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# Digital diplomatics of records in a government accounting system in Botswana

Olefhile Mosweu and Mpho Ngoepe

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Olefhile Mosweu

Department of Information and Knowledge Management, University of Johannesburg

olfmos@gmail.com

<https://orcid.org/0000-0003-4404-9458>

Mpho Ngoepe

Department of Information Science, University of South Africa

ngoepms@unisa.ac.za

<https://orcid.org/0000-0002-6241-161X>

## Abstract

*Determining the authenticity of digital records to support the audit process is problematic due to a lack of criteria to declare the authenticity of records. This study is part of a larger study (Mosweu 2018) that explored the authenticity of records in a government accounting system in Botswana. The current study utilised a literature review to demonstrate the need for a framework for digital diplomatics of records to support the audit process in a government accounting system in Botswana. The study used concepts from archival diplomatics as a theoretical lens. It was established that records in a government accounting information system are presented to auditors even when their authenticity is questionable, leading to their rejection as audit evidence. A framework is suggested with the hope that, if implemented, it would transform public sector audit processes and lead to improvements in accountability for monies expended as the government delivers services to the people.*

**Keywords:** Archives, authenticity, archival diplomatics, auditing, Botswana, digital records, government, records management, accounting, digital diplomatics

## Introduction

Digital records are either stored in an enterprise resource planning (ERP) system or an electronic content management (ECM) system, or managed without the benefit of either system. In Botswana, the government has implemented computer-based information systems in its public service delivery chains, marking the transition towards an automated public service. The gradual change from primarily paper-based administrative systems to digital records marks the era of e-government services (Lemieux 2015). The adoption of e-government systems is an alternative model of improving public service delivery around the world (Chen, Chen, Huang and Ching 2006). Such computer-based information systems in Botswana straddle all government operations. These include information systems used in the courts, social services, national registration and financial management (Government of Botswana 2012; Mosweu 2018). Notably, as early as the 1970s, government organisations utilised computers for work purposes (Kraemer, Danziger and King 1978; Danziger and Andersen 2002). Computer systems are used for controlling and monitoring administrative operations, including processing financial and other data (Porter, Simon and Hatherly 2003). Many governments in Africa have joined the bandwagon and now use computer-based information systems to drive government operations (United Nations 2014). In Botswana, an integrated financial management system named the Government Accounting and Budgeting System (GABS) was implemented to improve accounting capabilities for financial records in government.

Business processes conducted in the networked environment result in the creation of digital records. Accounting for monies and resources expended to deliver services is a form of accountability that relies on records as evidence. In the digital environment, auditors utilise computers to conduct audit procedures (Porter et al 2003) and in order to reach audit opinions, they rely on authentic records (Bhana 2008; Ngoepe and Ngulube 2014). The reason for performing an audit, which is to determine the accuracy and reliability of financial statements and to possibly locate fraud, becomes difficult without a record of transactions or when the authenticity of such a record is questionable (Ngoepe 2004). Transitioning from manual to digital systems demands that auditing be executed in the digital environment (Moorthy, Seetharaman, Mohamed, Gopalan and San 2011). For example, Mello and Ngoepe (2020) report that in 2017, the Auditor-General of South Africa (AGSA) used Rand Water, the South African water utility company, as a testbed to audit remotely in a virtual environment. This meant that after submitting the financial statements, the AGSA auditors were granted full remote access to the records management system of Rand Water, and the auditors were able to get the supporting evidence. This scenario is

feasible where public bodies have implemented both ERP and ECM systems (Mello 2020). In this regard, auditing becomes effective. Such scenarios are not common in Botswana as few public bodies have implemented digital records management systems. However, the government of Botswana has implemented an accounting system that results in the generation of digital records that need to be authenticated to be accepted as evidence in support of the audit process.

## The uptake of ICTs in the Botswana government's accounting processes

The increased adoption of ICTs in public sector organisations is a result of many factors, including accountability for public service delivery. Integrated financial management information systems (IFMIS) were introduced for efficiency, effectiveness, accountability, transparency, security of data management and comprehensive financial reporting (Hendricks 2012). Automation of auditing and accounting processes is done through the implementation of business systems. According to the International Council on Archives (ICA) (2013), business records typically contain “dynamic data that is commonly subject to constant updates (timely), are able to be transformed (manipulable) and holds current data (non-redundant).” Kastenhofer (2016) notes that business systems create and keep great quantities of digital records. Such systems are not capable of preserving records both in the medium and long term (McLeod 2012). The systems were originally designed to support business processes and capture records like record-keeping systems. Records generated in such systems will most likely stay undeclared in their home environment (Johnston and Bowen 2005).

The Government Budgeting and Accounting System (GABS), from which the Government of Botswana's financial information management processes are transacted, was implemented in 2004. Modules in the GABS include the ones for general ledger, payables, receivables, public sector budgeting and cash management. Digital records are generated as evidence of financial transactions done through the system.

