors addressed any issues with combined approach during the interim period of the engagements. With the assistance of the IT technical team and the internal auditors, the core audit team developed their expectations based on their experiences over the years. What the auditor had in mind was to ensure the objectives of the audit were addressed:

> "**During the interim**, we would go in and start testing the actual system to make sure that we can rely on the system and all the outputs and then **we get the IT and internal auditors to actually come in to do a preliminary test to see if that actually works… And they will do a trial run to see if it works… When I got onto the audit, we actually made a few changes to incorporate more elements to actually**

test the different drivers of the specific elements in the analytic which made it a bit more efficient for us…" (*Interviewee 2, emphasis added*)

This audit approach matured over time. The assistance of the IT technical team and internal auditors were critical in the calculation process. There were areas of specialised expertise leveraged to the advantage of the auditor. With the rise in automated processes on the audits, there is a direct increase of different elements of IT (*Interviewee 9*). For example, with the assistance of data, data analytics and SAP experts, the auditors were able to assess the data analytic for the data extracted from the SAP system to meet their expectations of the audit. In this way, the auditors managed to place themselves on a learning trajectory, developing and adapting the core considerations of the analytic during trial runs. The core considerations were as follows:

- The components considered in the conceptualisation of the analytic model i.e. what drives the data analytics;
- The resources who would be able to construct and execute the analytic;
- Whether there would be time constraints to perform the analytic;
- Which areas of the audit and accounts require the use of the analytic and
- The audit software which is capable to use the analytic.

The nature of this data analytic assumed the form of a recalculation. The objective of the data analytic is to generate similar results to those of the case entity. The auditors have responded to risks with a recalculation approach in past audits but with the incorporation of data analytics, the manner of how the technique was executed differed. With computer processing power, it eliminates the possibility of human error in performing recalculations and, for this reason, the auditors managed to reduce their detection risk. One crucial consideration in an IT-based audit is the importance of data. *Technical Report 2* explains how data analytics are data-driven. It is important for the auditor to extract and test relevant and reliable data before the data are used.

Successful trial runs occurred at the interim period and provided the auditors with a significant volume of evidence. This became essential for the audit team to find the optimal way to respond appropriately with the use of data analytics:

"… That we actually have enough time to do and go this calculation and that it works. **So, if it doesn't work, we can back to another model or have to look at different methods on how to perform the testing**." (*Interviewee 2, emphasis added*)

With this approach, the auditors at year-end could focus on rolling forward procedures, finalising the audit and resolving any unexpected changes subsequent to the interim period (*Interviewee 2 and 5*).

4.5.1. Execution of the audit – gathering sufficient and appropriate audit evidence

The importance of establishing the purpose of the execution phase is for the auditor to design and implement audit procedures so the evidence gathered is sufficient and appropriate (IAASB, 2009h).

One of the data analytics used on this audit was 'diagnostic analytics.' *Technical Report 2* provides an incentive to use these techniques as it explains the nature and purpose of the case entity's data by deconstructing complex processes:

> "We do have diagnostic analytics so it is **part of the controls testing. The auditors look at the [particular] diagnostics [of the system]** – posting journals, [does the client] have appropriate access to those functionalities on the system, is there inappropriate access [which provides evidence to the] sort of the logic behind the calculations that happened when you get to the substantive testing…" (*Interviewee 5, emphasis added*)

These IT capabilities can provide assurance to the auditor that the data captured onto the system is valid, accurate and complete. Moreover, *Technical Report 2* illustrates how these analytics demonstrate a 'supply chain' of how data is transferred through the case entity's system processes. This becomes relevant for processing journal entries and the manner in which transactions are followed to the general ledger and the financial statements. The auditors recently implemented *Jupiter* from the 2016 audit:

> "Our IT guys pull general ledger listings for the companies that we need to test journals for then we give them our audited trial balances. *Jupiter* **would do a completeness test to see if the movements in the trial balance agree to the movements in the general ledger**. If [there is an issue], they need to be fixed and need to be investigated. In most cases, the only difference is because of movements in the profits in the prior year. Or adjustments to tax journals that normally arise. **And *Jupiter* is designed to run specific tests so it has these tests built in**. For example, you could look at user functionality, backdating of transactions, user descriptions, user IDs, posting and approving the same journals… **[In addition] you could test for unusual journal combinations like debit provision and credit revenue**. You could go into the filters in *Jupiter* and apply those filters to say a journal would be unusual" (*Interviewee 5, emphasis added*)

