THE USE OF GENERALISED AUDIT SOFTWARE BY INTERNAL AUDIT FUNCTIONS IN A DEVELOPING COUNTRY: A MATURITY LEVEL ASSESSMENT

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Abstract

This article explores the existing practices of internal audit functions in the locally controlled South African banking industry regarding the use of Generalised Audit Software (GAS), against a benchmark developed from recognised data analytic maturity models, in order to assess the current maturity levels of the locally controlled South African banks in the use of this software for tests of controls. The literature review indicates that the use of GAS by internal audit functions is still at a relatively low level of maturity, despite the accelerating adoption of information technology and generation of big data within organisations. The empirical results of this article also confirm that the maturity of the use of GAS by the internal auditors employed by locally controlled South African banks is still lower than expected, given that the world, especially from a business perspective is now fully immersed in a technological-driven business environment. This study has since been extended to other industries in the following countries namely, Canada, Columbia, Portugal and Australia.

Keywords: Audit Evidence, Big Data, Computer Assisted Audit Techniques, Control Environment, Generalised Audit Software, Tests of Controls

1. INTRODUCTION

With the rapid advances in technology, most organisations today are impacted by changes in information technology (IT), and these changes usually result in the generation of an increasing volume of audit evidence which is now almost exclusively available in electronic format (Ahmi & Kent, 2013:89; Committee of Sponsoring Organisations of the Treadway Commission (COSO), 2013:25; PwC, 2014:25; Institute of Internal Auditors (IIA), 2015b:14). Technology is playing an increasingly important role in the manner in which internal audit is practiced today, making it almost impossible to conduct effective audits without the use of technology (Coderre, 2009:5; IIA, 2011:2; Olasanmi, 2013:68; Mahzan & Lymer, 2014:328). Pett predicts that by the year 2020 the internal audit function is going to be driven almost exclusively by data (cited in Jackson, 2013b:39). In the words of Chambers (current president of the IIA International), *"We are going from a period of 'Big Data' to a period of 'Mega Data', of 'Bigger than Big Data"* (cited in Jackson, 2013a:39). Chambers further highlights the importance of incorporating technology-based tools in the internal audit function's methodology. The term "Big Data" refers to data that is extremely large in size (in other words the volume of data) and also includes velocity (data that is available in real-time), variety and veracity (Moffit & Vasarhelyi, 2013:4; Yoon, Hoogduin & Zhang, 2015:432; IIA, 2016b:6). The variety component refers to the data that is retrieved from multiple sources (for example, blogs, video streams, website traffic and audio files), whereas veracity refers to the relevance and truthfulness of that data (Cao, Chychyla & Stewart, 2015:424; Yoon *et al.*, 2015:432; IIA, 2016b:7).

Observing this trend, Coetzee (2010:4) highlights that a more streamlined audit approach is needed in order for internal audit to continue to add value in identifying risks that threaten the achievement of an organisation's objectives. Accordingly, the Institute of Internal Auditors (IIA) (the authoritative professional body representing the internal audit profession globally), in the latest edition of its International Standards for the Professional Practice of Internal Auditing (Standards), has published Standard 1220.A2, *Due Professional Care*, which requires internal auditors to utilise technology-based tools in the execution of their responsibilities (IIA, 2016c:7).

The IIA defines technology-based tools as *"Any automated audit tool, such as generalised audit software (GAS), test data generators, computerised audit programs, specialised audit utilities, and computer-assisted audit techniques (CAATs)"* (IIA, 2016c:24). The most popular and frequently used of these technology-based tools is GAS (Braun & Davis, 2003:725; Debreceny, Lee, Neo & Toh, 2005:605; Kim, Mannino & Nieschwietz, 2009:215; Lin & Wang, 2011:777; Mahzan & Lymer, 2014:328; IIA, 2016b:56). GAS enables the internal auditor to extract data from multiple sources (i.e., databases and files) from an organisation's integrated systems in order to conduct detailed analyses of this data (Lin & Wang, 2011:777; Ahmi & Kent, 2013:89). Therefore, this article focused on the use of GAS as a technology-based audit tool, as formulated in section 2. Furthermore, the International Auditing and Assurance Standards Board (IAASB), (IAASB, 2015 International Standard on Auditing (ISA) 330 par.A16) also draws attention to the use of CAATs by auditors especially in cases where they want to increase the extent of testing for the purpose of gathering persuasive audit evidence during the execution of their duties.

Banks are key role players in the overall health and wealth-generating capacity of a country's economy; it is therefore crucial for a country to have a sound banking system as this will facilitate (and accelerate) economic growth and improve investors' confidence (Makhubela, 2006:6; KPMG, 2012(a):10). The banking industry, like any other business sector or industry, is not immune to risks and can also run into financial difficulties. The possibility of bank failures remains a reality of everyday business, and individual banks need to implement effective risk management and governance practices in order to ensure a sound and effective global banking system. Bank failures before and after the financial crisis are well known, with the resulting impact on the economy of a country and even the world. Public trust and confidence in a banking system is dependent on the implementation of effective corporate governance practices in each and every bank, which then collectively may ensure the proper functioning of the banking industry and the economy as a whole (KPMG, 2012(a):2; BIS, 2015:3). Ensuring that the internal audit function performs according to its mandate, as stipulated in the Statement of the Internal Auditors Responsibilities, is critical to the effective management of a bank, particularly with regard to meaningful risk management, control and governance practices (IIA, 2016c:23).

The King III Report in South Africa requires a company's board of directors or its committees to ensure that the effectiveness of the internal controls is evaluated by an effective internal audit function (IOD, 2009:31). This is also emphasised in the King IV Report (IOD, 2016:69). The Basel Committee on Banking Supervision (the Committee) issued an international guidance document regarding the effectiveness of internal audit functions in banks. This resulted in increased pressure on banks' boards of directors and senior management to demonstrate that their internal audit functions are, and continue to be effective in the performance of their duties (BIS, 2012:2). Standard 2130 *Control*, issued by the International Standard for the Professional Practice of Internal Auditing requires the internal audit function to assist an organisation to maintain effective controls by evaluating the controls' effectiveness and efficiency and by promoting continuous improvement (IIA, 2016c:14).

Business today is characterised by significantly increased and still increasing volumes of data and transactions compared to earlier periods in economic history (KPMG, 2012b:9; EY, 2013:6; Jackson, 2013a:35; PwC, 2014:25).This increase in the number of transactions and the volume of client data has had a significant and direct impact on the internal auditing profession. Internal auditors had to revisit the manner in which they collect audit evidence in order to achieve the predetermined engagement objectives in an efficient manner. The internal auditor can collect audit evidence for the purpose of evaluating the effectiveness of internal controls in one of the following three ways:

- Full population testing (i.e., a 100 percent examination of all items in the population with the use of technology-based tools such as GAS);
- Selection of specific items (i.e., the inclusion of specific items from the population based on pre-determined criteria), and
- Random sampling for the purpose of performing a statistical test (often called statistical sampling) or simply for generalization and/or extrapolation (often called non-statistical sampling) (Maingot & Quon, 2009:218; Aghili, 2011:21; AICPA, 2012:23; Smidt, 2014:85; IAASB, 2015 ISA 530 par.5 (g)).

