

A framework for development of digital records preservation in the cloud in Botswana

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Abstract

The deployment of digital systems in the delivery of public services by the Government of Botswana has seen an increase in the generation of digital records. Without preservation efforts over time, the continued availability of digital records is not guaranteed. The reverse side of this is that a focused records preservation regime ensures access to and accurate digital records in the long term, regardless of the challenges of media failure and technological change. Lack of an adequate legal and policy framework on digital material preservation; gaps in human resources in terms of knowledge, skills, and competencies to drive digital material preservation; lack of appropriate standards for digital records preservation; and limited collaborative efforts towards digital records preservation are some of the challenges in digital records preservation in Botswana. Despite these challenges related to digital records preservation, developing countries in Africa are increasingly embracing the use of cloud computing technology for the management and preservation of digital records due to its benefits. In the developed world, cloud computing has matured into a viable option for the management and preservation of digital records. This study utilised a review of literature, supplemented by document analysis, to propose a framework for digital preservation of records in the cloud in the context of e-government in the Botswana public sector. It is guided by concepts from the Policy, Strategy and Resources troika model as a lens to frame the study. The model provides the key elements of policy, strategy, and resources as necessary for the preservation of records in Botswana's public sector, using cloud computing as a platform. The proposed framework for the preservation of digital records may benefit public sector organisations that endeavour to adopt cloud computing for records preservation.

Keywords: Botswana, cloud computing, digital records, preservation, records management

1. Introduction

Globally, governments have embraced digital transformation of their public services to improve administrative and operational efficiency. This has seen the introduction of online services in what came widely known as e-government, which is dominated by the deployment of information and communication technologies in the work and/or office environment (World Bank 2020). According to United Nations (2022), the 2022 survey on digital government shows that the evolution of e-government worldwide has transformed public administrations and

institutions both structurally and in terms of dynamics between government and the consumers of public services. Kalusopa (2022) notes that the terms e-government and digital government are not distinct and only suggest an evolution in the use of ICTs to facilitate service delivery to the public. Bwalya (2018) and the World Bank (2020) agree that these concepts are used interchangeably. The global adoption of e-government has expanded over time, with countries digitalising their business processes (United Nations 2022). What is common about the deployment of e-government systems is that they generate digital records that need to be managed and preserved over time if they are to support the e-government agenda. Bwalya and Mutula (2014) aver that apart from e-government being the vehicle to catapult quality public service delivery, e-government can also be used as an information provision and analysis platform. The exponential growth of data, now referred to as big data, generated by different business processes, makes a case for such information provision and analysis.

One technology revealed that assisted the proliferation of e-government was cloud computing. Cloud computing is storing or accessing programmes, apps, and data via the internet, instead of directly from a computer hard drive (Raza 2020). According to Rajeswari (2019), cloud computing is referred to as the use of IT infrastructure for the provision of services to customers using the internet. Cloud computing takes place through the internet (cloud) (Tomblin 2021). According to McLeod and Gormly (2017), the proliferation of ICTs in work processes means that organisations are bound to use cloud services such as storing records in the cloud, whether by design or default. This raises the issue of trust in using third-party cloud service providers for records storage and digital archival collections. According to Shibambu and Marutha (2022), one offering of cloud computing is records storage. Digital records can be stored in the cloud where they can be preserved for their continued access and use.

According to Bwalya (2018), many organisations transformed their data management roles to include cloud computing as a progressive, reliant data and information platform. In addition, cloud computing is cost effective and reduces costs of putting together an e-government infrastructure, as cloud models can be integrated into the e-government design. Like other forms of records, public records generated by e-government systems are vital to government staff, citizens, businesses, and the legal community (Preservica 2020). Lack of their preservation and, the consequent inability to produce them when required as documentary evidence of government decisions, operations, and heritage leads to loss of public trust, non-compliance, risks to public health and safety, fines and litigation, and the inability to re-use institutional knowledge to meet evolving business needs (Preservica 2020). According to Kalusopa and Zulu (2009:99), digital preservation is a “series of adapting management activities necessary to ensure continued access to digital materials.” This includes born digital records and those that have been digitised (Perry 2014). Digital records need continual active management to maintain their authenticity, reliability, integrity, and usability. This active management encompasses digital preservation activities that ensure these characteristics of the records are maintained over time. Shibambu and Ngoepe (2020) note that storing records in the cloud as preservation strategy has become an increasingly viable storage option for organisations that cannot afford or maintain in-house, private electronic infrastructure suitable for long-term preservation of digital records.

1.1 Background to the study

The Government of Botswana adopted the utilisation of information and communication technologies (ICTs) in delivering public services (Bwalya & Mosweu 2017; Keakopa 2018; Kalusopa, Mosweu & Bayane 2021). There is a close relationship between digital preservation and e-government, which is assisted by effective and efficient recordkeeping through which citizens' right to information is realised (Adu, Dube & Adjei 2016). The emergence of digital records and how they should be preserved within government has been a subject of discussion by some authors (Decman & Vintar 2013). Digital preservation is thus a key records management undertaking as it ensures that records with value beyond operational use remain open and usable (ICA/IRMT 2016). Through its e-government agenda, the Government of Botswana endeavours to facilitate easier access to information with ICT-assisted services (Mosweu, Mutshewa & Bwalya 2014). This drive towards e-government led to the implementation of software applications specifically for managing records in government ministries and departments, including state-owned enterprises. Table 1 shows EDRMS implemented in Botswana public sector in different locations or organisations.