It is evident that *Jupiter* allows for a more efficient method to analyse data and its transaction flow. The auditor is able to filter the data and group similar information such as unusual transactions in the revenue cycle or analyse commonly recorded transactions such as payroll. Without *Jupiter,* the auditor is forced to analyse each transaction individually. This audit tool helps the auditor analyse information with limited human intervention (except for circumstances where professional judgement needs to be exercised). The auditor can determine the level of detail in the data so that he/she can evaluate sub-processes. The auditor is effectively following the transactions through the system to see which areas

are affected. This reiterates the importance of understanding the data before determining the nature of data analytics to be used.

Section 4.5 details what the nature of the primary data analytics would be: a recalculation and reperformance data analytic. The idea behind 'reperformance' is to reconstruct significant line items with an independent execution of procedures and controls. The ability of the auditor to take full advantage of data extraction (see Section 3.2 and 4.3) is dependent on the systems used by the client:

> "All the SAP is doing is it has got a set of queries in order to work out revenue when you tell it **to pull a trial balance, it goes to the database and it pulls information from that database based on the relevant queries**… **So literally all we are doing when we get the ITRS [IT risk services] people to come in, is they are going to go and they are going to reconstruct certain line items in the financial statements based on the raw data**. So, one way of actually doing it – [*Interviewee 1*] and I did this exercise – you can actually go and take all of the data and put it into Excel. You can basically recompute the client's revenue figure, inventory and foreign exchange movements." (*Interviewee 3, emphasis added*)

Auditors are now able to take advantage of different connections between systems and their databases. In this way, the auditor can readily extract available information to recompute relevant line items in the case entity's financial statements (*Interviewee 1 and 5*). This procedure is explained to provide context of how the auditor can capitalise on the efficiencies that CAATs present.

The use of data analytics to verify the integrity of the client's system

The issue here is for the auditor to validate whether the database and the data are accurate and complete. According to *Firm Report 1* and *Interviewee 3*, 'Big Data' does not necessarily capture the full picture. 'Big Data' does not equate to complete data because it does not accommodate every possible permutation of data. Data can be manipulated in different contexts (*Conference Report 1B).* This emphasises the important role of data analytics assisting the analysis of the data and its database:

> "But the method for calculating those revenues might be different [as each contract has different terms]. **The actual mathematics is different**. Once you have gone over all permutations that are possible, you can now go into the database and you can in Excel… You can say alright I have got this data and you can do a VLOOKUP for all of these contracts – take column A and multiply by this % etc. – **here you can go recompute it based on your compilation based on the contract terms**. Because each contract term will be a separate field in the database. **So, you can structure your database or disaggregate the database basically by contract and once you have done that, you can recalculate all of the revenue**." (*Interviewee 3, emphasis added*)

This reiterates the importance of understanding the business objectives and the nature of the business. From this knowledge, the auditor is capable of gathering valuable audit evidence:

"Where a lot of people went short, and where we almost came short originally, what you have now basically done, is to take a database that has 3 or 4 databases all of which are unaudited. **And then you go and tell Excel or the ITRS when they reperform/redo their program, they basically construct a same parallel SAP system**… Now what's happening is you have gone and taken four or five databases. You have run the Excel pivot tables because [*Interviewee 1*] and I wanted to check that the number coming out of ITRS recomputation was reasonable – calibration basically. **But all you are doing is taking the unaudited numbers and pulling them out – one unaudited number multiplied by another unaudited number. And comparing it to the client's income statement which at this point is also unaudited**. What does that tell you – mathematical accuracy…" (*Interviewee 3, emphasis added*)

This recomputation is confirming the mathematical accuracy of the system. The numbers into the calculation still need further verification before the auditor can feel satisfied that the line items are correct. In spite of this, the auditor still viewed this evidence as valuable because it substantially reduces the auditor's work. There was practical evidence that the entire system process (the system's operating effectiveness) was able to extract data and generate outputs accurately throughout the whole financial reporting period. The audit quality increases as the scope of the audit has increased.