These methods of collecting audit evidence can all be conducted with the use of GAS. The functionality of GAS, addresses population analysis to enable focused risk-based audit planning, 100 percent examination of all items in the population, the selection of items with specific characteristics, and statistical tools and sampling techniques amongst others (Coderre, 2009:5; IIA, 2011:6; AICPA, 2012:3; Ahmi & Kent, 2013:89; Olasanmi, 2013:69; Tumi, 2014:3; IAASB, 2015 ISA 500 par.A53). Importantly, the IIA Research Foundation (2010:27), in their 2010 Common Body of Knowledge (CBOK) report on the *Core Competencies for today's Internal Auditor*, predicted that the use of technology-based tools by internal audit functions in the following five years was going to increase and GAS was also ranked as one of the top 5 audit tools and techniques that would be utilised in the coming years. The accuracy of this prediction is unsurprisingly indicative of the pace of change: there is already an intensification of stakeholder expectations of their internal audit functions. Specifically, internal audit functions are expected to broaden their audit coverage in a

business landscape that is characterised by significantly increasing volumes of data, and the banking industry is probably leading the way (PwC, 2014:2; PwC, 2015:17). These rising expectations have already been officially recognised by the IIA in their global report, *The pulse of the profession - Enhancing value through collaboration: A call to action* (IIA, 2014:1). Perversely, perhaps, the IIA's Research Foundation (2015a:7), in their 2015 (CBOK) report on *Staying a step ahead: Internal audit's use of technology*, indicated that globally the use and/or adoption of technology-based tools by internal audit functions is still at a relatively low level.

Given the extremely large number of transactions processed in a bank, and the risks involved, the achievement of broader audit coverage with regard to a bank's risk universe should realistically be possible, but only with the adoption and optimal use of GAS. In addition, GAS enables the internal auditor to test an entire population, compared to the traditional sampling approach, with its additional risk of not always being representative of the audit population. In comparison, full population testing should increase the level of reliance that can be placed on the auditor's opinion relative to the reliability of the result when only a portion of the population was subject to the internal auditor's assessment. Although the benefits of using GAS in the execution of internal audits are well known, there are varying levels of maturity (the extent and effectiveness of use) in the use of these tools by different internal audit functions. This article (see section 2 for a detailed discussion of the research objective and methodology) explores the extent and effectiveness of the use of GAS as a means of gathering audit evidence for the evaluation of the effectiveness of a bank's risk management, governance and internal controls. A number of maturity assessment frameworks have been developed to measure the extent and effectiveness of the use of data analytics in a number of industries. Internal audit's maturity in the use of GAS can be assessed according to these data analytics maturity frameworks. This article however makes use of an analysis of the following frameworks and scales to serve as a specific benchmark for the assessment of the current levels of maturity of use of GAS by internal audit functions in the locally controlled South African banking industry:

- The Audit Command Language's (ACL) audit analytic capability "maturity" model (ACL, 2013:4);
- Deloitte's maturity model for internal audit analytics (Deloitte, 2013:5);
- EY's internal audit analytics maturity model (Ernst & Young, 2014:4);
- PwC's data analytics maturity scale (PwC, 2013:2);
- KPMG's data analytics maturity assessment (KPMG, 2013:5);
- IIA's data analytics maturity model framework (IIA, 2016b:40) and
- IIA's data analysis usage maturity levels (IIA, 2011:21).

The research findings in this article form part of the results of an extensive study done by Smidt (2016), on the use of GAS by internal audit functions in the South African banking industry, performed in fulfilment of a PhD degree in Auditing. This article highlights the research findings with regard to the maturity of the use of GAS by internal audit functions in the South African banking industry and is the first in a series of two articles. The second article will highlight the different uses of GAS as a data analytics tool by the internal audit functions in the South African banking industry.

In the next section the research objective and methodology is discussed, and this is followed by a literature review, empirical findings and a conclusion.

2. RESEARCH OBJECTIVE AND METHODOLOGY

Given the already elevated and increasing volumes of data and transactions that form part of the day-to-day business activities of a bank, and the high levels of personal and professional risk faced by a bank's board of directors, management and its internal auditors, this article will be guided by the following research objective:

To measure the existing practices of internal audit functions in the locally controlled South African banking industry regarding the use of GAS, against a benchmark developed from recognised data analytic maturity models, in order to assess the current maturity levels of the locally controlled South African banks in the use of this software for tests of controls.

The primary method of data collection used in this article was by means of a structured questionnaire (quantitative method), which was then followed up with a semi-structured telephonic interview, but only in cases where further clarity was sought from the respondents (qualitative method). The quantitative data, for the purposes of this article, was analysed through the use of descriptive statistics. The structured questionnaire (refer to Smidt (2016:306) also gathered additional qualitative data through the use of a limited number of open ended questions. The qualitative data provided additional insight regarding the current frequency of use (i.e., level of maturity) in the use of GAS, the second article in this series provides insight into the reasons for including GAS in their respective audit methodologies.

The locally controlled banking population consists of 10 banks, all of which have local in-house internal audit functions, and are permitted to conduct the business of a bank in South Africa (Reserve Bank, n.d.). The research population therefore consisted of Chief Audit Executives (CAEs) of in-house internal audit functions from the ten (10) locally controlled banks that were at that stage (2016) registered with the South African Central Bank (Reserve Bank), and that were thus permitted to conduct the business of a bank in South Africa (a list of these 10 locally controlled banks is included in Annexure A). The locally controlled banks were specifically selected as their internal audit methodologies and procedures have been developed and maintained by their respective South African head office internal audit functions, in compliance with South African legislation. Internal audit methodologies used in the locally operating foreign banks have been developed and are maintained at the banks' international head offices, and were therefore excluded from this research because of the diversity of jurisdictions and legislation governing these functions.

The total number of questionnaires returned was nine from the ten banks. The questionnaires were followed up by a semi-structured interview with the nine participating CAEs (but only in cases where further clarity was sought from the respondents).