## Auditing in an information technology environment

The auditing and accounting processes have been affected by the use of ICTs by businesses and governments (Nearon 2005). Digital records as evidence to inform an audit opinion require an even greater level of scepticism than those for manual records because they are easy to alter without trace (Nearon 2005), thus making it difficult to prove their authenticity for audit purposes (Park 2001). Comparatively, detecting falsified paper records is easier than their

digital counterparts. Therefore, auditors have to be extra careful when dealing with digital evidence and have to scrutinise its sufficiency and competence (Nearon 2005). This calls for clear criteria to determine the authenticity and reliability of digital records to support the audit process (Mukwevho and Jacobs 2012). Effective records management would ensure that records form part of the audit evidence which would provide auditors with reasonable assurance that transactions completed have been duly authorised and recorded in accounting records. For this to happen, the challenges associated with creating legal relationships through the use of ICTs must be overcome through authentication of the records establishing such relationships (Gregory 1999). For audit purposes, if there are questions about the authenticity of digital records, they would be rejected by auditors as unworthy evidence and thus unfit for making informed audit opinions and conclusions (Ngoepe and Ngulube 2014).

Auditing as a profession and its processes have been affected by the utilisation of ICTs to facilitate work processes. This has challenged audit professionals to be proficient in both information technology (IT) and auditing to keep pace with emerging technologies (Carroll 2006). The computerisation of business records and the availability of computer-aided audit tools (CAATs) mean that these activities can be performed faster and more thoroughly. Auditing in the networked environment has to be underpinned by appropriate laws. This is because legislation has an impact on records management, including those generated by digital systems (Ngoepe and Saurombe 2016). Botswana, South Africa, Uganda and Mauritius have laws that recognise digital records in the transactions of public services (Government of Mauritius 2000; Uganda Law Reform Commission, 2004; Government of Botswana 2014a). For Botswana in particular, the Public Audit Act (PAA) and the Public Finance Management Act (PFMA) demand accountability in the use of public funds, inclusive of auditing forms (Government of Botswana 2011a; 2012). Specific functions of the Auditor General are detailed in the PAA (Government of Botswana 2012). These laws prescribe that public sector organisations should account for monies expended in transacting public affairs and auditing is part of that. The PAA requires the Auditor General to audit the accounts and prepare the financial statements of public bodies as specified in the PFMA. According to the International Records Management Trust (IRMT) (2004), the Accountant General's Department (AGD) views this regulation as the prime directive for good records management within the department.

## Statement of the problem

In Botswana, there are no clear criteria for determining the authenticity of digital records in general and those which are generated in the GABS in

particular. In a study on performance auditing in selected public organisations in Botswana, it emerged that the authenticity and reliability of records as evidence were questionable and could not be used in the audit process (Mosweu 2011). The Office of the Auditor General of Botswana (OAGB) had conducted performance audits at Gaborone City Council, Kgatleng Land Board, Public Procurement and Disposal Board, Ministry of Trade and Industry, the Independent Electoral Commission and Air Botswana. The OAGB lamented that records consulted were incomplete, misplaced, misfiled, haphazardly stored, difficult to retrieve, poorly classified and fragmented (Mosweu 2011). The situation is worse in the digital environment as most public bodies operate without ECM systems to manage records.

In South Africa, where there is some literature on the relationship between auditing and records management, it has been shown that proper records management supports audit processes (Ngoepe and Ngulube 2014). It is only through complete, authentic and reliable records that audit opinions can be formed during an audit. It is now accepted that financial audit processes rely on the availability of records to make worthwhile audit opinions (Ngoepe and Ngulube 2014). Using digital records as evidence during audits in South Africa has been problematic as auditors have often rejected them because they were found insufficient to support audit queries (Mulaudzi, Mukwevho and Ngoepe 2015). The criteria they use to assess whether digital records are authentic and reliable are also unclear (Barrister 2006). Compared to their paper-based counterparts, digital records may be more easily destroyed or altered without leaving any trace. The modern-day and complex business environment, accompanied by a plethora of digital business systems, makes achieving proper records management a massive challenge (Australia National Audit Office 2012). The volatile nature of the digital environment poses the risk that such systems might generate inaccurate or incomplete information, which could erroneously be used to make decisions during audits and the delivery of public services. Furthermore, for Botswana, records management professionals lack the competencies and skills required to effectively manage records generated in networked environments (Ngoepe and Keakopa 2011; Mosweu 2019; Mosweu and Ngoepe 2019). That said, organisations should create and maintain authentic, reliable and usable records, and protect their integrity for as long as required to enable them to support the continued flow of business, comply with the existing regulatory environment and provide the necessary accountability (ISO 15489-1 2016). This applies to both manual and digital records. This study sought to explore the digital diplomatics of records in accounting systems in Botswana.

## Conceptual framework

Lester (2005: 460) defines a conceptual framework as “the concepts chosen for investigation, and any anticipated relationships among them, will be appropriate and useful given the research problem under investigation.” The concepts frame and guide the issue under investigation. Empirical research needs to be guided by theory to guide its choice of research questions, research methodologies and data analysis (Ngulube, Mathipa and Gumbo 2015). The conceptual framework guiding this study goes well with records management policy requirements which include key aspects (evidentiary quality, authenticity, reliability), their purpose (accountability and audit), record-keeping requirements and system design (paper and electronic), standards for financial records management, skills and competencies for managing records, and user responsibilities (IRMT 2004).