Table 1: EDRMS implemented in Botswana public sector

EDRMS implemented	Location	Source
Document Workflow Management System (DWMS)	Ministry of Investment, Trade, and Industry (MITI)	Mosweu (2014)
National Archives and Records Management System (NARMS)	Ministry of Labour and Home Affairs	Moatlhodi and Kalusopa (2016)
National Archives and Records Management System (NARMS)	Botswana National Archives and Records Services	Keakopa (2018)
Court Records Management System (CRMS)	High Courts Gaborone Magistrates Court	Motsaathebe and Mnjama (2009), Mosweu (2012); Mosweu and Kenosi (2018)
HP TRIM	Botswana Qualifications Authority (BQA)	Motlhasedi (2012)
EDRMS	Tlokweng Land Board	Shonhe and Grand (2019)
Alfresco	Botswana Housing Corporation	Botswana Housing Corporation (2019)

This is not surprising, as records management is central to public administration (Dikopoulou & Mihiotis 2010). Other than software applications focused on the management of records, business systems have also been implemented for specific functions. The numerous business systems implemented in Botswana's public value chains cover several government functions across different sectors of the economy. The resultant digitalisation of government business process has seen, among others, the following business systems implemented in the government sector (Government of Botswana 2012; Mosweu 2019a):

- Human Capital System for government personnel data and records management
- National Identity Registration System for managing the registration process of citizens of Botswana
- Vehicle Registration and Licensing System for managing processes related to vehicle registration
- Driver Licensing System for driver's licensing and management
- Central Medical Stores System for managing, storing, and distributing centralised healthcare medicines to health facilities across the country
- Government Payroll, Pensions and Passages System for managing payroll, processing gratuities and pensions, Electronic Funds Transfer to Bank of Botswana and pay-as-you-earn tax forms processing
- Value-Added Tax System for managing value-added tax (VAT) in conjunction with Botswana Unified Revenue Service
- Social Benefits and Reconciliation System paying old-age pensions
- Ministry Investment, Trade, and Industry's Management Information System for trade licensing, issuing rebate certificates and export/import permits and registration, investigation and resolution of consumer complaints
- Fleet Tracking and Maintenance Management System for tracking the entire government fleet
- Government Bookshop Online System to transact publication orders and sale of government publications

In e-government, digital records preservation is a major records management function. The increased deployment of e-government systems across several government agencies registered some improvements in all indicators on technological readiness (Samboma 2019). This notable infiltration among many government entities indicates that some of these systems may not have archives and records management functionalities (Kalusopa et al. 2017). Digital preservation remains a concern.

2. Research problem

The endeavour to improve public service delivery brought the deployment of business information systems in the public sector (Kalusopa et al. 2021). This e-government practice generates digital records that need proper management, like their paper counterparts. However, digital records preservation faces numerous challenges such as lack of preservation policies; inadequate policy framework for digital preservation; gaps in human resources in terms of knowledge, funding difficulties, skills, poor awareness of digital preservation, lack of collaboration, and competencies to drive digital material preservation; and the absence of standards for digital preservation (Kalusopa & Zulu 2009; Adu & Ngulube 2016; Ngoepe & Saurombe 2016; Mosweu & Bwalya 2022; Porogo 2022). The resultant digital records generated

by implemented business systems face preservation challenges, which may be a disadvantage to organisations that pursue cloud computing for its goodness.

3. Purpose and objectives of the study

The purpose of this study was to develop a framework for the preservation of digital records in the cloud in Botswana's public sector. The specific objectives were to:

- determine the policy, strategy, and resources to support the digital preservation of public records in the cloud in Botswana
- identify key stakeholders in the preservation of digital records in the cloud
- develop a framework for the digital records preservation of public records in the cloud in Botswana

4. Literature review

The literature review for this study was guided by the research objectives which were turned into thematic areas for the review.

4.1 Policies, strategies, and resources for digital records preservation

Digital records preservation must be guided by a policy and legal framework. According to the National Archives of UK (2011), a digital preservation policy lays the foundation for a sustainable digital preservation programme and acts as an authority for its implementation. Among others, it articulates roles and responsibilities, defines a succinct set of success criteria it can be measured against, and defines the coverage of digital preservation activities, including the broad categories of records. Ngoepe (2017) investigated the post-custodial realities of digital records management in South Africa and found that legislation that covers digital records management such as Electronic Records and Evidence Act and ECTA does exist but lacks guidance when it comes to preserving records in the cloud. Mutsagondo (2021) notes that in Zimbabwe, one of the challenges that affect the effective management of digital records negatively was a lapse in legal policy and procedural frameworks.

4.2 Stakeholders in the preservation of digital records in the cloud

The successful management of digital records and their preservation requires a combined effort by various stakeholders, because the field of archival science has seen technological advances in digital preservation, digitisation, database applications, and various preservation software tools which changed archival practice. Such technological advances require a mirrored advancement in skill sets and knowledge of archives and records management professionals to manage, preserve, and make public records available in digital form (International Council on Archives 2016). Inadequate knowledge and competencies among archives and records management professionals (Tsvuura 2022) mean they need to collaborate with other key stakeholders such as

those from ICT. In South Africa, there is thriving collaboration between the National Archives and Records Service of South Africa and the State Information Technology Agency (SITA). SITA compiled a list of vendors and solutions that government agencies can choose from when selecting vendors' technical capabilities to implement electronic digital records management systems (Keakopa 2016). In the context of the public sector in Ghana, Adu (2018) concludes that a focused and appropriate dialogue is necessary between stakeholders and government for the proper maintenance and preservation of digital records.