The respondents of the audit team stated there is a general misconception that CAATs are 'the solution to everything'. CAATs and data analytics are valuable aiding tools and not a replacement of the 'conventional audit process' – these computerised techniques are facilitating the audit. Similarly, *Firm Report 1*'s theme of collective insight involves a contribution by people and technology. Human judgement is still required:

> "**We actually made a few changes to incorporate more elements to actually test the different drivers of the specific elements in the analytic** which made it a bit more efficient for us because it gave us more information to actually identify where the issues might be." (*Interviewee 2, emphasis added*)

Conference Paper 1B reiterates this point that circumstances change almost immediately when new information is introduced into models. The auditors, according to *Conference Paper 1C*, are able to provide a more holistic approach despite the increased efficiency data analytics present.

The importance of testing data inputs of the client's system and the data analytics

The combined approach was undertaken for the key areas of the case entity. Bearing that in mind, substantive testing is compulsory per ISA 330 due to the risk areas being significant:

> "**Given that it is a significant risk area, we have to do some substantive testing.** So, on the inventory side, we would test the controls to make sure everything that goes into the calculation is accurate **because the system is only as good as what you put into the system so we got comfort over all of the inputs into the system from that side and the same for revenue as well… But the majority of the testing was the recalculation of the balances**" (*Interviewee 2, emphasis added*)

As the auditors have verified the integrity of the case entity's system, they need to determine an efficient method to confirm whether the data in the case entity's database are accurate. Even though the audit engagement is conducted as a 'fully computerised' audit, the manual approach to verify the inputs into the system (and the data analytic) is critical. For example, information such as the volume of tonnes and the exchange rates need to be agreed to a delivery note and any other relevant external data sources. *Interviewee 3* further established the concept of a 'combined' test with the use of CAATs:

> "We know that the CAAT is going to use that field in the system and we know that we can't just check if the field is correct in only one point in time. **You need to makes sure that the data is correct over a whole period which is why we are doing the tests of controls**. So, the only way that this test of control is going to be useful for what we want to do is if the control now includes almost a substantive element – **sometimes you can see the ISA talk about a combined test. It is combined in the sense that, yes, we are testing if the process is taking place i.e. the test of control but we are also testing to makes sure that the data underlying the substantive test we are going to do later is correct...**"

A combined approach is an effective way to conduct the audit (IAASB, 2009g). The auditor can confirm the operating effectiveness of the internal controls of the case entity's system (as indicated earlier), however, if the underlying data stored in the system is not correct because of error or fraud, the operating effectiveness of the controls becomes a meaningless exercise. The erroneous data would follow through the financial reporting process and be presented on the financial statements. This is a further indication that CAATs are seen as an aided tool:

> "**[CAATs] does not necessarily change the approach but it facilitates the approach**… It is about adding value, about talking to each other and understanding the business… **It all depends on the impact on the quality of elements.**" (*Interviewee 4, emphasis added*)

What was particularly evident in the process above was the corroboration of various audit techniques to gather evidence, for example, tests of control aided with substantive tests and manual driven techniques used in conjunction with CAATs:

> "We will test the one for 'high' assurance – maximum sample size and the other one, we will test as corroborating evidence… If I have got two control tests plus I have got an enquiry of management – I accept inquiry of management is not a phenomenal source of evidence but it is some evidence. **If I have those three sources, and they are all telling me the same thing, I have more comfort that the answer is correct whereas if I did it a poor job of enquiring of management and I didn't test the one control**… Then I only have one piece of evidence showing me completeness or another assertion. **I have rather three sources confirming with corroborating evidence and that reduces your detection risk**."
> (*Interviewee 3, emphasis added*)

The main objective of this process was to gather evidence which supported other evidence. A primary source was used and a secondary one was gathered in addition to support the primary evidence. Have all the sources collected led to similar conclusions?