Concepts guiding this study derive from archival diplomatics. Diplomats provides a specified view of a model record and the means of understanding and defining record authenticity, including elements that comprise it (McKemmish and Gilliland 2013). Its purpose is to assess whether or not these documents are records and whether or not assertions about their authenticity can be made. The biggest challenge for any modern organisation is to ensure that digital records created within and by the organisation are reliable and authentic. Metadata is key in the authentication of digital records and should relate to the content, context and structure of a record (Bearman 2007; McKemmish and Gilliland 2013). Archival diplomatics concerns itself with defining and assessing the trustworthiness of digital records or their authenticity (Duranti 2014). It was appropriate to use concepts to develop the study’s conceptual framework as, in the digital environment, the internal and external elements that constitute a record such as context (juridical, administrative, procedural and documentary framework) in which the record is created, archival bond (which links the current record and the one before as well as the one coming after) and persons (entities acting by means of the record) are included as metadata in a digital information system (Duranti, Eastwood and MacNeil 2002).

The constructs that make up the conceptual framework are legislation, skills and competencies, management of records and procedures for records authenticity. The conceptual framework underpinning this study is presented in Figure 1 in line with Ngulube et al (2015) who suggested that a conceptual framework is best depicted diagrammatically.

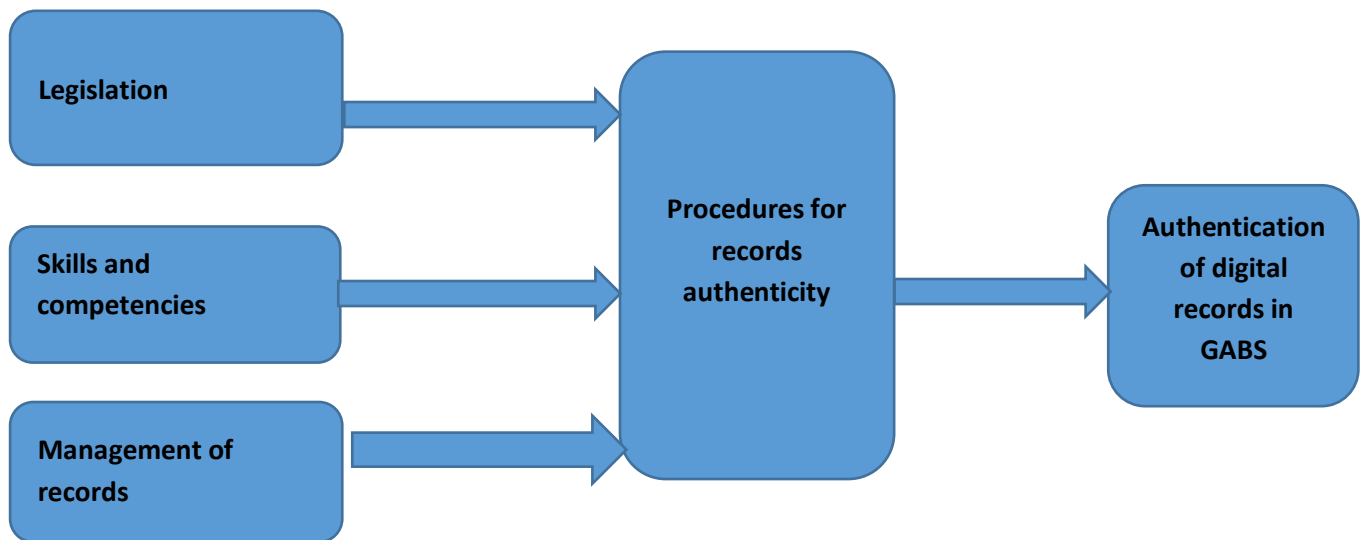


Figure 1: Conceptual framework for the study

## Legislation

Auditing and the management of records are regulated by law to guide practice, even in the digital environment (Bantin 2008). In Botswana, principally, the National Archives and Records Services Act and other laws such as the Electronic Records (Evidence) Act (Government of Botswana 2014a) regulate public sector records management. The latter recognises digital records as evidence in legal proceedings. Managing records in the networked environment is also supported by the Electronic Communications and Transactions Act which provides for the authentication of digital records using digital signatures. These should not be denied legal effect simply because they are in digital form (Government of Botswana 2014b). The Cybercrime and Computer Related Crimes Act makes it a crime to intercept and falsify data in computer-based information systems (Government of Botswana 2007). The Public Audit Act prescribes an annual audit of public finances by the Auditor General (Government of Botswana 2012) in accordance with the provisions of the Public Finance Management Act (Government of Botswana 2011a). The Constitution of Botswana provides for overall accountability for the use of state resources in a transparent manner (Government of Botswana 1966).

## Skills and competencies

Managing digital records require appropriate skills and competencies (Mosweu and Ngoepe 2019). A shortage of requisite skills and competencies is common in eastern and southern Africa, including Botswana (Katuu and Ngoepe 2017).

Recognising the need for competencies for records management and ICT professionals, the National Archives of Australia enacted and documented them in its Digital Continuity Policy Competency Framework (National Archives of Australia 2015). The acquisition of capabilities and skills enables archivists and records managers to authenticate digital records. Auditors have to audit financial statements in the networked environment to completion (Moorthy et al 2011). The law requires auditors to have a high level of professional competencies in order to offer reasonable assurance that the financial statements of an audited entity truly and fairly represent its financial position (Gear 2013). Competencies required for an audit assignment such as planning the audit, risk assessment, internal review control, substantive testing, documentation and forming an opinion, staff supervision and audit management, decision-making on reporting and other issues, and application of the knowledge of auditing standards as well as appropriate legislation, are crucial (Chartered Accountants of Australia and New Zealand 2016). The auditing assignment and quality of the audit are affected by auditor competency and expertise (Gear 2013).