3. LITERATURE REVIEW

3.1. A brief overview of the impact of information technology and big data on collecting audit evidence

Paperless business environments are the norm, an internal audit functions have to adapt in order to deliver on their mandates. A comparison between the traditional (paper-based) audit evidence and electronic audit evidence revealed that the traditional means of collecting audit evidence for tests of controls purposes will, in a paperless environment now be inappropriate and impractical to apply, especially in the present-day business environment which is dominated by "big data" (also refer to section 1) (Williamson, 1997:69; Shaikh, 2005:409; Caster & Verardo, 2007:69; Coderre, 2009:4; Josiah & Izedonmi, 2013:2; Brown-Liburd & Vasarhelyi, 2015:6; IIA, 2016b:6; Singh & Best, 2016:35). It should be noted however, that the overall objectives of the internal audit function (to provide independent assurance over the adequacy and effectiveness of a company's risk management, control and governance processes) to a large extent remains unchanged (Madani, 2009:514; IIA, 2016b:8). The rapid evolvement of data (electronic evidence) and the development of software tools and techniques to enable analysis of that data has had a significant impact on "how" the internal audit function goes about obtaining audit evidence in order to still deliver in terms of its statement of responsibilities (IIA, 2016b:8).

3.2. Technology tools and techniques use by internal audit functions

The advances in the use of technology in organisations' business processes (as was mentioned in section 1 above) over the last few decades has put internal audit functions under pressure to adapt to this "new" business environment, which is predominantly driven by technology. An additional pressure on the internal audit function is the rising expectations of its key stakeholders requiring an increase in audit coverage in an effective and efficient manner (IIA, 2014:1; PwC, 2014:2; PwC, 2015:17; Tusek, 2015:188). For this reason, the internal audit function has had to find innovative responses to these "pressures" so as to continue to deliver on its mandate (refer to section 1). The upskilling of internal audit functions and the implementation of technology-based tools was probably one of the most significant responses to these "pressures" (Motubatse, van Staden, Steyn & Erasmus, 2015:269). Business' adoption of technology necessitated the adoption of technology-based tools and techniques by internal audit functions (IIA, 2011:2; Olasanmi, 2013:68; Mahzan & Lymer, 2014:328).

The increased pressure on the internal audit function to adopt and/or use technology-based tools is given added impetus by the Standards (Standard 1220.A2, *Due Professional Care*) and by currently recognised best practice guidance for internal audit functions, as stipulated in the King III Report. King III requires the internal audit function to adopt and implement tools and techniques in order to stay abreast of the ever evolving organisational landscape, and especially with regard to an organisation's risk and assurance needs (IOD, 2009:98; IIA, 2016c:7). In the IIA's Research Foundation's (2015a:5), in their 2015 (CBOK) report entitled *Staying a step ahead: Internal audit's use of technology*, it appears that the adoption and implementation of technology-based tools by internal audit functions is increasing, but that there is still room for improvement.

It is worth noting how the usage of some of these technology-based tools has changed over the 10 year period since the IIA's 2006 CBOK study was conducted. For comparison purposes the five most frequently used technology-based tools identified during the 2006 CBOK study are compared with the equivalent 2015 usages in Table 1 below.

Table 1. Increase in internal audit's use of technology-based tools

Technology-based tool employed by internal audit	***Cbok 2006 percentage usage*** (indicates the moderate to extensive use as indicated by the research participants)	***Cbok 2015 percentage usage*** (indicates the moderate to extensive use as indicated by the research participants)	***PERCENTAGE CHANGE BETWEEN THE CBOK 2006 AND CBOK 2015 STUDIES***
Continuous/real-time auditing	37%	44%	Increase of 7%
Computer assisted audit technique (caat)	52%	48%	Decrease of 4%
A software tool for data mining	39%	53%	Increase of 14%
Flowchart or process mapping software	43%	52%	Increase of 9%
Electronic work papers	65%	72%	Increase of 7%

(Source: IIA, 2015a:9)

The results presented in Table 1.1 above indicate that there has been an overall increase in the use of the most popular technology-based tools over the past 10 years, with the exception of CAATs. This upward trend in the use and implementation of technology-based tools may possibly be an indication that the internal audit function (globally) is actively and positively responding to the pressures it has been under to ensure that its auditing approaches remain relevant and keep pace

with the evolvement of technology. A decline of 4% was however noted in the usage of CAATs as a technology-based tool. The reason behind this decline is unclear, but could possibly be linked to an interpretation issue with regard to the broad definition of what CAATs entail (this was suggested in the IIA's 2015 CBOK study). In spite of this decline, increasing the use of CAATs still remains a top priority for internal audit functions. Smidt (2014:152), in his study on the use of sampling by internal audit functions in the South African banking industry, found that 90% of respondents indicated that the use of CAATs (specifically GAS) could be "utilised more frequently" within their respective departments. This relatively low use of technology-enabled tools was also further accentuated by the IIA's Research Foundation (2016a:6), in their 2016 (CBOK) report on *Regional Reflections: Africa*, where 57% of respondents from South Africa indicated that their internal audit functions only utilise technology "to some extent", or rely solely on manual interventions in the execution of their duties. Another study conducted by Protiviti (2015a:19) in the USA – *From Cybersecurity to Collaboration: Assessing Top priorities for internal audit functions* - confirmed that improving the adoption rate of CAATs remains a top priority for internal audit functions in order to improve the function's skillset in technology-enabled tools and techniques.

Although a number of different technology-based tools are available for internal audit functions' use (as was highlighted in Table 1.1), these will not form part of the scope of this article. The most popular and frequently used CAAT by internal audit functions is GAS (Kim, Mannino & Nieschwietz, 2009:215; Lin & Wang, 2011:777; Mahzan & Lymer, 2014:328). It is therefore the intended purpose of this article to assess the use of GAS as a technology-based audit tool (as mentioned in sections 1 and 2).

3.3. Data analytics maturity frameworks for internal audit functions

Data analytics enable internal auditors to provide "hindsight, insight and foresight". All three of these together can be referred to as the internal audit function's "line of sight" (ACL, 2013:3). This "line of sight" enables internal auditors to provide meaningful feedback to their various stakeholders from three perspectives, namely; historical (hindsight), current (insight into the current control environment) and future (foresight) (IIA, 2011:6; ACL, 2013:3; Deloitte, 2013:3; KPMG, 2013:2; PwC, 2013:4; Coderre, 2015:39; Deloitte, 2016:2). To put it differently, the primary or basic forms of data analytics are focused on answering questions such as: "what happened?" or "why did it happen?" In other words, it is focused on providing feedback from historical and at best, current perspectives. These types of analytics are known as descriptive and diagnostic analytics (Deloitte, 2013:3; IIA, 2016b:14). They are useful to improve the efficiency of organisational processes and can also inform strategic decisions. More advanced analytics can be used to answer questions such as: "what might happen?" or, "what is the best/worst that could happen?" These types of analytics are known as predictive and prescriptive analytics, which provide a view of potential situations that could require future action, such as updating the state of the control environment to address a potential materialising risk (IIA, 2016b:14). From an internal audit perspective, the predictive capability of analytics is paving the way for internal audit functions to conduct risk-focused annual audit planning, and also to focus audit efforts on high risk areas that warrant emphasis (Deloitte, 2013:3).