4.6. Documentation of auditor's work

The preparation of documentation is a process which underlines all above-mentioned key elements and as a result, supports its significance in the entire audit process. The audit team respondents drew attention to the importance of documentation with reference to the following expression:

"If something is not documented, the assumption is that it has not been performed." (*Interviewee 2*)

It was emphasised that there should be a thorough effort in the compilation of documents during this audit engagement. *Interviewee 1* mentioned that the working papers on this particular engagement were documented extremely well in comparison with other working papers observed. Generally, the extent of documentation increased significantly which led to the following:

- The documentation was detailed beyond expectations and would be more than sufficient to guide another auditor to follow the process in an equivalent manner (*Interviewee 3*).
- The audit team member given the role of reviewing the files should be familiar with the template and the objective of that particular document. Despite the rise in documentation's volume and detail, the audit files are structured in way which will assist managers and/or partners refresh their memories of the purpose of the file. The structure goes a long way to assist creating timely and comprehensive reviews (*Interviewee 1 and 3*)
- More rigorous documentation improved quality control processes such as engagement performance. In hindsight, the respondents described that the process is more important than the conclusion itself. This ensures high-quality audits are more likely to be achieved (*Interviewee 3, 4 and 5*)

Scoping into the planning phase of the audit, *Interviewee 2* described:

"The documentation process would have to be more rigorous in these instances particularly at clients such as the case entity."

All the respondents emphasised the complexities of the case entity's business model and IT environment. For this reason, the requirements to document the finer details about the audit engagement, the different areas of the case entity and, most importantly, the thought process of how the auditor addressed all relevant matters becomes a compulsory exercise. The effort in the documentation process is supported by *Interviewee 2*:

> "But it is all there because we need to explain our thought process, we need to tell people how we got to where we got."

In summary, as more information is found, more is required to be documented. This also aids the quality of the audit – if the intricacies of significant matters are known and documented, the audit team of the following year will be able to follow and reach similar conclusions.

In spite of the benefits of increased volume and detail of files, the respondents described that the likelihood of an auditor to read all the particulars of the file was low:

> "The problem is because there is so much documentation, **you rarely find somebody who reads through all of it.** So, the quantity of the documentation is a little bit large and **confuses a lot of people when they first read it.**" (*Interviewee 1, emphasis added*)

The question which is raised here is whether more documentation should be prepared. On a similar note, the sheer volume of information compiled in the files led to confusion for numerous audit team members upon the reading the documents a few times. Consequently, the timely completion of documentation is hindered and in essence opposes the benefits of a structured audit file. Confusing documentation can then lower the quality of an audit.

Chapter 5: Conclusion

5.1. Key findings

5.1.1 Overall conclusions from research

The case entity and audit firm have provided a well-established case for the researcher to analyse the effects of CAATs on the key elements of the audit process. The results suggest that the core features of the audit process are largely unaltered by the introduction of computerised audit techniques. These key elements, according to professional and academic literature, are summarised as follows: (1) objectives of external auditing, (2) planning the audit, (3) the identification of risks from understanding the entity and its environment, (4) responding to risks and (5) documentation. When there is an opportunity to revolutionise techniques in the auditing environment, it is more effective to develop and apply innovations which build on systems, processes and practices which have already been established. In other words, there is more value generated in expanding existing principles than in reconceptualising the current audit risk model.

In Jensen and Meckling (1976), an audit is viewed as a type of monitoring activity. The key elements of the audit function fulfils this role as an essential guide for auditors on an effective planning and execution of the audit to maintain high levels of audit quality over the reasonable assurance of a client's financial statements (Basu and Wright, 1997, Peecher et al., 2007, IAASB, 2009j). The role of CAATs

does not alter this characteristic but merely confirms the importance of the basic structure of the audit function and how the new audit tools complement the primary role of the audit.

The inclusion of CAATs and data analytics in the audit is viewed as a value-added service (Curtis and Turley, 2007). As evident from the findings, CAATs has the potential to increase the scope and quality of audit evidence and aids additional angles of collecting information of the entity for understanding and execution purposes. This is evident from the rise of automated testing through the Jupiter diagnostic analytic and analysis of larger populations of the client's accounts (Francis, 2011, Eimers, 2016).

Given the rise of e-business in the economic environment, computerised audit tools have become increasingly relevant in modern audits. Here, auditors need experience when managing a modern audit (Abou-El-Sood et al., 2015, Barac et al., 2016). The change in the IT systems at the case entity is primary example of how the auditors are required to revise their knowledge in order to manage their role to meet current audit expectations (Braun and Davis, 2003).