5. Theoretical framework for the study

The purpose of a theoretical framework is to provide a foundation from which all knowledge is constructed in a research study. It informs the study rationale and purpose, problem statement, significance, research questions, literature review, methods, and analysis in a study (Grant & Osanloo 2014). According to Heale and Noble (2019:37), a theoretical framework logically presents and represents the concepts, variables, and relationships related to a study. It helps to clearly identify and order what is to be examined, described, or measured. A research study comprises different components that should be glued together for successful completion (Bryman & Bell, 2015). This study was guided by the Policy, Strategy and Resources (PSR) troika model, which served as its theoretical framework (Davies 2000). The model has three constructs, being the policy, strategy, and resources. These are all necessary for the preservation of records in a cloud environment and are the key constructs under investigation. A policy as the manifestation of considered judgment, plan, or tactics adopted by a government or an organisation (Parsons 1995). Through policy, government commits to follow a specified path of action. In the context of this study, BNARS issues policy guidance that supports preservation of records. Strategy entails enacting a plan detailing what should be achieved and how, as articulated in a policy (Davies 2000). For a strategy to be achieved, resources such as funding, knowledge, and appropriate human resource are required (Davies 2000). As a public sector body mandated by the NARS Act to manage public sector records, BNARS is the authority to devise strategies appropriate for the preservation of public records in Botswana. Resources include budget, capacitated personnel, culture, time, and ICT resources (Davies 2000; Zlotin & Zusman 2005). Resources enable the achievement of policy and strategy (Zlotin & Zusman 2005). The Government of Botswana is required to provide the right resources to transition from manual systems to cloud-based digital records preservation. According to Davies (2000), the three key elements of PSR should be considered equally if an organisation is to achieve a sustainability over time.

6. Methodology

This study adopted a qualitative research approach and utilised documentary analysis, supplemented by available literature, to address the research objectives. According to Bowen (2009), document analysis is a systematic procedure for evaluating documents with potential information required to answer research questions. Examples of documents that can be analysed to source information include personal documents, official documents derived from the state or

private sources, mass-media outputs, virtual documents, reports, websites, photographs, letters, and emails (Creswell & Creswell 2018). The researcher can discover patterns and themes that can help resolve the research question (Leedy, Ormrod & Johnson 2019). In this study, data were collected from documents such as legal and policy documents, reports, and blogs, and supplemented by both published unpublished literature.

7. Findings and discussions of the study

The findings of the study are organised and presented in alignment with the research objectives.

7.1 Policy, strategy, and resources to support the digital records preservation in the cloud

The findings showed that policy framework is available in the National ICT Policy, which is 16 years old and may have been passed by ICT developments (Government of Botswana 2007; Mosweu & Kenosi 2018). Old as the policy framework is, ICTs remain the focal point to improve public service delivery through initiatives such as e-health, e-education, government online, and an enabling environment for e-commerce by residents and citizen. Supportive legislation is the ECTA and Electronic Records (Evidence) Act (Government of Botswana 2014a; 2014b). The current legislation has limitations in providing guidance for digital records preservation (Ngoepe & Keakopa 2011) and preservation of social media records is lacking (Mosweu 2021), although the government of Botswana's social media use is prevalent.

The e-Government Strategy supports policy efforts by providing a platform for ICTs to propel Botswana to be an active player in the knowledge economy. Some public services are delivered online through deploying high-quality citizen-centric information systems (Government of Botswana 2012; Mosweu 2019). Notably, the absence of a focused strategic document to provide specific direction on digital preservation strategies to use such as migration, cloud computing, emulation, and refreshing (Decman & Vintar 2013; Adu & Ngulube 2016; Magama 2018) hampers positive strides achieved so far.

In terms of resources to support digital preservation, infrastructure in the form of records centres and the national archives is available, but they cater more for records. Pockets of excellence in digital records preservation exist but are not adequate when considering the magnitude of digital records generated by e-government systems. Digital preservation requires ICT infrastructure, which do exist but are inadequate to ingest digital records for custody (Ngoepe & Saurombe 2016; Mosweu & Bwalya 2022). Resource constraints for digital preservation are also a challenge for digital records ingestion in archival custody in South Africa (Ngoepe 2017). The competition for scarce resources leads to limited resources to fund preservation initiatives, hence the need to spend wisely.

7.2 Key stakeholders for the preservation of digital records

The preservation of digital records needs collaborative effort between key stakeholders. In Botswana, they are BNARS, Department of Information Technology (DIT), academic institutions, and the ICT industry. According to Keakopa (2016), BNARS has formed collaborative partnerships with key stakeholders such as the ICT industry, which can be convenient for the design and implementation of the systems that meet records management requirements. However, BNARS collaborates regularly with DIT which coordinates government computerisation projects (Moloi 2009). This resulted in the successful implementation of EDRMS projects in the public service (Motlhasedi 2012; Mosweu 2014; Moatlhodi & Kalusopa 2016). Despite the computerisation of public sector value chains, which increasingly generate digital records, BNARS has not yet created direct linkages with the ICT industry through which it can provide advice related to the procurement and implementation of records and document management systems (Keakopa 2018), and that meet records management requirements (Keakopa 2016). Kalusopa et al. (2021) observe that although lack of collaboration is not yet clearly defined in literature as problematic for Botswana, its presence in general literature suggests it is an area for consideration.