## Management of records

As evidence of organisational business done, the management of such records through their entire life cycle is a necessity, even in digital systems. Duranti and Rogers (2012) are of the view that records are understood in the context of their creation, which is basically the framework for action. The evidentiary value of records is enhanced through proper management. This evidentiary value is sustained right from a record's creation, through its use, and can be validated by authorised users. A determination can be made through checks to ensure that it has not been modified, abused or tampered with. Management activities include proper storage, records safety and security, assigned responsibilities for their management, guidance in the form of records management policies and procedures, and records retention and disposal. Accounting and auditing functions rely on properly kept records to promote proper financial management (World Bank/IRMT 2000).

## Procedures for records authenticity

Authentic records can be trusted because they stand for what they purport to be, and are free from tampering or corruption (Duranti 2001). Their identity and integrity metadata are secured (MacNeil 2005). Notably, records generated in digital systems are at risk of being easily tampered with or corrupted, either accidentally or maliciously (Bradley 2005). Social and technical procedures can be used to maintain digital records authenticity. Social indicators include written policies and procedures governing digital records, their retention and



disposition schedules. Technical indicators are general IT controls and system application controls (Rogers 2015a). Authentic records are a requirement in the audit process as they inform audit opinions (Ngoepe and Ngulube 2014). Digital records can be authenticated using technological methods such as digital signatures, timestamps, hash digests, checksums and cyclic redundancy checks (Elliot 2007).

## Proposed framework

The purpose of this study was to develop a framework to authenticate records in a government accounting system in Botswana to support the audit process. It intends to facilitate the financial audit process by facilitating the authentication of digital records created and stored in the GABS so that it can support the audit process. It is hoped that the framework will help in the creation and maintenance of authentic records capable of being accepted as audit evidence in the audit process. The framework attempts to show the link between factors that need to be in place to authenticate digital records for purposes of supporting the audit process. These factors include legislation, records management standards, auditing standards, prowess (skills), authenticity (integrity and identity of records), records retention and disposal, digital signatures, auditing software, persons, archival bond, IT and system application controls and ICT infrastructure. These factors are discussed below. Figure 2 presents the proposed framework to authenticate digital records in the GABS.