However, there is also evidence that auditors have a natural resistance to adopt audit methods with which they are unfamiliar but this does not prevent a change the way auditors collect and test data. Following the case entity's implementation of SAP in the 2013/2014 financial year, the auditors set their experiments into motion. They were able to follow a more autonomous approach for testing balances and transactions of the case entity. The outcomes of these changes are summarised in *Table 5*:

Table 5: Key findings which resulted from the integration of CAATs in the audit process

Key finding	Basic overview of key finding	Data source(s)
The audit process is driven by understanding the client	The auditor cannot overlook the importance of understanding both the IT and business processes of the client. Without investing time in this process, the auditor will not be aware of relevant risks of material misstatement. This confirms the purpose of the ARM: risk is the foundation of the audit. In an IT-based audit, ongoing communication between the core audit team and the IT experts is needed to sustain a mutual understanding. Even though the auditor does not need the skills of a programmer to conduct the audit, the communication channels present ensure that the auditor has reasonable expectations of what should happen under an IT-based audit.	The respondents of the audit team The respondents of the case entity The respondents of the IT technical team Technical Report 2 Firm Report 1
The increase in the scope of the audit due to the integration of CAATs	Since the 2013 financial year, the audit engagement has expanded its role and scope of testing. Key examples include: • The auditor is able to test the population of data in more areas of the audit; • The auditor is aware of additional areas of the case entity's business which was not considered or identified in prior years.	The respondents of the audit team The respondents of the IT team Conference Report 1A Conference Report 1B
Incorporation of	The auditors had the freedom to extract and analyse data from the client's systems without the assistance of the client. This illustrates an example of unpredictability which the auditor	The respondents of the audit team

Key finding	Basic overview of key finding	Data source(s)
unpredictability in the audit	managed to incorporate into the audit. Overall, this means the auditor can place higher reliance on the evidence collected. The audit risk of the engagement is reduced as a direct result of the auditor's reduction in detection risk.	The respondents of the case entity Technical Report 2
Management of the client and auditor relationship	The face-to-face interactions between the auditors and the client provide complementary evidence for the results from data analytics. This emphasises the importance of integrating the use of technology and people in the understanding phase of the audit process. In this way, the auditor is able to build and refine his/her knowledge about the client which has long lastly benefits for future audits, such as increased recovery rates.	The respondents of the audit team The respondents of the case entity Technical Report 2 Firm Report 1
Human capital investments	The resources placed on audit engagements is an important consideration for a high quality, efficient audit. This provides an opportunity for audit firms to consider succession planning of audit team members. Succession planning of audit partners has become routine; however, succession planning should be a priority on a manager level. A primary reason for this consideration is the significant role managers have in the selection and adoption of the audit approach.	The respondents of the audit team
Overreliance on IT-based techniques	In line with the continual innovation of audit techniques, there may be a possible overreliance of IT-based techniques. This paper has shown how these techniques are able to 'replace' certain aspects of the auditor's role in the audit process. What becomes an issue is when the auditor cannot use CAATs to execute the audit. If the auditor has an overreliance on CAATs, the auditor may not be able to adapt the audit method and provide real value. This supports an audit with an unstructured approach so the auditor can be flexible and adapt under unexpected circumstances.	The respondents of the audit team The respondents of the IT team Conference Report 1C

5.1.2. Findings on perspective: auditor vs client

The data collection included a second 'level' of data to add further insight on the outcomes of the interview process. This additional layer of information is accommodated mainly by commentary from the audit team and case entity participants. The most significant themes from both groups of individuals have been summarised in *Table 6* that addresses the integration of CAATs in the audit.

Table 6: Commentary from both the auditors and case entity participants on key findings from the integration of CAATs and IT-related procedures in the audit process

Key finding	Auditor perspective	Client perspective
Auditor interactions with the client	Data analytics can assist with remote access to client information. This supports a continuous audit approach which improves efficiencies of audit work and timeliness of data collection. There is a reduced interaction with the client, however, this does not prevent the auditor from executing its procedures in the required manner.	There is a reduced time of face-to-face interaction between the auditor and client. The client emphasised the limitations of remote access to raw data – they have better insights into the information because they interact with the data more often compared to the auditors who conduct work within a confined space of time.