8. Recommendations

Several recommendations emanate from the findings of this study. A review of archival legislation is recommended to cater for social media records management. The current e-government strategy use has been overtaken by time, so a new one, which includes aspects of cloud computing, is recommended. Collaborative efforts by stakeholders towards digital records preservation is recommended, as the national archives alone cannot resolve issues related to digital records preservation. More funds are also needed from the Treasury to fund digital records preservation initiatives such as the establishment of data centres. It is also recommended that the national archives domesticate standards appropriate for digital records preservation.

8.1 Proposed framework for digital records preservation in the cloud

The third objective of this study was to propose a framework for the preservation of digital records in the cloud. It shows how government can utilise the cloud for digital records preservation. The framework can be customised by users to suit the operational environment.

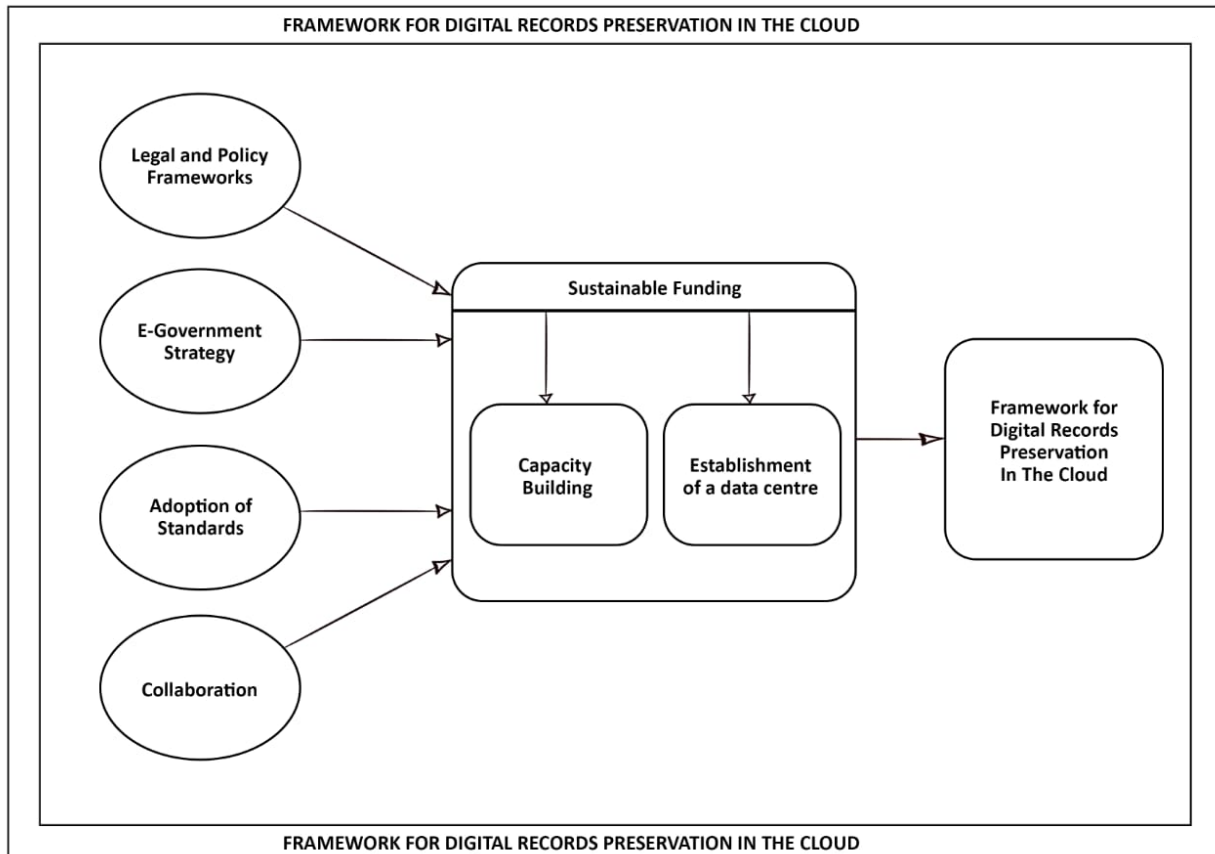


Figure 1: Framework for development of digital records preservation in the cloud

Figure 1 shows that a framework for development of digital records preservation in the cloud is possible only with establishment of capacity building and data centres with appropriate financial support. This would only be possible with sustainable funding to support implementation of standards, collaboration, e-government strategies, and legal and policy frameworks. Specific elements are discussed in the subthemes below.

8.2 Legislation and policy framework

This study showed the available legal and policy framework supports the management of digital records although limited (Ngoepe & Keakopa 2011; Mosweu & Kenosi 2018). For example, legislation covers the management of social media records (Mosweu 2021). The NARS Act should be amended to include aspects of managing records in the cloud, including their preservation. The policy framework can be enhanced to include digital records preservation aspects. This includes the National ICT Policy (Government of Botswana 2007).

8.3 E-government strategy

The study revealed that there is an e-government strategy to support digital records management initiatives. Notably, the strategy covered the years 2011 to 2016 (Government of Botswana

2012). It seems no follow-up strategy was formulated to build on the first one. An e-government strategy is recommended, which would include digital records preservation strategies for cloud-based records management. Positive digital preservation efforts were noted in seven Botswana public service ministries whereby preservation strategies such as migration of data from the old systems to the new updated systems, refreshing, and data backup were used (Porogo 2020; Porogo & Kalusopa 2021). The recommended new e-government strategy can leverage on this development and gain mileage and acceptance.