In order to advance from simply providing basic descriptive and diagnostic data analytics to more complex data analytics (where predictive and prescriptive analytics are performed) requires an internal audit function to evolve through the different levels of maturity on the data analytics maturity continuum. It should be obvious that, as with all new techniques and technologies, there are different levels of maturity in the adoption and use of data analytics by internal audit functions. A review of internal audit literature revealed seven data analytics maturity frameworks (as mentioned in section 1), and these formed the basis for the development of the research instrument used in this article.

Goksen, Cevik and Huseyin (2015:209) state that: *"Maturity models are based on the premises that people, organizations, functional areas, processes, etc., evolve through a process of development or growth in the direction of a more advanced maturity,* ***going through a distinct number of levels*** [own emphasis]*"*. It is clear that a maturity model or framework consists of specific levels, each with unique characteristics and that a form of growth or evolvement has to take place in order to advance to a more "mature" level. Each of the data analytics maturity frameworks mentioned above proposes a different set of levels of maturity and identifies the characteristics associated with each level of maturity when employing data analytics.

To advance from one level of maturity to the next requires an internal audit function to illustrate growth or improvement with regard to their current capabilities in the use of data analytics for tests of controls purposes. Functions demonstrating the most basic level of implementation (depicted as level 0 and/or level 1) (also refer to section 4), only make limited use of data analytics and perform basic data analytics procedures: in other words, they only manage to provide descriptive and diagnostic analytics. By way of contrast, internal audit functions that have transitioned to a more mature state and are illustrating capabilities to perform at levels 4 and 5, have reached the levels where continuous auditing and continuous monitoring can be performed (also refer to section 3.4 for a brief discussion on continuous auditing and continuous monitoring) where they can provide predictive and prescriptive analytics.

It should however be borne in mind that the successful employment of data analytics is not only reliant on the technological aspect (such as the specific audit software tool used to perform analytics). Equally important to ensuring the success of a data analytics initiative are the aspects of managing the people and the processes (ACL, 2013:6; Deloitte, 2013:5; KPMG, 2013:11; PwC, 2013:7; Coderre, 2015:40; IIA, 2016b:49). It could happen that a specific internal audit function is on a higher level of maturity with regard to the technology it has at its disposal than it is on when

assessing the level of maturity of the people aspect (i.e., do we have the necessary skills available to ensure the data analytics initiative will be successful?). It is therefore important that these three components (people, process and technology) be assessed in conjunction in order to provide an overall assessment of the level of maturity displayed in the use of data analytics by an internal audit function. Such an approach to measuring the level of maturity could provide CAEs with valuable information with regard to identifying the specific areas in need of improvement (people, processes and/or technology) which is prerequisite to advancing the entire internal audit function to the next level of maturity (IIA, 2016b:41).

Improving the people aspect requires considering matters such as: the training requirements of the internal audit staff on the use of GAS and conducting data analytics; whether each internal auditor within the internal audit function should have the knowledge or competency to perform data analytics, or should it be limited to a select few individuals; and whether a separate, specialist, dedicated data analytics group should be formed within the internal audit function (Coderre, 2015:40; IIA, 2016b:49).

The aspect of processes refers to the fact that data analytics should be integrated into all phases of the engagement from the annual planning phase all the way through to the audit reporting phase (PwC, 2013:7; Coderre, 2015:41; IIA, 2015c:3; Protiviti, 2015b:8). Internal audit functions that are serious about actively pursuing a transition from traditional audit approaches and techniques to one that fully utilises data analytics in its most advanced form must realise it will take time. Zitting (2016:3) puts it this way: *"Start small and evolve, but actually start"*.

3.4. A brief overview of continuous auditing and the relation to internal audit

The internal audit functions of today are confronted by many and increasingly complex challenges such as:

- They are expected to do more with less (i.e., they must perform "lean" audits as a result of cost cutting and pressure on organisations' audit budgets);
- They are required to provide the audit committee, senior management and other stakeholders with timely audit results that demonstrate deeper insight and offer enhanced value;
- They are expected to provide assurance on a much broader organisational risk and control landscape;
- They are required to play a more prominent role with regard to compliance and risk management;
- They are viewed as trusted advisors of senior management and are expected to fulfil a more proactive role regarding the identification of risks and controls; and
- They need to conduct their day-to-day activities in a control environment that is dominated by technology and big data (Baker, 2009:30; KPMG, 2013:2; IIA, 2014:1; Malaescu & Sutton, 2015:96; Protiviti, 2015b:9; PwC, 2015:17; Tusek, 2015:188).

These pressures necessitate that internal audit functions continue to evolve, moving from just performing basic data analytics with the use of GAS (i.e., the early stages of maturity when data analysis techniques are first adopted, through increasingly advanced levels of analytic sophistication until they are performing data analytics on a continuous basis (i.e., until continuous auditing is standard practice). This evolvement towards continuous auditing capability is a discernible but slow trend. This can be seen in the increase of 7% in its use over the 10 year period since CBOK 2006, as was reported in the IIA's Research Foundation's (2015a:5) 2015 CBOK report: *Staying a step ahead: Internal audit's use of technology*. It should be noted that although the increase is noticeable, it has been measured off a very low starting level (currently at 44%). Thus, the absolute number of internal audit functions that have achieved this advanced level of maturity in the use of data analytics is still relatively small.

The term continuous auditing is often confused with the term continuous monitoring.

Continuous auditing refers to the repeated automated collection of audit evidence and indicators by an internal auditor making use of information technology systems, processes, transactions and controls at regular intervals. It includes the performance of analytical procedures on a predefined schedule (e.g., weekly, monthly or quarterly) and is based on the identification of specific criteria as defined by the auditor (ACL, 2013:11; KPMG, 2013:2; IIA, 2015c:1; IIA, 2016b:44).

Continuous monitoring refers to the feedback mechanism for ongoing management review in order to verify whether implemented controls are functioning as intended and whether transactions are being processed according to the predefined criteria. Continuous monitoring is a management responsibility and therefore forms an integral part of an organisation's internal control environment (ACL, 2013:14; KPMG, 2013:2; IIA, 2015c:1; IIA, 2016b:45).

Although these two terms are closely related the main difference lies in the roles and responsibilities associated with the key role-players in each process. Continuous auditing is a responsibility that resides with the internal audit function, whereas continuous monitoring is a management responsibility. Internal audit functions that have already achieved or that are aiming to reach a level of maturity where continuous auditing is conducted within their departments can potentially experience the following benefits:

- Optimisation of the balance between the review efforts of internal audit and management;
- A more efficient use of organisational resources;
- Reduced cost of assessing and providing assurance over the adequacy of internal controls;
- Ability to provide an ongoing evaluation of risks and controls;
- Ability to provide timely reporting of gaps and weaknesses, thus enhancing the opportunity for prompt corrective action by management;
- Flexibility in order to prioritise corrective action to be taken by management;
- An enhanced understanding of business performance, risks, and compliance;

- The ability to provide continuous assurance regarding controls, risks, and opportunities (ACL, 2013:11; IIA, 2015c:2).

