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The state of digital records preservation in South Africa's public sector in the 21st century: a literature review

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Abstract

Purpose – This study aims to assess the status of the digital records preservation practices in the South African public sector at the national department level. It set out to establish to what extent digital preservation policies have been implemented in South Africa's public sector, to determine the related skills and competency of public sector staff, and to make any necessary recommendations of the basis of the results.

Design/methodology/approach – A content review of Southern Africa literature dealing with the preservation of digital records, its importance and related factors over the past 20 years was conducted.

Findings – The current state of preservation of South African digital records suggests serious consequences of existing knowledge and training gaps. Addressing those gaps may provide the knowledge needed to support new ways of working. Records management professionals in the South African public sector at the national department level are currently ill-equipped to adequately preserve digital records. This complicates the application of tools offered by the information and communication technologies that have resulted in increased creation of digital records.

Research limitations/implications – The study was limited to only the public sector of South Africa.

Practical implications – The study makes practical implications concerning the policy framework for improving the state of digital preservation in South Africa so as to ensure long-term preservation of digital records. For instance, government departments are recommended to formulate and implement in-house policy frameworks, guidelines and plans that address digital preservation of records.

Social implications – Sufficient funding and resource allocation ought to be provided to advance electronic records management programmes. In addition, the formulation of proper strategies needed to preserve digital records should incorporate technological tools and media software in the existing operations for the creation, capturing, appraising and preserving of digital records.

Originality/value – This study offers informed recommendations to address the challenges of preserving digital records in South Africa so that future losses may be avoided and allow readers to see changes over the 20-year period.

Keywords Records management, Electronic records management, Digital preservation, Digital records, South African public sector, South African government, Information and communication technologies (ICTs)

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Background

Advancements in information and communication technologies (ICTs) have made it convenient for the South African government and organizations to generate digital records

(Ngulube, 2007). This means that records can be recorded and preserved at their creation phase. Electronic records should be captured and recorded in ways that make them easily accessible during their entire lifecycle (Asproth, 2005). Preservation management assists in decision and policymaking processes as well as reused as secondary data in potential government research projects [International Records Management Trust (IRMT), 2009]. Governments now deliver mission-critical information (previously generated in a paper-based environment) in electronic format to make easily accessible (Adila and Habee, 2018; Ngulube, 2007).

ICTs are predominantly used to carry out business activities and for transmitting information, thereby contributing to the need to manage and preserve the resulting records (Luyombya, 2010). In most cases, while great effort is being put into embracing the adoption and implementation of ICT tools through e-government, the same cannot be said with regard to creating a favourable environment for the management and preservation of e-records. Increased use of digital records has therefore presented additional and new challenges in these areas (Lemieux, 2016).

Adila and Habee (2018) remark that although the problems posed by the preservation of digital records of enduring value seem straightforward, solving them requires careful consideration of processes and technology. McDonald (2015) reports that the preservation of digital records for continuous access remains a major concern of archival institutions across the globe. Rapid development of relevant technology means that software and hardware systems have to be constantly upgraded to ensure the continued usefulness of fragile digital records (ISO 15489).

The literature indicates that South Africa lacks the appropriate infrastructure to ingest digital records into archival custody (Ngoepe, 2017; Ngoepe and Saurombe, 2016; Archival Platform, 2014; Ngoepe and Van der Walt, 2009; Harris, 2007). This situation has led the government to leave the management and preservation of digital records to creating agencies at the national department level (Katuu and Ngoepe, 2015; Nkala *et al.*, 2012). Because of the lack of digital record management systems among most South African institutions, the problem is magnified (Shibambu and Ngoepe, 2020, p. 1). Balogun and Kalusopa (2021, p. 188) also note that there are no solid digital preservation plans, strategies or policies in place for the long-term preservation of resources outside a few warehouses that are OASIS-compliant. To date, there has not been enough published information on how government departments are preserving digital records for research access over the long term. This study comprises a review aimed at extrapolating the current state of digital preservation at the national government level in South Africa from the body of literature created over the past 20 years.

Problem statement

The preservation of and access to digital records created by national departments in the South African government poses serious challenges that require careful preparation and appropriate organizational mechanisms (Ngoepe and Van der Walt, 2009). A limited number of studies have been done on the state of digital records in South Africa and on the challenges facing both records managers and archivists in relation to resources, skills adequacy, authority, content management systems, long-term digital preservation and the problem of evidencing authenticity over time (Ngoepe, 2017). Some of the challenges include non-adherence to any existing records management standards, lack of adequate and proper infrastructure and lack of a skilled workforce (Chikomba, Rodrigues and Ngoepe, 2020, p. 2). In South Africa, there has been little discussion of the existing literature on records and archival management, including that about the post-custodial activities concerned with

digital records. Studies by Ambira (2016), Matangira (2016) and Mutsagondo (2017) all bemoan the environment in which digital records are being managed across public sector institutions.