8.4 Establishment of a government data centre

Currently, semi-current government records are stored in three records centres in Gaborone, Francistown, and the village of Kanye, serving the northern, southern, and western part of the country. Notably, this BNARS infrastructure is principally for physical records, and is not adequate for digital records preservation (Kootshabe & Mnjama 2014). This is like NARSSA, which was also developed for manual records, resulting in focus being placed on paper records management at the expense of cloud-based records management and preservation (Ngoepe & Saurombe 2016; Shibambu & Marutha (2022). An appropriate ICT infrastructure is a key component for digital preservation (Porogo & Kalusopa 2021). Technical components that would operationalise infrastructure preservation capabilities are essential for digital preservation (Dollar & Ashley 2015), including other infrastructure like network capabilities, stakeholders in preservation, policies, and practices (Svärd 2017). The government should establish a government-controlled data centre (government cloud) to serve as records storage and preservation facility. The data centre can reduce the expenditure that come with storing and preserving records in the cloud in the long term. InterPARES (2018) checklist should guide archivists and records managers when contracting cloud providers, including data ownership, availability, storage, preservation, retention, and security.

8.5 Collaboration by stakeholders

The preservation of digital records in e-government can be a complex and mammoth task which cannot be limited to a single entity. It needs collaboration (Adu 2015). BNARS can collaborate on digital preservation with other information management services organisations like libraries and museums and share knowledge, skills, and resources (Mosweu 2019c). Furthermore, collaboration with the DIT, which manages government computerisation efforts from the technical side, would enhance the technical capacity required. More collaboration is also needed with higher educational institutions to revamp their curriculum and offer courses with components on digital records preservation (Segaetsho & Moloji 2019; Porogo 2022). Further collaboration with industry can enhance capacity for digital records management and preservation (Keakopa 2021). Digital preservation issues overlap across organisations and sectors, making collaborations worthwhile (Digital Preservation Coalition 2022). Pooling resources together, including expertise and experience, can overcome digital preservation challenges and implementation costs (Yarrow, Clubb & Draper 2008; Mosweu 2019b). Archives and records management professionals in Africa are encouraged to undertake interdisciplinary

collaboration, as they are isolated (Ngoepe, Maluleka & Onyancha 2014; Masenya 2020), and to facilitate equal partnerships with ICT experts (Erima & Wamukoya 2012).

8.6 Capacity building for archives and records management professionals

Lack of skills and competencies for digital records management is a major challenge among archives and records management professionals in Botswana (Mosweu 2019a; Kalusopa et al. 2021; Porogo 2022), which frustrates digital preservation efforts. This is an impediment for the management and preservation of digital records in developing countries such as ESARBICA member countries and beyond. This was seen in several studies such as in Botswana, Tanzania, Zimbabwe, and South Africa (Kamatula & Kemoni 2018; Mosweu & Ngoepe 2019; Mosweu 2019; Chikomba, Rodriques & Ngoepe 2020; Mosweu & Bwalya 2022). According to Adu and Ngulube (2016), it is worrisome that information professionals in Africa fare poorer than their European counterparts in the acquisition of technical skills required for digital preservation. Capacity building to acquire skills and competencies required for digital preservation and the management of digital records in general is critical to preserve digital record and keep them accessible and useable over time. This can be achieved through formal education in higher education institutions and undertaking continuous professional courses to develop new skills and competencies necessary for digital records management and preservation.

8.7 Adoption of standards

Lack of standards to support digital preservation is a major challenge in Africa (Osedo 2013). This study revealed lack of standards for the management and preservation of digital records in Botswana (Porogo & Kalusopa 2021; Mosweu & Bwalya 2022). Standards provide an essential framework for organisations to benchmark their activities (Chikomba et al. 2020). They enable access to, and discovery of, records. Their relevant use helps with organisational compliance and interoperability between diverse systems within and beyond the sector (Digital Coalition Preservation 2023). For example, the e-Governance Standard for Preservation Information Documentation (eGOV-PID) of Electronic Records of India is applicable to guiding preservation of digital records from 10 to 50 years, and beyond (Centre of Excellence for Digital Preservation 2013). The preservation of digital records in Botswana can benefit from the adoption of standards that support digital preservation. Standards such as MoReq 2: Model Requirements Specification for the Management of Electronic Records and ISO 16175-2: Guidelines and functional requirements for records in electronic office environments can be used to guide the preservation of records in the in the cloud.

8.8 Sustainable funding

Unsustainable funding for digital preservation efforts is an African challenge. Funding required for purchasing hardware and software required for some preservation strategies such as copying of data (refreshing), and construction and maintenance of data (emulation) to support old and obsolete data is scarce (Adu & Ngulube 2016). Well-functioning organisations readily adopt new

technologies and infuse them sustainably in their operations (Tsvuura & Ngulube 2021). The ICT infrastructure required for digital records preservation is expensive and must compete with other government priorities (Mosweu & Bwalya 2022). According to Keakopa (2004), records preservation efforts need to be budgeted for and costed amid national budgetary constraints. Lack of funding to accomplish archives and records management activities is also apparent in the wider sub-Saharan Africa region and extends to efforts towards the preservation of audio-visual archives (Adjin-Tetey 2016; World Intellectual Property Organisation 2018; Rakemane & Mosweu 2021).

9. Concluding remarks

Available literature shows the preservation of digital records in Botswana's public sector is still a challenge for Botswana. This is generally consistent with other technology-assisted records management initiatives, which suffer from challenges such as limited staff capacity, inadequate legal frameworks, and insufficient funding. The proposed framework serves as solution to address some of the said challenges. Although the proposed framework has never been empirically tested, when put to test, it may positively contribute to the preservation of digital records. This will require concerted efforts by stakeholders.