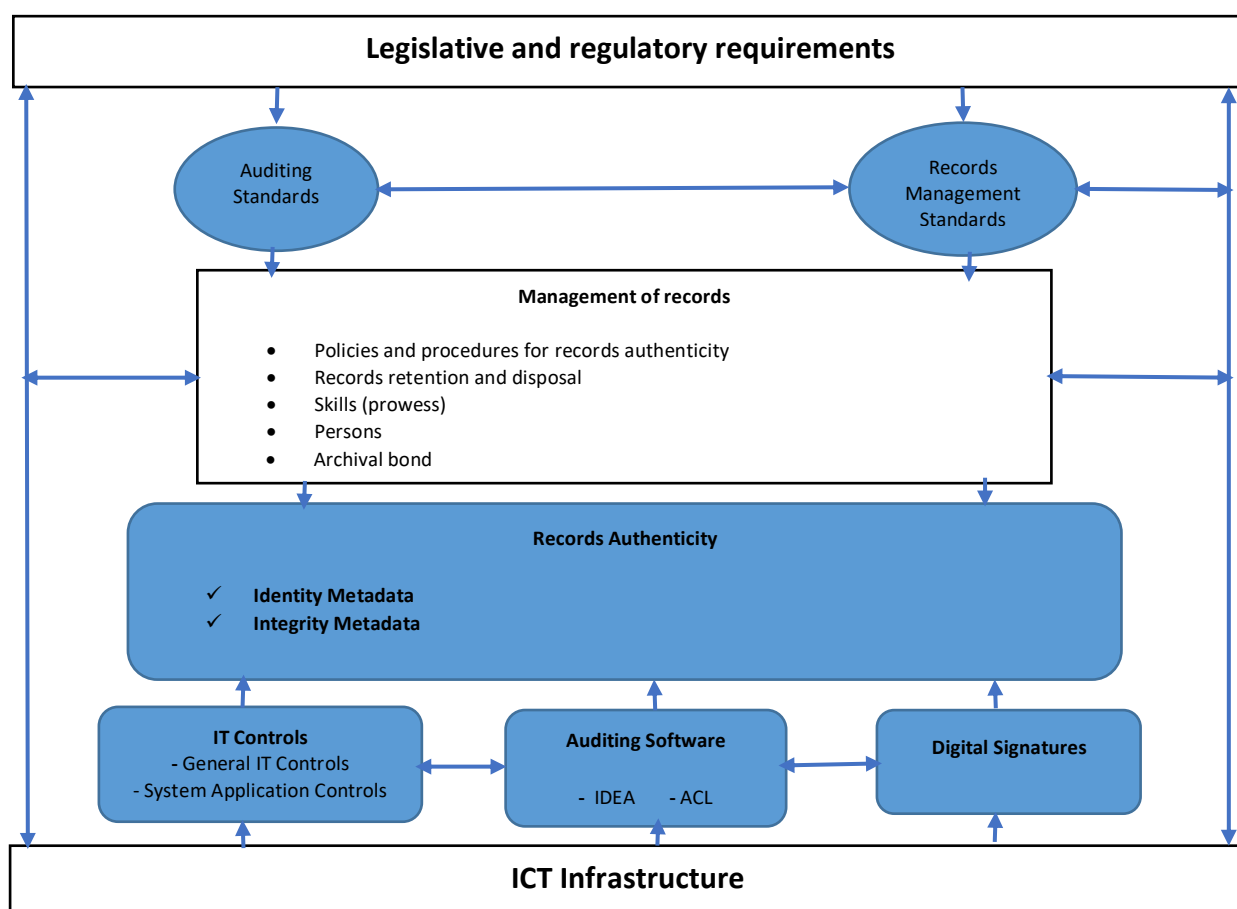


Figure 2: Proposed framework to authenticate digital records in the GABS

## Legislation

Legislation forms the basis for all public service activity in any country (Okello-Obura 2012; InterPARES Trust 2016), and Botswana is no exception. Thus, a framework that authenticates digital records to facilitate an audit process has to be supported by applicable laws and auditing standards. The Electronic Records (Evidence) Act provides for the recognition of digital communications, admissibility of digital evidence (Keetshabe 2015) and the authentication of digital records, and gives their evidentiary value weight that equals that of paper records. This legislation is complemented by the Cybercrime and Computer Related Crimes Act of 2018, which criminalises unauthorised access to computer data and systems with the intention to alter, delete or falsify data, resulting in data that are not authentic (Government of Botswana 2018). Article 7 of the Budapest Convention urges member states to criminalise all forms of computer-related forgery and "... international... input, alteration, deletion, or suppression of data resulting in inauthentic data with the intent that it be considered or acted upon for legal purposes as if it were authentic" (Council of

Europe 2001a:6). Introducing security mechanisms is effective in dealing with issues of unauthorised access to computer systems and data over and above implementing cybercrime laws. (Council of Europe 2001a). However, caution should be exercised to avoid criminalising legitimate and common operating or commercial practices as the intention is to protect the confidentiality, integrity and availability of computer systems or data. A supportive legislative framework forms the foundation of a framework for the authentication of digital records.

The provisions of the Electronic Records (Evidence) Act (Government of Botswana 2014a) prescribe several ways in which digital records can become accepted as evidence in legal proceedings and these are as follows:

- There should be compliance with required production expectations of a digital record which include an approved process of certification of the digital records system that produced the record, as set by Botswana Communications Regulatory Authority (BOCRA).
- Digital signatures can be used to verify the authenticity of the record.
- The record needs to pass the best evidence rule such to erase any doubt about its authenticity.
- Doubt should not arise over the accuracy of the digital record due to improper use of the digital records system that created and stored it.
- The record should also have been generated as part of performing a normal business process (Government of Botswana 2014a).

The Electronic Communications and Transactions Act (ECT Act) (Government of Botswana, 2014b) also prescribes the generation and maintenance of authentic digital records. Digital signatures are acceptable to authenticate digital records, and their validity or enforceability is not to be rejected solely because they are digital. For the digital signature to be deemed reliable, its creation data should only be linked to the person to whom it was assigned. Digital records are trusted to be authentic if proof can be availed that after creation, they were not modified. Section 7, sub-section 2(a) prescribes that, if doubt arises about their reliability, an assessment of their integrity should be undertaken. The assessment for such integrity should be about ensuring that no alterations were made to the record besides any additions made in the normal course of business, its storage, display and the principal reasons why it was generated in the first place.

The other important pieces of legislation that are crucial in the audit process are the aforementioned Public Finance Management Act (PFMA) and the Public Audit Act (PAA) (Mosweu and Ngoepe 2018). The PFMA promotes accountability and transparency in financial transactions undertaken while doing

government business. It empowers the Auditor General to annually audit public accounts within six months of the close of each financial year (Government of Botswana 2011a). This presupposes that complete and accurate accounting records should be kept so that they can be perused by auditors when the auditors undertake financial audits (Mosweu and Ngoepe 2018). This underscores the relationship between auditing and records management (Ngoepe and Ngulube 2013; Mosweu 2018) for, without sufficient records, auditors are not able to express an opinion on the financial statements (Ngoepe and Ngulube 2016; Keakopa 2018).

The PAA outlines the duties of the Auditor General, which are constitutional, and these include ensuring that reasonable precautions are taken to safeguard the collection, receipt, issue, custody and disbursement of public monies and supplies, in accordance with applicable laws and instructions (Government of Botswana 2012). A study of the legislative framework for auditing public accounting records in the digital environment in Botswana by Mosweu and Ngoepe (2018) found that it is through a perusal of records by auditors that the Auditor General expresses an opinion on whether the annual financial statements of public bodies, audited fairly, represent the financial position for the period covered by the audit.

## Auditing standards

Legislation aside, auditing standards are key in promoting the authentication of digital records to support the audit process. In Botswana, the Office of the Auditor General undertakes performance (money for value) audits, information technology audits, local government audits and financial audits (Lekorwe 2008). This study focused on financial auditing. The study has shown that the PAA (section 18) regulates public sector financial auditing in Botswana and promotes the adoption of standards and other necessary tools for implementing the auditing standards issued by the International Auditing and Assurance Standards Board (IAASB) in the audit process. Specific standards are not stipulated. The International Auditing Practice Statement 1013 requires that auditors should have an understanding of the legal and regulatory framework applicable to the entity being audited when planning audits, and the entity's state of compliance with the framework (IFAC 2010). The same auditing standard emphasises risk identification during the audit process. These risks may be related to:

- loss of transaction integrity, the effects of which may be compounded by the lack of an adequate audit trail in either paper or digital form

- pervasive e-commerce security risks, including virus attacks and the potential for the entity to suffer fraud by customers, employees and others through unauthorised access (IFAC 2010).