Balogun and Kalusopa (2021, p. 79) note that there are few studies on the preservation of digital resources in Southern Africa. This study's researchers are unaware of a more comprehensive literature review that assesses the state of digital preservation practices within the national departments of the South African public sector, which suggests strategies for improved digital preservation to achieve good governance, effective public service delivery and transparency.

Specific literature review objectives are to:

- establish whether digital preservation policies have been adequately implemented in South Africa's public sector at the national department level;
- determine available staff skills and competencies for the preservation of digital records created or used by those departments; and
- make recommendations for the digital preservation of records in the South African public sector at the national department level.

Role of the national archives and records service in the preservation of digital records

South Africa's public sector institutions generate public records that need to be managed in compliance with the country's legislative and regulatory instruments (Katuu and Ngoepe, 2015, p. 135). Netshakhuma (2020, p. 3) notes that in South Africa, there are two tiers of public archival authorities: provincial and local/municipal archival structures. NARS was established by promulgation of the *National Archives and Records Service of South Africa Act 43 of 1996* (Republic of South Africa, 1996, or NARSSA). The model is specifically designed to enhance proper management and care of the records of governmental bodies, and the preservation and use of a national archival heritage (Chaterera *et al.*, 2012, p. 368).

NARS controls national departments and each province now has its own provincial archives and related legislation. NARS has authority over provincial and local municipal archival structures, and many provincial departments still follow NARSSA guidelines (Netshakhuma, 2020, p. 3). Mokwevho and Jacobs (2012, p. 38) pointed out that the NARS published guidelines in 2000 regarding electronic records management as part of an integrated management system for documents and records. Mukwevho and Jacobs (2012, p. 38) cited Ngoepe and Van der Walt (2009, p. 12), who stated that the purpose of the guidelines was to integrate the management of all record formats.

Shibambu and Ngoepe (2020, p. 4) cited Katuu (2015) as stating that the NARS policies and guidelines were most recently revised in 2006. In the early 2000s, the NARS sought to assist public sector institutions in managing their digital records more efficiently (Shibambu and Ngoepe, 2020, p. 4). However, the transfer of digital records from public institutions to archival custody has not occurred in a systematic manner because of the inability of the national archival system to effectively manage these records and facilitate their long-term preservation (Shibambu and Ngoepe, 2020, p. 4 cited in Katuu and Ngoepe, 2015).

For instance, even though there was a reorganization of some departments, it was still essential for all the provincial government departments and municipalities to be managed in terms of the 1996 Act, which states that the National Archivist "shall be charged with the proper management and care of public records in the custody of government bodies"

[National Archives and Records Service of South Africa (NARSSA), 2006, p. 5]. For that task to be accomplished, "each department should designate or appoint a records manager" (Netshakhuma, 2020, p. 3). In practice, many provincial departments work to the requirements of the national act (Ngoepe and Nkwe, 2018). NARS is charged with the primary statutory responsibility to preserve public and non-public records with enduring value for use by the public and the State, and to provide effective management of public records to support evidence-based governance and service delivery [National Archives and Records Service of South Africa (NARSSA), 2006, p. 5].

All government bodies need to get authorization on matters pertaining to the management of records from the National Archivist (Ngoepe, 2014). Twelve years after the legislation was enacted, Ngoepe and Van der Walt (2009) observed that while the NARS had digital records management policies and strategies in place that were benchmarked against international standards and best practice, it did not have a digital preservation infrastructure, and its staff lacked the technical skills required to manage a trustworthy digital repository suitable for the long-term preservation of sustainable, authentic digital archival records. To meet its legislative mandate, the NARS would need to establish a solution that addressed the preservation of records created in disparate systems and that contributed to the formulation of best practice digital preservation requirements. Furthermore, in order for the digital archives programme to be a success, NARS and the provincial archives needed strong leadership and an improvement agenda endorsed at a higher political level (Ngoepe and Van der Walt, 2009).

South African institutions continued to lack the strategies and proper technological tools for sustainable digital preservation. Investing in e-records management systems without a strategy will fail to achieve the goals for which they were designed (Chigariro and Khumalo, 2018, p. 161). NARS is of the view that until the correct strategies have been adopted and implemented, departments should be left in sole custody of their digital records. Therefore, most government entities in South Africa have not yet transferred their digital records to NARS because of the lack of the necessary infrastructure (Ngoepe, 2017, p. 34, cited Ngoepe and Keakopa, 2011).