Declarations

The author declares that:

- The manuscript has not been previously published and is not under consideration for publication with any other journal or copyrighted publishing platform of any kind.
- Unlawful statements that infringe any existing copyrights were avoided in the manuscript.
- Manuscript and study meet all the ethical requirements of the journal and that of my institution or company, as well as legal requirements of the study country.
- There is no potential conflict of interest for the research.
- Author(s) gives consent to the Journal of South African Society of Archivist to publish the manuscript.

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References

Adjin-Tetey, S.O. 2016. *Preservation of audiovisual collections in the J. H. Kwabena Nketia archives*. MA Dissertation, University of Ghana, Accra. Available at: <http://ugspace.ug.edu.gh:8080/handle/123456789/21772?show=full> (accessed: 10 February 2023).

- Adu, K.K. 2015. *Framework for digital preservation of electronic government in Ghana*. University of South Africa, Pretoria. Available at: <https://uir.unisa.ac.za/handle/10500/20118> (accessed: 17 April 2023).
- Adu, K.K. 2018. A multi-methods study exploring the role of stakeholders in the digital preservation environment: The case of Ghana. *The Electronic Library* 36(4): 650-664.
- Adu, K.K., Dube, L. & Adjei, E. 2016. Digital preservation: the conduit through which open data, electronic government and the right to information are implemented. *Library Hi Tech* 34(4): 733-747.
- Adu, K.K. & Ngulube, P. 2016. Key threats and challenges to the preservation of digital records of public institutions in Ghana. *Information, Communication and Society* 20(8): 1127-1145.
- Botswana Housing Corporation. 2019. *Botswana Housing Corporation 2019 Annual Report*. Available at: <https://www.bhc.bw/sites/default/files/2019%20BHC%20Annual%20Report.pdf> (accessed: 27 December 2022).
- Bowen, G.A. 2009. Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2): 27.
- Bryman, A. & Bell, E. 2015. *Business research methods*. Oxford: Oxford University Press.
- Bwalya, K. 2018. *The e-government development discourse: analysing contemporary and future growth prospects in developing and emerging economies*. Durban: OASIS (Pty) Ltd.
- Bwalya, K. & Mosweu, O. 2017. Integrating document workflow management system in the business processes of a public institution. *Topics in Intelligent Computing and Industry Design* 1(3): 06-08.
- Bwalya, K. & Mutula, S. 2014. *E-government: implementation, adoption, and synthesis in developing countries*. De Gruyter Saur.
- Centre of Excellence for Digital Preservation. 2013. *e-Governance standard for Preservation Information Documentation (eGOV-PID) of Electronic Records*. Available at: <http://www.ndpp.in/index.php/digital-preservation-standards> (accessed: 26 December 2022).
- Chikomba, A., Rodrigues, A. & Ngoepe, M. 2020. Management of digital records in selected financial services parastatals in Zimbabwe. *Information Development* 20(10): 1-13.
- Creswell, J.W. & Creswell, J.D. 2018. *Research design: qualitative, quantitative, and mixed methods approaches*. 5th ed. Los Angeles: Sage.
- Davies, W. 2000. Understanding strategy. *Strategy & Leadership* 28(5): 25-30.
- Decman, M. & Vintar, M. (2013) A possible solution for digital preservation of e-government: a centralised repository within a cloud computing framework. *Aslib Proceedings* 65(4): 4.
- Digital Preservation Coalition. 2008. *Preservation management of digital materials: the handbook*. Available at: <https://www.dpconline.org/docs/digital-preservation-handbook/299-digital-preservation-handbook/file> (accessed: 23 December 2022).
- Digital Coalition Preservation. 2023. Standards and best practice. Available at: [dpconline.org/handbook/institutional-strategies/standards-and-best-practice](https://www.dpconline.org/handbook/institutional-strategies/standards-and-best-practice) (accessed 24 November 2023).

- Dikopoulou, A. & Mihiotis, A. 2010. Records management: a key element for effectiveness, accountability and development in the Greek public administration. *International Journal of Public Administration* 33(5): 262-287.
- Dollar, C. & Ashley, L. 2015. Digital preservation capability maturity model. Available at: https://static1.squarespace.com/static/52ebbb45e4b06f07f8bb62bd/t/55a7ed87e4b016f840ba1adb/1437068679137/DPCMM+Background+and+Performance+Metrics+v2.7_July+2015.pdf (accessed: 17 April 2023).
- Erima, J.A. & Wamukoya, J. 2012. Aligning records management and risk management with business processes: a case study of Moi University in Kenya. *Journal of the South African Society of Archivists* 45: 24-38.
- Government of Botswana. 2007. *National Information and Communications Technology Policy*. Gaborone: Ministry of Communications, Science and Technology.
- Government of Botswana. 2012. *E-government strategy*. Gaborone: Ministry of Transport and Communications.
- Grant, C. & Osanloo, A. 2014. Understanding, selecting, and integrating a theoretical framework in dissertation research: creating the blueprint for your “house”. *Administrative Issues Journal Education Practice and Research* 4(2): 12-26.
- Heale, R & Noble, H. 2019. Integration of a theoretical framework into your research study. *Evidence Based Nursing* 22(2): 36-37.
- International Council on Archives. 2008. *Principles and Functional Requirements for Electronic Office Environments, Module 2 – Guidelines and Functional Requirements for Electronic Records Management Systems*. International Council on Archives.
- ICA/IRMT. 2016. *Understanding digital preservation initiatives*. Available at: <https://www.ica.org/sites/default/files/Digital%20Preservation%20Initiatives%20Module%200.pdf> (accessed: 23 December 2022).
- InterPARES/ICA. 2012. *Digital records pathways: topics in digital preservation*. Available at: http://interpares.org/ip3/display_file.cfm?doc=ip3_canada_gs12_module_6_july-2012_DRAFT.pdf (accessed: 23 December 2022).
- InterPARES Trust Project. 2018. *NA14: Trust in cloud service contracts - final report*. Available at: http://interparestrust.org/assets/public/dissemination/NA14_final_report_v5-1.pdf (accessed: 30 December 2022).
- Kalusopa, T. 2021. Perspectives on digital government in Africa: where do we go from here? In Ocholla, D.N., Evans, N.D. & Britz, J. (eds.). 2021. *Information knowledge and technology for Development in Africa*. Durbanville: AOSIS.
- Kalusopa, T., Mosweu, T. & Bayane S. 2021. Implementation of enterprise-wide systems to manage trustworthy digital records in Botswana’s public sector. *New Review of Information Networking* 26(1-2): 50-69.
- Kalusopa, T. & Zulu, S. 2009. Digital heritage material preservation in Botswana: problems and prospects. *Collection Building* 28(3): 98-107.
- Kamatula, G. & Kemoni, H. 2018. A framework for e-records in support of e-government implementation in the Tanzanian Public Service. *ESARBICA Journal* 37: 69-88.