The IIA's (2015c:3) Global Technology Audit Guide (GTAG 3) entitled *Continuous Auditing: Coordinating Continuous Auditing and Monitoring to Provide Continuous Assurance* provides a clear picture of the allocation of the roles and responsibilities between the various levels of management and the internal audit function, within the context of the three lines of defence model. The internal auditors have the responsibility to:

- Plan continuous auditing jointly with first and second lines of defence;
- Perform continuous auditing:
  - relate analytics to assertions and business objectives,
  - align risk factors and control activities,
  - add value as a trusted adviser by assessing emerging enterprise risks.
- Perform audit testing of continuous monitoring;
- Provide continuous assurance in connection with audit objectives such as completeness, accuracy, and security;
- Maintain effective data security arrangements.

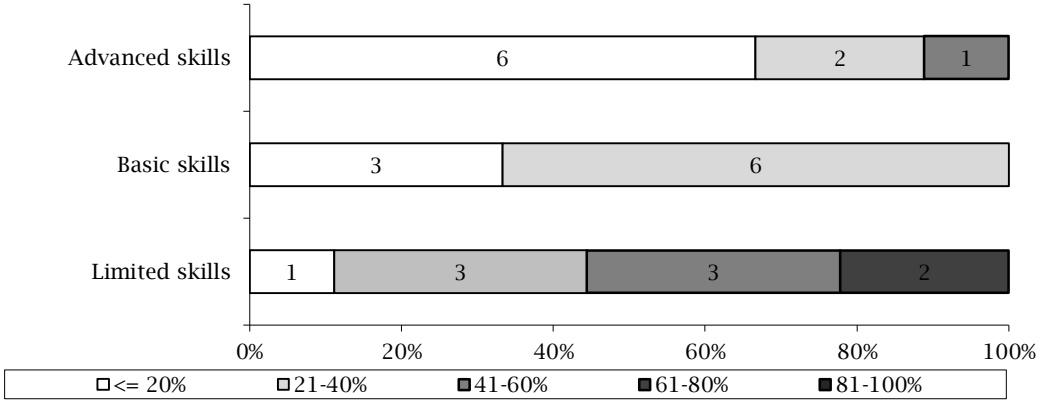
Management's responsibilities encompass designing and performing continuous monitoring.

4. EMPIRICAL FINDINGS

4.1. The ability of internal audit team members to embrace data analytics

As mentioned in section 3.3, the people aspect should consider matters such as, the training requirements of the internal audit staff in the use of GAS and conducting data analytics, whether each internal auditor within the internal audit function should have the knowledge or competency to perform data analytics (or should it be limited to a select few individuals), and should a separate and dedicated specialist data analytics group be formed within the internal audit function. The distribution of the individual internal auditors' capabilities in the use of GAS is displayed in Figure 1 below.

Figure 1. Internal audit functions' capabilities in the use of GAS



- Limited skills" means that individual internal auditors only have an awareness of the commands or functions that GAS may offer, but they are not proficient enough to independently apply the basic functions and commands that are built into the GAS (for example: not able to run the duplicates, statistics, and summarise commands, or to draw random samples). The survey results indicate that the majority (66.7%) of the respondents' internal audit staff with limited skills in the use of GAS are at a level of between 21% and 60%.
- "Basic skills" means that individual internal auditors' proficiency in the use of GAS is sufficient to enable them to independently apply the basic functions and commands built into the GAS (for example: they can run and interpret the results of the duplicates, sampling and summarise commands) but do not have the ability to write scripts. The survey results show that 33.3% of the respondents indicated that at most 20% of their internal audit staff has basic skills in the use of GAS, and that 66.7% of the respondents indicated that between 21% and 40% of their internal audit staff has basic skills in the use of GAS.
- "Advanced skills" means that individual internal auditors are experienced in and can apply all the basic functions and commands built into the GAS, and also have the ability to write scripts for the automated performance of tests for internal auditing purposes. The survey results show that 66.7% of the respondents indicated that at most 20% of their internal audit staff has advanced skills in the use of GAS; 22.2% of the respondents indicated that between 21% and 40% of their internal audit staff has advanced skills in the use of GAS, and 11.1% of the respondents indicated that between 41% and 60% of their internal audit staff has advanced skills in the use of GAS.

The overall skillset of individual internal auditors in the use of GAS (measured as limited, basic or advanced) indicates that the skills of individual internal auditors need to be improved (refer to Figure 1). Various international studies indicate that the level of competency required of internal auditors in the use of GAS is an important factor contributing to or inhibiting the adoption of GAS by internal audit functions (PwC, 2013:3; Tumi, 2014:9; IIA, 2016b:10). The presence of individual internal auditors with lower skillsets with respect to the use of GAS could therefore contribute to the determination of a lower level of maturity in the use of GAS as it pertains to the people aspect of internal audit functions for tests of controls purposes.

While the individual internal auditors' skillsets in the use of GAS for tests of controls purposes is less than optimal, 55.6% of the respondents indicate that they have separate data analytics teams, and that the members of these teams exhibit advanced skills in the use of GAS (i.e., they are sufficiently experienced to be able to apply all the basic functions and commands built into the GAS, and also have the ability to write scripts for the automated performance of tests for the rest of the internal audit function). In addition, 77.8% of the responding banks also have individuals with specialist skills such as Data Specialists (who have a sufficiently detailed understanding of IT infrastructure and data sources to be able to access the data), and/or ERP systems specialists (who have expert knowledge of ERP systems such as SAP or Oracle) to support and enable the internal audit function to conduct data analytics with the use of GAS within their respective internal audit functions using GAS. Internal audit functions that display these characteristics are normally considered to be operating on higher levels of maturity when compared to those internal audit functions that do not have these characteristics (also refer to section 3.3). This will contribute positively when evaluating the overall skillset maturity (i.e., the individual internal auditors together with the specialists) in the use of GAS for tests of controls purposes.