ISA 250 also recognises that in the context of laws and regulations, the auditor should have an understanding of the legislation that affects the operations of the auditee and how this legislation relates to auditing of financial statements (IAASB 2010). A lack of compliance with legal frameworks may involve conduct meant to hide wrongdoing that may include collusion, forgery and deliberate failure to document transactions, management override of controls or intentional misrepresentations being made to the auditor. Standards may not prescribe records creation and maintenance succinctly, but auditors rely on them as trustworthy audit evidence to support audit processes (Ngoepe and Ngulube 2014).

### Adoption of appropriate standards in archives and records management

Standards in archives and records management originate within and outside the profession and these can be categorised by subject. They fall into six categories, namely, metadata standards, fundamental professional standards, file format and imaging standards, standards for digital conversion and preservation processes, ERMS and EDMS standards (Katu 2016a). It has been revealed in this study that the Botswana National Archives and Records Services (BNARS) has not adopted or adapted international best practices in archives and records management. Furthermore, local best practices in digital records management practices in the public sector do not exist. To control digital records, there is a need for standardisation (Seymour 2016). Standardisation enables the capturing and preservation of original records and evidence of access or changes made to them. Records management standards promote the creation of authentic records. The said standards should include those related to records management processes, metadata for records management, records management concepts and principles, functional records for records in digital systems and a practice guidance tool on integrating records management into ICT systems (IRMT 2008; ISO 2006; 2011; 2016).

ISO 15489-1 (ISO 2016) indicates that records generated in digital systems must pass the authoritative test, meaning that the records should be authentic, have integrity, be useable and be reliable. Therefore, care must be taken to ensure that information systems, at a minimum, can ensure such key characteristics of a digital record.

ISO 16175-2 is an important standard as it prescribes best practice for managing digital records. It provides guidance on cloud-based records management and web-based collaborative software. In terms of guidance for managing records in a cloud environment, the standard points out that in addition to authenticity issues, organisations need to be aware of jurisdictional rules around data sovereignty and network security and to develop adequate contractual and technical frameworks to guarantee an adequate level of service.

The integration of business applications with records management systems can ensure that records generated in such business systems retain their authenticity. ISO 16175-2 indicates that software designed to manage records can support other business applications and can be interfaced with business applications using application programming interfaces (API).

Another crucial standard which provides sound advice is ISO 23081-2 (ISO 2009), which identifies generic types of metadata that are required to fulfil the requirements for managing records. There is flexibility as organisations are left to select specific metadata to meet their business requirements for managing their records in line with their records-retention requirements. The standard also acknowledges that metadata entities can exist at different layers of aggregation and provides definitions for all types and at all layers of aggregation. This enables organisations to make a choice depending on specific organisational needs and requirements.

### Authenticity (records integrity and identity)

Authentic records have discernible integrity and an identity that can be established (Duranti and Blanchette 2004). To protect the authenticity of records in the GABS, it is important that their identity and integrity metadata are in place (Duranti 2014). They should be related to the records' content, structure and context as professed by Bearman (2007). Metadata can be descriptive or structural and are responsible for the preservation of information resources (NISO 2017). Records are sensible only when their content is linked to its structure and context (IRMT 2008). The context can be legal-administrative, provenancial, procedural, documentary and technical and, in this sense, metadata helps to document the reliability and authenticity of records and record-keeping systems (InterPARES 2008). The very same metadata ensures that records are identifiable and can be managed, stored, used and reassembled to generate an authentic copy (InterPARES 2008). Information resources remain accessible over time because of metadata. Examples of integrity include the following:

- Name(s) of handling persons over time
- Name of person responsible for keeping the record
- Indication of annotations
- Indication of technical changes
- Indication of presence or removal of a digital signature
- Time of planned removal from the system
- Time of transfer to a custodian
- Time of planned deletion
- Existence and location of copies in or outside the system (Duranti 2014).

Apart from integrity metadata, a government information system that manages records good enough to support the audit process should have the following identity metadata:

- Names of the persons concurring in its creation
- Date(s) and time(s) of its genesis, issuing and transmission
- The matter or subject, or the action in which it participates
- The expression of its relationships to other documents
- Documentary form name
- Digital presentation (format)
- The indication of any attachment(s)
- Digital signature (if applicable) (Duranti 2014).

Metadata is crucial in preserving records authenticity. Metadata schemas recognise the need for identity and integrity metadata to establish and assess the authenticity of digital resources. In the archives and records management perspective, ISO 23081 provides high-level guidance for recordkeeping metadata (Tennis and Rogers 2012).