- Keakopa, S.M. 2004. Costing and budgeting for preservation and conservation in the east and Southern Africa regional branch of the international council on archives (ESARBICA) region. *ESARBICA Journal* 23: 63-74.
- Keakopa, S.M. 2016. Developing an integrated framework for procurement and implementation of Electronic Records Management Systems (EDRMS) in the ESARBICA region. Paper presented at the SASA Conference, Mafikeng, South Africa
- Keakopa, S. 2018. *Management of Public Sector Records and Archives in Botswana*. Available at: https://www.researchgate.net/publication/330481167_Management_of_Public_Sector_Records_and_Archives_in_Botswana (accessed: 6 January 2023).
- Kootshabe, T. & Mnjama, N. 2014. Preservation of government records in Botswana. *Journal of the South African Society of Archivists* 47: 26-49.
- Leedy, P.D., Ormrod, J.E. & Johnson, L.R. 2019. *Practical research planning and design*. 12th ed. New York: Pearson Education.
- Magama, B. 2018. Strategies for preservation of digital records in Masvingo Province of Zimbabwe. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives*, 37: 18-38.
- Masenya, T.M. 2020. Application of modern technologies in the management of records in public libraries. *Journal of the South African Society of Archivists* 53: 65-79.
- McLeod, J. & Gormly, B. 2017. Using the cloud for records storage: issues of trust. *Archival Science* 17: 349-370.
- Motlhasedi, O. 2012. Tackling politically motivated sexual violence: a case study of violence against women in Zimbabwe. Doctoral Dissertation, University of Pretoria.
- Moathodi, T. & Kalusopa, T. 2016. An assessment of e-records readiness at the ministry of labour and home affairs. *Mousaion: South African Journal of Information Studies* 34(3): 1-22.
- Moloi, J. 2009. E-records readiness in the public sector in Botswana. *ESARBICA Journal* 28: 105-127.
- Mosweu, O. 2014. Factors influencing adoption of the Document Management Workflow System by action officers and records officers at the Ministry of Trade and Industry in Botswana. Master's Dissertation, University of Botswana, Gaborone.
- Mosweu, O. 2018. A framework to authenticate records in a Government Accounting System in Botswana to support the auditing process. PhD Thesis, University of South Africa, Pretoria.
- Mosweu, O. 2019a. Knowledge and skills requirements for a records manager in Botswana in the networked environment. *Journal of the South African Society of Archivists* 52(2): 110-132.
- Mosweu, O. 2019b. Management of authentic digital accounting records in an Enterprise Resource Planning system in the public sector of Botswana. *ESARBICA Journal* 38: 1-20.
- Mosweu, O. 2019c. Collaboration on public programming by memory institutions in Botswana: Factors for Consideration. Available at: <https://www.igi-global.com/chapter/collaboration-on-public-programming-by-memory-institutions-in-botswana/219898> (accessed: 2 January 2023).