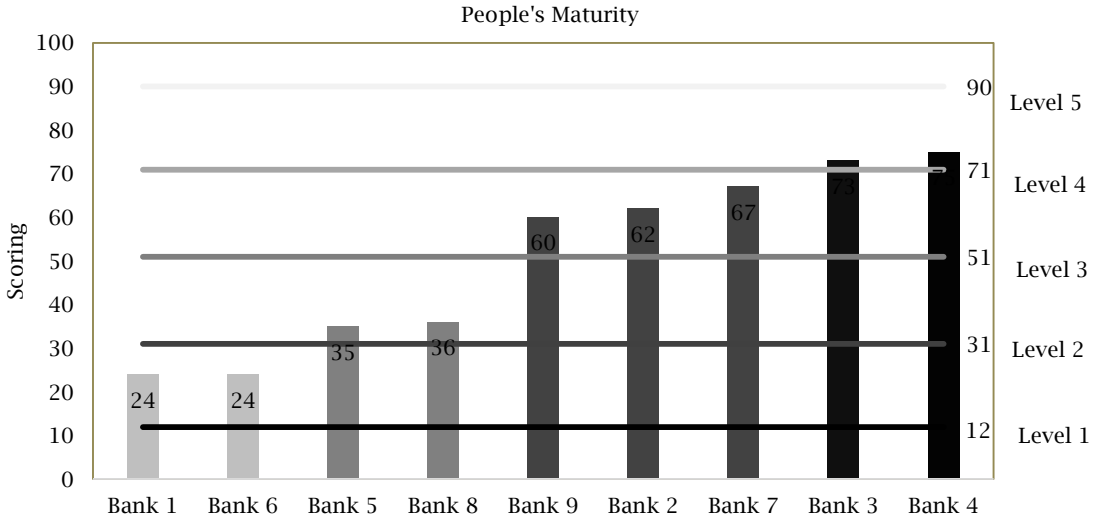
Additional factors that contribute to or motivate internal audit staff to improve their skills in the use of GAS in order to embrace data analytics are, (1) buy-in and support from audit management for the use of GAS as part of the internal audit methodology; (2) the incorporation of the use of GAS as one of the Key Performance Areas for individual internal auditors, and (3) to offer higher levels of remuneration for those internal audit staff members with specialist data analytics skills.

44.4% of the respondents indicated that the use of GAS is already one of their Key Performance Areas for internal audit staff members. 33.3% of the respondents indicate that higher levels of remuneration and/or reward are linked to internal audit staff with specialised data analytics skillsets appropriate to the use of GAS, which has been done in an effort to attract and retain these skills within their internal audit functions.

In conclusion, it is evident that the respondents are doing well with regard to the buy-in and support from audit management and the CAE to incorporate the use of GAS as part of the internal audit methodology (88.9% of the respondents indicated that they do have buy-in and support from audit management for the use of GAS as part of their internal audit methodology). However, the use of GAS as one of the Key Performance Areas for internal auditors' performance evaluations, and the higher levels of remuneration for those internal audit staff members with specialist data analytics skills, achieved low response levels which also adversely impacts on the level of maturity in the use of GAS achieved for the maturity aspect of people.

Figure 2 illustrates the distribution of the different levels of maturity achieved for each bank with regard to the aspect of people.

Figure 2. Maturity assessment: People



Reviewing the results from Figure 2 it is clear that the ability of internal audit team members to embrace data analytics using GAS is not yet optimal and that there is still much room for improvement. To summarise, 44.4% of the respondents demonstrated a low level of maturity (level 1 and 2) with regard to the aspect of people. Another 33.3% of the respondents demonstrated a medium level of maturity (level 3) for this aspect. There were only two respondents that achieved a high level of maturity (level 4) with regard to the aspect of people. The next section discusses the processes in place that support and enable the use of GAS (i.e. the process aspect).

4.2. Processes in place that support and enable the use of GAS

The aspect of processes addresses the fact that data analytics should be integrated in all phases of the internal audit engagement (as discussed in section 3.3). It refers to the processes that are in place that should support and enable the use of GAS. To this

end, 55.6% of the respondents indicated that their banks' internal audit functions have formalised and implemented procedures, standards, and documentation and offer training that provides guidance to the internal audit staff on how GAS and data analytics should be applied on an internal audit engagement. This should contribute positively to the maturity assessment of the process aspect of these internal audit functions. In contrast, 44.4% of the respondents indicated that their internal audit functions' use of GAS is an informal arrangement; thus it is up to the individual internal auditor to decide whether or not to make use of GAS, as he/she deems fit. Informal arrangements with regard to the use of GAS will adversely impact the maturity assessment of the process aspect of such internal audit functions.

The following responses are all strong characteristics with regard to the aspect of processes in place to support and enable the use of GAS within internal audit functions. In other words, internal audit functions that display these characteristics are normally associated with higher levels of maturity in the use of GAS for tests of controls purposes. It appears that the majority of the respondents do not currently display these characteristics, as can be seen from the responses analysed below.

The responses were as follows:

• Only 33.3% of the respondents indicated that their bank's use of GAS is standard practice throughout their internal audit function for tests of controls purposes (i.e., it is integrated in all audit programs).

• Only 33.3% of the respondents indicated that their banks have developed data analytics scripts that have been through a quality assurance review, are defined, and are readily available for use by their respective internal auditors.

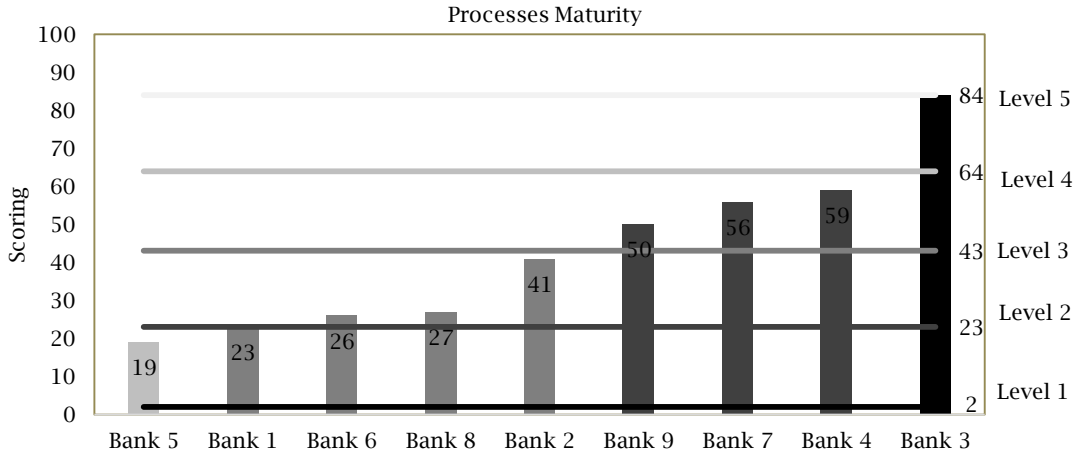
• Only 11.1% of the respondents indicated that their bank has developed and tested comprehensive suites of tests, and that they are available in a central, controlled environment for use by the internal audit staff.

• Only 22.2% of the respondents indicated that their banks have custom-built, automated scripting and testing in place, and that this is running according to a predefined schedule (i.e., continuous auditing has been achieved). The implementation of continuous auditing is therefore not at a mature level in a majority (77.8%) of internal audit functions in the locally controlled banking industry of South Africa. This limited use of continuous auditing also corresponds with the overall global trend that has been identified by the IIA's Research Foundation (2015a:5) in their 2015 (CBOK) report entitled *Staying a step ahead: Internal audit's use of technology* in which a slowly growing trend of 7% was identified over the period 2006 to 2015 with regard to the implementation of continuous auditing by global internal audit functions (as mentioned in section 3.4).