### Skills (prowess)

Managing digital records is a vocation that needs skilled personnel, and there is a lack of such in Africa (Asogwa 2012; Marutha and Ngoepe 2017; Chigariro and Khumalo 2018; Mosweu and Ngoepe 2019). For example, Wang (2009:248) notes that “the qualifications of digital records managers are insufficient to meet the more comprehensive management requirements for these types of records.” Accountants need records management skills to manage records in the GABS, as opposed to records management professionals. Auditors also need the skills and competencies to authenticate digital records when undertaking audit assignments using CAATs (Elefterie and Badea 2017). In addition, they need skills related to digital records management (including an appreciation of digital signatures), data analytics, analytical and planning skills,

the security of records, metadata, and effective communication and consensus-building skills. The acquisition of technical skills by auditors is a necessity if these are audit records in digital systems.

ICT specialists also require technical skills to maintain system application and general controls and to ensure that they work maximally. These skills include database administration, system design, metadata, data analytics, business process analysis, IT certification (information systems auditor), IT security-related technical competencies and computer forensics and security. These skills and competencies are crucial for the authentication of records. The Digital Continuity Strategy of the National Archives of Australia affirms that ICT professionals need skills and competencies to equip them to manage digital information, including records (National Archives of Australia 2015). Auditors, records management professionals (accountants who manage records in the GABS) and ICT professionals need appropriate skills and competencies to enable them to authenticate digital records.

## Management of records

Regardless of their format, records need to be managed properly for the benefit of the organisation that created them. Records management programme components, like policies and procedures, and records retention and disposal scheduling, were revealed in this study as crucial for the promotion of the management of authentic digital records.

## Policies and procedures for creating and maintaining authentic records

Although the GABS has been implemented in government ministries and departments since 2004, no documented policies and procedures geared towards providing guidance on the management of authentic records generated and stored in the system exist. Studies by Keakopa (2010), and Ngoepe and Keakopa (2011) revealed a lack of policy documents to guide digital records management in Botswana's public sector. This state of affairs has also been reported in the ESARBICA region, with the exception of South Africa (Katuu 2016b; Ngoepe and Saurombe 2016). National archival agencies such as those in South Africa and Namibia have issued policies and procedures to guide the management of digital records in their jurisdiction (National Archives of Namibia 2007; National Archives of South Africa 2007).



## Records retention and disposal

Records retention and disposal schedules control the disposal of records in an accountable manner (Ngoepe and Van der Walt 2010). It was discovered in this study that records have never been disposed of in the GABS since its initial implementation in 2004. Since then, the records have resided in the system although it is not an archival system that can preserve records. Many countries are faced with challenges of preserving digital records in the long term (Bearman 2007). The long-term preservation of digital records remains an unresolved problem due to the impact of ICTs on record keeping (Keakopa 2007). According to Duranti (2010), the trouble with digital systems lies in their ability to create and maintain reliable records that are preserved over time without concerns over the loss of their authenticity. They can be easily tampered with and corrupted so their authenticity over time is not guaranteed. This brings to the fore the issue of the importance of records retention and disposal to support the audit process. This process ensures that records are available when needed, as records without continuing value are destroyed while those possessing continuing value are preserved as corporate memory and evidence of business transactions conducted.

The BNARS has developed a records retention schedule for financial records and this can be configured into the GABS to control the accumulation of digital records. The schedule can be used to select records for disposal. For digital records management, the process of appraisal is at the centre and front of the records creation and maintenance processes (Duranti 2010). The disposal of records in the GABS can thus be decided at the point of creation. Controlled records retention and disposal helps to ensure that records remain available when needed to provide evidence in the audit process.

## ICT Infrastructure

The management of authentic digital records needs to be supported by a resilient ICT infrastructure. Although the ICT infrastructure does not entirely solve problems related to the management of digital records, its availability is key to the adaptation of digital systems. ICT tools enable records creation, capturing, storage and preservation processes (Muchaonyerwa and Khayundi 2014). The Government of Botswana has a fairly well-developed local area network (LAN) across government ministries and departments (Moloi 2009), and a well-developed ICT infrastructure (Kalusopa, Mosweu and Bayane, 2017) known as the Government Data Network (GDN) which provides the “basic technology platform for the rollout of e-Government services” (Government of Botswana 2011b:2). The infrastructure through which the GABS runs is interoperable with other business systems, including some ECM systems. A

harmonisation of ICT infrastructures across e-government platforms is paramount to ensure that they operate at the same level to achieve operational resilience and economy in a digital records management and e-government environment. This integration would include both hardware and software harmonisation. The standardisation of nomenclature for describing records within e-government, digital records and business systems needs to be done to allow the seamless exchange of data using the linked database fields, but without causing any harm to the authenticity of records in the GABS. A sound ICT infrastructure enables business systems such as the GABS to generate and maintain authentic records. Furthermore, reliable electricity supply, telephone and internet connectivity, computer networks and technical support are provided by ICT specialists stationed in all ministries (Moloi 2009).

### Digital signatures

Procedures and appropriate security mechanisms are needed if digital records are to be preserved in the long term and remain accessible for effective e-governance. Challenges to records security include possible data corruption whereby the integrity and reliability of digital records are compromised (Muchaonyerwa 2017). Digital signatures are one of the mechanisms employed to authenticate records. Digital signatures consist of information that is attached to a record or logically associated with a record. It is used as a method of authentication (European Commission 2008). It is typically a sequence of characters and is “secured with algorithms, procedures and ‘keys’ (a long string of characters analogous to a password) to confirm the integrity of a record, and/or to authenticate the identity of the sender or the source of a record” (European Commission 2008:14). According to Stančić, Ngoepe and Mukwevho (2019), a digital signature represents the basic technology used to check a digital record’s authenticity. In this regard, it validates or confirms the signatory.