- Mosweu, O. & Bwalya, K. 2022. The challenges of post custodial management of digital records in Botswana laid bare. *Information Development*: 1-16.
- Mosweu, O., Mutshewa, A. & Bwalya, K. 2014. Electronic Document and Records Management System (EDRMS) implementation in a developing world context: case of Botswana. Digital access and e-government: perspectives from developing and emerging countries: perspectives from developing and emerging countries. Available at: <https://www.igi-global.com/book/digital-access-government/95210> (accessed: 2 January 2023).
- Mosweu, O. & Ngoepe, M. 2019. Skills and competencies for authenticating digital records to support audit process in Botswana public sector. *African Journal of Library, Archives and Information Science* 29(1): 7-28.
- Mosweu, T. 2021. A review of the legislative framework for social media records in Botswana. *Records Management Journal* 32(1): 62-74.
- Mosweu, T., Luthuli, L. & Mosweu, O. 2019. Implications of cloud-computing services in records management in Africa: Achilles heels of the digital era? *South African Journal of Information Management* 21(1). Available at: <https://journals.co.za/doi/abs/10.4102/sajim.v21i1.1069> (accessed: 23 December 2022).
- Mosweu, T.L. & Kenosi, L. 2018. Implementation of the court records management system in the delivery of justice at the Gaborone Magisterial District, Botswana. *Records Management Journal* 28(3): 234-251.
- Mutsagondo, S. 2021. The role of the national archives of Zimbabwe in fostering professional management of email in Zimbabwe's central government. *International Journal of Management Research and Emerging Sciences* 11(1): 94-103
- National Archives of UK. 2011. Digital preservation policies: guidance for archives. Available at: <https://cdn.nationalarchives.gov.uk/documents/information-management/digital-preservation-policies-guidance-draft-v4.2.pdf> (Accessed 23 December 2022).
- Ngoepe, M. 2017. Archival orthodoxy of post-custodial realities for digital records in South Africa. *Archives and Manuscripts* 45(1): 31-44.
- Ngoepe, M. & Keakopa, S.M. 2011. An assessment of the state of national archival and records systems in the ESARBICA region. *Records Management Journal* 21(2): 145-160.
- Ngoepe, M., Maluleka, J. & Onyancha, O.B. 2014. Research collaboration in the archives and records management field across and beyond universities in Africa: an informetric analysis. *Mousaion*, 32(3): 119-135.
- Ngoepe, M. & Saurombe, A. 2016. Provisions for managing and preserving records created in networked environments in the archival legislative frameworks of selected member states of the Southern African Development Community. *Archives and Manuscripts* 44(1): 24-41.
- Osedo, O.A. 2013. Challenges of digital preservation in Africa. Available at: https://www.researchgate.net/publication/339132885_Challenges_of_Digital_Preservation_in_Africa/comments (accessed: 26 December 2022).
- Parsons, W. 1995. Public Policy. Cheltenham: Edward Elgar Publishing.
- Perry, S.R. 2014. Digitisation and digital preservation: a review of the literature. *SLIS Student Research Journal* 4(1): 1-12.

- Preservica. 2020. *Preserving electronic government records*. Available at: <https://cdn2.assets-servd.host/preservica-core/production/resources/Essential-Guide-Gov-White-Paper-2020-0527.pdf> (accessed: 6 December 2022).
- Porogo K. 2020. A strategic framework for digital preservation capability maturity readiness in the context of e-government in the public service in Botswana. PhD Thesis, University of South Africa.
- Porogo, K. 2022. Digital preservation regulatory frameworks for e-government infrastructure in selected Ministries of Botswana. *Journal of the South African Society of Archivists* 55: 137-146.
- Porogo, K. & Kalusopa, T. 2021. A strategic framework for digital preservation in the context of e-government in Botswana public service. *Journal of the South African Society of Archivists* 54: 83-101.
- Rajeswari, N. 2019. Overview of cloud computing and its types. *Journal of Emerging Technologies and Innovation Research* 6(3): 61-67.
- Rakemane, D. & Mosweu, O. 2021. Challenges of managing and preserving audio-visual archives in archival institutions in Sub Saharan Africa: a literature review. *Collection and Curation* 40(2): 42-50.
- Raza, M. 2020. *Public vs private vs hybrid: cloud differences explained*. Available at: <https://www.bmc.com/blogs/public-private-hybrid-cloud/> (accessed: 6 December 2022).
- Segaetsho, T. & Moloi, J. 2019. Integration of digital preservation knowledge, skills and competencies in the teaching curricula of library and information studies at the University of Botswana. *Mousaion* 37(1): 1-19.
- Shibambu, A. & Marutha, N.S. 2022. A framework for management of digital records on the cloud in the public sector of South Africa. *Collection and Curation* 50(2): 165-175.
- Shibambu, A & Ngoepe, M. 2020. When rain clouds gather: Digital curation of South African public records in the cloud. *South African Journal of Information Management* 22(1): 1-10.
- Svärd, P. 2017. The woes of Swedish private archival institutions. *Records Management Journal* 27(3): 275-285.
- Tomblin, J. 2021. *Cloud-based vs. Web-based Applications: What You Need to Know*. Available at: <https://www.linkedin.com/pulse/cloud-based-vs-web-based-applications-what-you-need-know-john-tomblin> (accessed: 6 December 2022).
- Tsvuura, G. & Ngulube, P. 2021. A framework for the digitisation of records and archives at selected state universities in Zimbabwe. *South African Journal of Information Management* 23(1). Available at: <http://www.scielo.org.za/pdf/sajim/v23n1/16.pdf> (accessed: 6 January 2023).
- Tsvuura, G. 2022. Knowledge and skills for managing digital records at selected state universities in Zimbabwe. *Journal of the South African Society of Archivists* 55: 110-123.
- United Nations. 2022. *UN E-Government surveys*. Available at: <https://publicadministration.un.org/en/Research/UN-e-Government-Surveys> (accessed: 03 December 2022).
- World Bank. 2020. *Digital government readiness assessment toolkit: guidelines for task teams*. World Bank.

- World Intellectual Property Organisation. 2018. *Feasibility study on enhancing the collection of economic data on the audio-visual sector in a number of African countries*. Available at: https://www.wipo.int/meetings/en/details.jsp?meeting_id=46438&la=EN (accessed: 17 April 2023).
- Yarrow, A., Clubb, B. & Draper, J.L. 2008. *Public libraries, archives and museums: trends in collaboration and cooperation*. International Federation of Library Associations and Institutions (IFLA).
- Zlotin, B. & Zusman, A. 2005. *The concept of resources in TRIZ: past, present and future*. USA: Ideation International Publishers.