• Only 22.2% of the respondents indicated that their banks have real-time data monitoring, with system workflow processes in place through which the control owners in the respective business units in the banks are notified of exceptions, and that they are then able to respond to them (i.e., continuous monitoring has been achieved).

Figure 3 illustrates the distribution of the different levels of maturity achieved for each bank with regard to the aspect of process.

Figure 3. Maturity assessment: Process



Reviewing the results from Figure 3 it is clear that the processes in place to support and enable the use of GAS are also far from optimal in a majority of the banks' internal audit functions. To summarise, 55.5% of the respondents reflected a low level of maturity (level 1 and 2) with regard to the aspect of process. Another three respondents achieved a medium maturity level (level 3) for this aspect, and only one respondent displayed a high level of maturity (level 5) with regard to the aspect of process. The next section discusses the technology platform that enables the performance of data analytics (i.e. the technology aspect).

4.3. The technology platform that enables the performance of data analytics

Most internal audit functions are faced with significant initial costs with regard to the purchase and implementation of the technology platform that supports and enables the data analytics effort (IIA,

2016b:56). The issue of cost implications with regard to the purchase of commercially available software packages was also cited as one of the impeding factors, amongst others, believed to hinder the adoption of GAS by internal audit functions (ACL, 2013:4; Tumi, 2014:9; IIA, 2016b:10). There are however various CAATs tools available to the internal auditor that are useful in conducting data analysis, as was mentioned in section 3.2. The most common data analysis tool that is currently used by the internal audit functions in the locally controlled banking industry in South Africa was identified as the GAS package called ACL (77.8% of the respondents indicated the use of ACL as their preferred data analytics tool). Consideration of the use of appropriate data analysis tools (i.e., the specific CAATs tool, or for the purpose of this article, the GAS tool) is not the only aspect to consider under the technology platform. Equally important are the issues of access to, and availability, accuracy, completeness and integrity of the data, amongst others, within the various banks' or organisations' control environments.

The following responses provide insight regarding the technology platforms that are currently available to the internal audit functions of the locally controlled South African banking industry:

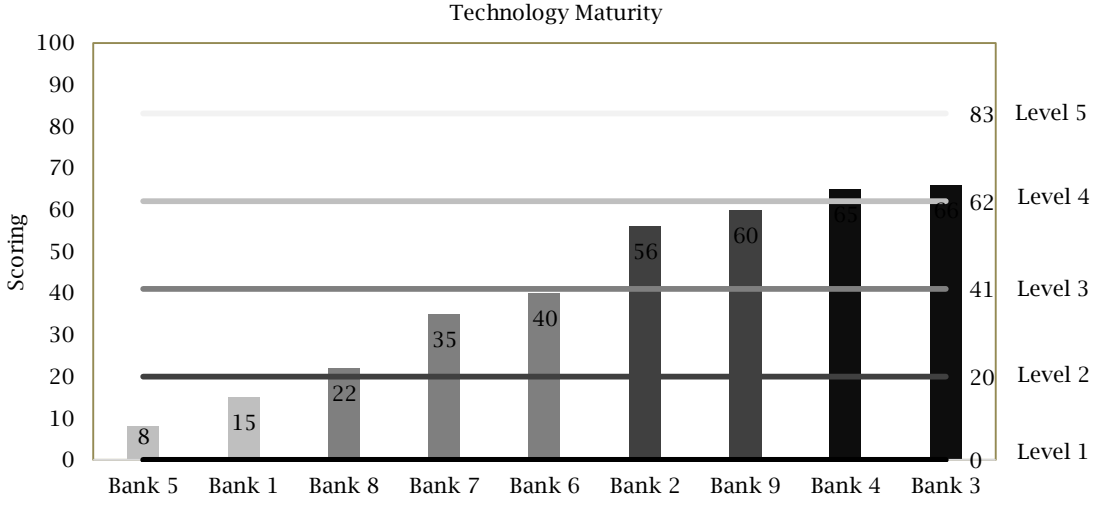
- The majority of the respondents (77.8%) indicated that it is difficult for the internal audit function to obtain access to the organisational data without support from IT. On the other hand, 44.4% of the respondents also indicated that they do have an established data access protocol with the IT department that enables them to obtain data for audit and analytical purposes. This issue of data access has also been consistently identified as a top concern in a majority of the international studies reviewed (AuditNet, 2012:9; KPMG, 2013:10, PwC, 2013:3; Protiviti, 2015b:8; IIA, 2016b:10), and that this adversely impacts on the internal audit functions' decisions on whether to integrate the use of GAS and data analytics into their respective audit methodologies.
- Less than half of the respondents (44.4%) indicated that complex processing of large data volumes is performed on high-powered servers.
- Less than half of the respondents (44.4%) indicated that they do have access to a central enterprise data store which allows for easy access to data for audit and data analytical purposes.
- Only 33.3% of the respondents have advanced analytics in place, that are available for use within the internal audit function, and which have been developed by their data analysis specialists who also have expert knowledge of ERP systems.
- Only 22.2% of the respondents have an automated data extraction, transfer and load capability for data analysis purposes.
- Only 22.2% of the respondents have a well-structured and centrally-managed server environment which stores and maintains large data sets and the contents of the audit analytics processes.

The presence and functionality of these technological attributes are also indicative of a higher level of maturity being displayed by such banks (with regard to the technology aspect).

In addition to the characteristics of the technology platform described above, it is important to note that the use of data visualization tools for reporting purposes also contributes to enhancing the assessed level of maturity that can be achieved from a technology perspective. The results revealed that 22.2% of the respondents *never* make use of data visualization tools for reporting purposes; 33.3% indicated that they *rarely* make use of them; another 33.3% indicated that they *sometimes* make use of data visualization tools for reporting purposes, and 11.1% indicated that they *often* make use of these tools. To put it differently, a majority of the internal audit functions (88.9%) do not make use of data visualization tools *very often* for reporting purposes with the exception of one respondent indicating that they *often* use data visualization tools for reporting purposes.

Figure 4 illustrates the distribution of the different levels of maturity achieved by each bank with regard to the aspect of technology.

Figure 4. Maturity assessment: Technology



Reviewing the results from Figure 4 it is clear that the technology platform the banks have in place that should enable the performance of data analytics with the use of GAS is also not yet optimal in a majority of the banks' internal audit functions. To summarise, 55.6% of the respondents fell in a low level of maturity (levels 1 and 2) with regards to the aspect of technology. Two respondents (22.2%) achieved a medium level of maturity (level 3) for this aspect. A further two respondents (22.2%) displayed a high level of maturity (level 4) with regard to the aspect of technology.