The use of digital signatures for authenticating digital records helps to reduce fraud and detects forgery or tampering with records (Oloyede 2017). Digital signatures are thus an integral part of the proposed framework to authenticate digital records created and stored in the GABS. As a method of authentication, the digital signature is prescribed for in the Electronic Communications and Transactions Act (Government of Botswana 2014).

### IT and system application controls

IT and system application controls are crucial in ensuring that records in computer-based information systems are protected (Bellino, Wells and Hunt

2007). This study has revealed that general IT and system application controls are used to protect the authenticity of records in the GABS. Therefore, they are rightly included in the proposed framework for the authentication of digital records in the GABS. These controls are technical and social (Rogers 2015b). Technical indicators of records authenticity are audit logs/trails, metadata, deployment of software to monitor the activities of system administrators, access controls to systems and access controls to computers. The controls have to be maintained at all times. Social indicators of authenticity such as policies, guidelines, system documentation on segregation of duties in the system and documentation of authorisation to use the system are, as a whole, used to protect the authenticity of digital records (Rogers 2015a). Taken as a whole, both the application and general IT controls ensure that records are accurate and complete and their validity is protected, as well as the integrity of computer programme and data files (Information Systems Audit and Control Association 2001; Bellino et al. 2007). Security features at the GABS application and general IT control levels are a requirement for ensuring that records in the system are not forged, falsified or corrupted. Existing laws such as the Electronic Communications and Transactions Act and the Electronic Records (Evidence) Act support technical measures for the protection of digital records authenticity.

## Archival bond

Transactions in the GABS are related to others within and outside the system and, consequently, create records as evidence of the same transactions. The government of Botswana budgets for expenditure every financial year and the actual expenditure is then monitored against the approved budget. The budget is captured into the GABS before any expenditure can be incurred. When transactions are performed through the system, records are created. All these are regulated by rules of procedures and manifested through repeated actions following a certain business process (Herrera 2011). Therefore, records in the GABS have an archival bond. An archival bond refers to the relationship of each record with the previous one and the subsequent one (Duranti 2001) and is key in the existence of digital records (Duranti and MacNeil 1996). An archival bond is created once a record is set aside to transact a business function and may be manifested in a classification code assigned to the record in a grouping of records belonging to the same class. This is also obtained when records are registered (incoming or outgoing) and assigned registration numbers (Duranti and MacNeil 1996). Notably, in business systems without record-keeping functionalities, the classification code or filing identifier and, if applicable, registration number, are part of the metadata which constitutes the data dictionary (Duranti and MacNeil 1996).

## Persons

Personnel given the rights to transact business functions create records. In archival diplomatics, a digital record has eight components, and “persons” is one of them (Duranti 2001). When a digital record is created, four persons, namely, author, addressee, writer and creator are involved and of these four, only three are necessary for its existence (Duranti and MacNeil 1996). These are the author (has authority and capacity to issue the record or it can be issued in their name), the addressee (person to whom the record is directed or intended) and the writer (person having the authority and capacity to articulate the content of the record). Roles and responsibilities are assigned in the GABS, so records creation by persons who concur in its production is controlled. There are preparing officers, revenue collectors and authorising officers. The assignment of roles ensures that only authorised personnel gain access to the system to transact business. These persons include accountants who are the day-to-day users of the system and senior officers who authorise transactions. Therefore, identifiable persons in the creation of digital records fit in well with records identity and are part contributors to the creation of authentic records as theorised by archival diplomatics.

## Auditing software

The use of auditing software is unavoidable in an era where ICTs have been used to aid delivery of services to business and citizens (Public Records Office 2001), and to meet the expectations of users of financial and other business performance information (Ahmed 2003). This study revealed that auditors from the Office of the Auditor General of Botswana (OAGB) use the Interactive Data Extraction and Analysis tool (IDEA) auditing software while those from the Department of Internal Audit (DIA) use the Audit Command Language (ACL) auditing software to verify the authenticity of records in the GABS. Auditing software confirms the correctness of calculations or the lack thereof, confirms whether the relationships between data items are correct or not, spots inconsistencies in data relationships, identifies unusual or unexpected transactions (for example, large journal postings, transactions entered at unusual times) and investigates whether programs are performing as expected following set business rules (Lewis 2009). Thus, CAATs are used to verify the integrity of data in business systems in the financial audit process.

## Conclusion

This study has shown that a relationship between records management and the audit process exists, and that good records management facilitates the audit

process as an enabler. A study by Ngoepe and Ngulube (2016) also came to this conclusion. According to Bouter (2008), society should benefit from research findings. If implemented through the adoption and adaptation of the suggested framework, the findings from this study may influence policy and practice. Assessed through auditing, the role of records management in promoting accountability has been brought to the fore in this study over and above the ongoing discourse on the same theme. The implementation of the framework is bound to bring together stakeholders, such as the Botswana National Archives and Records Services, the Office of the Auditor General of Botswana and the Department of Information Technology, all of which would play a role in devising measures, including guidelines, necessary for the authentication of digital records generated in the GABS to support the audit process, as there is no doubt that records management is a critical component in auditing. It is hoped this framework would lead to ministries and departments obtaining clean audits and sustaining them during the annual financial audits undertaken by the Office of the Auditor General of Botswana.

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