Key finding	Auditor perspective	Client perspective
Planning function in a change in IT systems	In the understanding and planning phases of the audit function, a vital consideration for the auditors is the capabilities of the system and whether they can extract data for interpretation and analysis. If this understanding is missing, there is an increased difficulty for the auditors to obtain information required to complete the audit.	The participants indicated that poor planning lead to a disorganised introduction of their SAP system. Consequently, if the client is unable to understand its own systems, this would have a substantial negative effect on the efficiency and capability of the auditors to understand and extract information.
Indirect effects of the IT-based systems and procedures	From the auditor's view, the use of the SAP accounting system illustrates how two different IT environments (case entity and auditor) can interact with one another. The only way this interaction could be effective is through understanding the client so that when audit procedures are performed, they are aimed at the correct risks.	The change in the IT system acted as a catalyst for the case entity to increase its level of controls and vigilance of possible deviations from expectations. This illustrates what responsibility the client has in the performance of their duties and adapting internal process to create a well-structured control environment.

5.2. Recommendations

Based on the findings of this report, the researchers have some practical recommendations which audit firms can implement in the context of an IT-based audit:

- The results of the case entity have illustrated that a CAATs approach should be a guided, hands-on learning process. What can be used to aid this process is the design of a framework which describes the nature and purpose of CAATs. The framework should be made for firm-wide use in order to address any uncertainties a trainee, manager or partner may have. This may be a solution to reduce any resistance to change auditing approaches. Auditors should be aware of various audit methods which are appropriate for the audit.

- Audit firms should consider an unstructured audit approach. It has become increasingly common to refer to an audit as a procedural, tick-box exercise in which working papers are rolled over from the prior year. In order to stray away from this procedural approach, auditors should ensure that they implement an audit approach which can adapt without being constrained by the approach of the previous year. This means the audit approach should be suitable for the current year's events and circumstances.

- Audit firms should clearly define and communicate the role of an auditor in an IT-based audit. The respondents of the audit team stated that auditors are not expected or required to know the same about IT as an expert in that field. What auditors should know are the basics of the IT environment so that they can understand the context of any IT-related issues and discuss these with IT specialists so that the auditors can ensure accounting and auditing implications are managed appropriately.

5.3. Areas of future research

There are a number of opportunities for future research. One example is artificial intelligence (AI). The developments in AI have become prominent in recent times and may have implications in the context of an audit and particularly on the key elements of an assurance engagement. Focusing on data analytics, these techniques have several applications in the context of an assurance engagement as evident in the results collected in this paper. It may be necessary to research what effects data analytics have in the context of a combined assurance model, seeing that there is an increasing relevance in the role of internal auditing in modern times.

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Annexure A – interview agenda – audit team

Implementation of CAATs and data analytics

1. How long has your audit firm been the auditors of the case entity? How have these audits been conducted?

2. When was the decision taken to incorporate data-analytics/computer-aided techniques in the audit process? What informed this decision? Could data-analytics/computer-aided techniques have been incorporated earlier? Why or why not?

3. What type of data-analytics/computer-aided techniques do you use in connection with the key elements/focal points of your engagement?

Effects of CAATs on the key elements of an assurance engagement

4. What are the key elements/focal points of your assurance engagement? How have you identified these elements and have there been any changes?

5. Were there any changes to the nature, timing, and extent of procedures and resources? Were there major changes?

6. What have been the main benefits/advantages of data analytics/computer aided techniques? Are there any disadvantages/costs?

7. Did the audit team have experience with a computer-based audit? If so, what training was in place to ensure the audit team members were comfortable with a change in audit methodology? With the benefit of hindsight, what training should have been provided?

8. Has the audit file been subjected to internal or external quality reviews and, if so, what were the outcomes of those reviews?

Impact of IT-audit

9. Has this audit engagement influenced how you will execute other audits? Substantiate your views.

10. Do you think that data-analytics/computer-aided techniques can bolster public confidence in an external audit? Substantiate your views.