4.4. Overall maturity assessment

In order to calculate the overall maturity level of each bank, with respect to their use of GAS to conduct data analytics for tests of controls purposes (as was indicated in section 3.3), the three aspects (people, processes and technology) should collectively contribute to generating the overall maturity assessment. In order to achieve this, each of the three aspects (people, processes and technology) was equally weighted. This meant that, because there were differences in the number of questions addressing each of these aspects (for example, as the process aspect had more questions than the others, it could have had a much higher influence on the assessment than either the technology or people aspects), a simple arithmetic average was calculated for each bank, using the following formula:

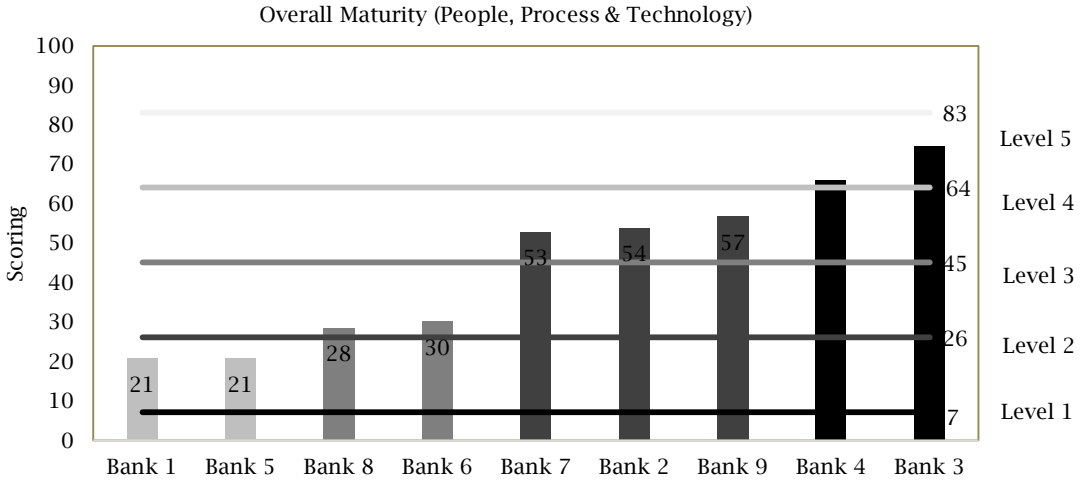
$$(P + PR + T)/3$$

Where:

P = total score for people for a specific bank
PR = total score for process for a specific bank
T = total score for technology for a specific bank

Figure 5 illustrates the distribution of the overall maturity levels that were achieved after having applied the above mentioned formula to the data for each bank with regard to the three aspects, namely people, processes and technology.

Figure 5. Overall maturity scoring



Reviewing the results from Figure 5 it is clear that the overall assessment of maturity of the use of GAS (i.e., the sum of the assessments of maturity of the people, process and technology aspects) revealed that 44.4% of the respondents demonstrated a low level of maturity (level 1 and 2), while 33.3% demonstrated a medium level of maturity (level 3). Only 22.2% demonstrated a high level of maturity (level 4).

The next section contains concluding remarks regarding the current level of maturity of the use of GAS by internal audit functions within the locally controlled South African Banking industry.

5. CONCLUSION

The majority of the respondents (77.8%) currently do use GAS for data analytics purposes in obtaining audit evidence for conducting tests of controls. The most popular GAS tool currently in use is ACL (77.8% of the respondents indicated the use of ACL as their preferred data analytics tool). Although the majority of respondents are currently using GAS (in this case ACL), the frequency of its use in conducting internal audit engagements is still at a low level, with 88.9% of the respondents subscribing to the belief that GAS can still be utilised more frequently than it is at present within their respective internal audit functions.

The overall assessment of the maturity of the people aspect revealed that 44.4% of the respondents demonstrated a low level of maturity (levels 1 and 2), while another 33.3% of the respondents demonstrated a medium level of maturity (level 3) for this aspect. There were only two respondents that achieved a high level of maturity (level 4) for the aspect of people.

The overall assessment of the maturity of the process aspect revealed that 55.5% of the respondents demonstrated a low level of maturity (levels 1 and 2), while another 33.3% of the respondents demonstrated a medium level of maturity (level 3) for this aspect. There was only one respondent that displayed a high level of maturity (level 5) for the aspect of process.

The overall assessment of the maturity of the technology aspect revealed that 55.6% of the respondents demonstrated a low level of maturity

(levels 1 and 2), while two respondents demonstrated a medium level of maturity (level 3). Another two respondents demonstrated a high level of maturity (level 4) with regard to the aspect of technology.

No respondents achieved an overall maturity rating of level 0, which is an indication that the internal audit functions of the locally controlled banking industry of South Africa has at least started on the maturity continuum in their use of GAS for tests of controls purposes. At the other end of the spectrum, no respondents received an overall maturity rating of level 5 either, which is an indication that the maturity of the use of GAS by the locally controlled internal audit functions of the South African banking industry has not yet been optimised. The highest overall level of maturity achieved was level 4, and only two respondents achieved this level. This indicates that the use of GAS by these banks' internal audit functions is at a higher level of maturity than in the remaining banks surveyed. It should however be noted (as was revealed by the results recorded in sections 4.1 – 4.4) that not a single respondent has reached a level in any of the three aspects, where there is no longer any room for improvement (even if an overall maturity rating of 5 was achieved).

As revealed by the empirical results of this article (discussed in section 4) and the results of various other authoritative internal audit studies (as mentioned above) it is clear that the overall use of technology based tools, and in particular the use of GAS, is still lower than expected, given the current dominance of technological-driven business practices generally, and especially within the banking industry which is now dominated by big data. This concurs with the observation made by Coderre (2015:40) that, *"Study after study has shown that the data analytics capabilities of internal audit functions consistently fall below what is desired and even what is required."* The performance of internal audit engagements in banks should be a continuous process which takes place in an effort to provide their various stakeholders with assurance regarding the effectiveness of governance, risk management, and controls. With the pervading uncertainty in business, and the ever evolving nature of risk and its potential impact on organisations, it is expected that internal audit functions will increasingly be tasked with the responsibility for anticipating future risk events that may threaten the achievement of the organisation's or bank's objectives. All of this will have to occur within control environments that are increasingly dominated by the use of technology and big data. Accordingly, internal audit functions in the locally controlled South African banking industry will inevitably experience increased pressures from their stakeholders to provide them with meaningful results and analyses of the effectiveness of their respective control environments, should this current low level of maturity of the use of GAS continue.

It is hoped that the internal audit functions of today take action and continuously strive to become leading-edge internal audit functions that optimally utilise technology, and specifically the use of GAS, to their advantage, and so ensure that they always deliver on their mandates with audits of the highest levels of quality.

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APPENDIX A

The 10 locally controlled banks, in alphabetical order, are:

- African Bank
- Bidvest
- Capitec
- First Rand Bank
- Grindrod
- Investec
- Nedbank
- Sasfin
- Standard Bank
- UBANK