Annexure B – interview agenda – client

System changes

1. When did you implement your SAP accounting system? Can you elaborate on any challenges encountered when migrating from your previous system?
2. What are the main differences between the SAP and the previous system? Does the new system have any weaknesses which the original system did not have?
3. Was the possibility of the new system being used to aid the external audit process considered when deciding to change systems?

External audit

4. What would you consider to be the benefits and challenges of an IT-based audit?
5. Have any of these benefits been realised or challenges been encountered at your firm?
6. Do you believe the use of a computer-based audit is allowing auditors to move from being a "compliance provider" to a "business advisor"?
7. Has the accounting system changed the communication between you and your external auditors?
8. Do you think that the computer-aided/system-dependent approach being followed by your external auditors is value adding? Give your reasons.
9. Do you think that it would be possible to move to a real-time approach to auditing? What are the possible benefits and challenges?

Annexure C – interview agenda – IT technical team

System changes

1. How did the system change at the case entity impact your role and responsibility on the external audit before, during and after the implementation?

Audit software and data analytics

2. What type of services do you provide for the auditors and other clients?

3. What audit software do you use to assist the audit team? Is this software developed in-house or is it a standardised package? Is there any audit software you have in the pipeline which may have an impact on future audits? What effects will the current and future software have on future audits?

4. What type of data analytics are used on the external audit? What function do these data analytics have in the context of an audit?

5. What are the benefits and challenges of data analytics you use?

6. To what extent were you involved in the development of these data analytics? Have these data analytics evolved over time or do you construct additional analytics which accumulate over time to address the needs of the audit?

Role in the external audit

7. How often do you have discussions with the audit team? What are the discussion points in these meetings? Based on these responses, do you feel that auditors have an increased reliance on your function in an IT-driven audit? If so, does this have impact on your role and responsibility on an external audit?

8. Do you believe you need to have a basic understanding of accounting and auditing principles to assist the audit team? If so, at what level of understanding should this be?

Annexure D - information sheet and consent form

Ethics clearance number: <u>CACCN/1160</u>

Title: A Case Study: An Exploration of the Implications of CAATs on the Audit Approach in terms of the Key Elements of an Assurance Engagement.

Dear Sir/Madam

We would like to invite you to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

- In this study, we want to assess the key elements of an assurance engagement with the recent introduction of a fully computerized audit on the client entity and expand on prior research that has been already been performed on the influence of CAATs.

- If you agree to participate, a time will be scheduled for an interview that is expected to take no more than sixty minutes to complete.

- There are no material risks posed by participating. Your identity and place of employment will be kept confidential. No personal information will be collected from you. There are also no right or wrong responses – this research is only interested in your own experiences and impressions.

- Interviews will be audio recorded, subject to your permission. The interview will be transcribed and kept on file by the researcher but your identity and that of your employer and/or clients will be kept confidential and will not be referred to directly in the final research.

- You will not receive any compensation for participating in the research. There is no direct benefit from participating or not participating in the research.

- Should you be interested, a copy of the final report will be available to you on request.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason. In addition to withdrawing yourself from the study, you may also withdraw any data/information you have already provided up until it is transcribed for use in the final report.

If this study has harmed or offended you in any way you can contact the University of the Witwatersrand using the details below for further advice and information:

Details	Researcher 1	Researcher 2
Name		
Contact number		
Email address		

CONSENT FORM FOR PARTICIPANTS IN RESEARCH STUDIES

Please complete this form after you have read the Information Sheet and/or listened to an explanation of the research.

Title of Study: A Case Study: An Exploration of the Implications of CAATs on the Audit Approach in terms of the Key Elements of an Assurance Engagement

Ethics Committee Ref: *CACCN/1160*

Details	Please tick or initial
I understand that if I decide at any time during the research that I no longer wish to participate in this project, I can notify the researcher involved and withdraw from it immediately without giving any reason. Furthermore, I understand that I will be able to withdraw my data up to the point of submission of my responses.	
I understand that the information I have submitted may be published in a journal article and that I can request a copy of the final article.	
I understand that my personal information will not be collected. My identity and that of my employer and/or clients will be kept confidential and will not be referred to directly in the final report.	
I consent to my interview being recorded and this data may be used in the research included in the final results.	

Participant's Statement:

I _____

agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed   **Date**