This poses a major challenge to public organizations that wish to archive digital records (Ngoepe, 2017, p. 35). Consequently, public institutions must either store digital records in-house or transfer them to cloud services, because there is no infrastructure with which to ingest digital records into national archival custody (Ngoepe, 2017, p. 37). Therefore, NARS must develop policies that allow government bodies to develop interim infrastructures for preserving digital records (Ngoepe, 2017, p. 33). Masenya and Ngulube (2020, p. 62) propose a multi-layered approach to digital preservation, including policies, adequate resource allocation, improved collaboration and upgraded technology infrastructure to address software and hardware obsolescence.

Methodology

The study is qualitative, in which literature focusing mainly on the South African context for digital preservation of records from the past 20 years is reviewed and analysed. An integrative review procedure is used, following the guidelines of Torraco (2005) as cited by Snyder (2019) that comprise assessing, critiquing and synthesizing relevant literature on digital preservation so as to identify theoretical frameworks and new perspectives.

Conventional content analysis is normally used in a study design that aims to describe phenomena faced with a limited availability of literature (Hsieh and Shannon, 2005). In relation to the present study objectives, this applies to the state of preservation of digital

records in which the literature is searched for content that addresses selected key themes (Krippendorff, 2013, p. 24).

Chigariro and Khumalo (2018, p. 163) note that access to relevant data from reputable databases is required to examine research outputs over time. Databases provide options for searching and browsing by affiliations, authors, countries and date (Chigariro and Khumalo, citing Archambault *et al.* (2009, p. 1322), which were applied in this study. Since the prevalence of ICT use and digital records began taking shape in the early 2000s, it has created a paradigm shift in the way digital data is captured, stored, used and disseminated. Therefore, the scope of the study identified indexed research output on preservation of digital records published between 2000 and 2020 in nine bibliographic databases, comprising JSTOR, Social Science Citation Index, ProQuest, IEEE Xplore, ScienceDirect, Scopus, ERIC, Social Science Citation Index and Google Scholar using the following key word phrases: digital preservation, South Africa and digital records. The researchers categorized and analysed the identified content from peer-reviewed journals, conference proceedings, books, book chapters, theses and conference proceedings, and then examined it by theme.

Discussion of results

The findings are discussed under the digital preservation themes of policies implementation; adequate staff skills and competencies; and challenges.

Establishing digital preservation policies implementation

Drijfhout (2007, p. 58) defines a policy as "a course or general plan of action adopted by a governmental body, party or person". Most organizations across the globe are establishing policies, standards and guidelines to ensure that the digital preservation process is effectively implemented (Adila and Habee, 2018). The United National Educational, Scientific and Cultural Organization (UNESCO) charter on the preservation of digital heritage remains a fundamental international policy framework document applicable to the South African environment. It covers aspects such as digital collections heritage status and heritage loss, measures required (strategies and policies), partnerships and cooperation, and UNESCO's role (UNESCO, 2002).

There is a recognized need for development of policies that give strategic direction to digital resources management in Southern Africa (Garaba and Ngulube, 2010). The policies should support the creation and management of authentic, reliable and usable records that can sustain government and business functions for as long as required. At one point, South Africa had an enabling environment in terms of a policy and regulatory framework to facilitate transparency and effective oversight of government. With respect to electronic records management, the national government developed policies, regulatory frameworks and IT strategy initiatives to ensure that sufficient electronic records would be created. Policies and regulations related to free speech, ICTs and universal access support freedom of information (Mukwevho and Jacobs, 2012, p. 38, citing Mutula and Mostert, 2010, p. 40). However, Masenya and Ngulube (2019) conclude that digital resources preservation in South Africa is hindered by a lack of standards, policies and procedures.

According to Chikomba *et al.* (2020), policies and guidelines are critical components of any records management programme. Hence, proper records management starts with the establishment of policies and guidelines to regulate control of records throughout their life-cycle; and the preservation of digital records has to be supported by regulations, with well-established policies, procedures and guidelines (Mnjama, 2010). Preservation policies are crucial and serve to give direction to the manner in which digital preservation practices

are applied sustained (Magama, 2017). Tembe (2019) attests that policy frameworks and procedures ought to include the use of well-resourced buildings and proper storage facilities for preservation of and access to records. Ideally a digital preservation policy comprises clear guidelines, principles and long-term directions applied to records from the moment of their creation.

Drijfhout (2007) noted that in the South African context, a national digital preservation policy could reinforce efforts of government to preserve the documentation in its collections. The policy should define organizational roles and funding responsibilities. And the roles of established memory institutions, such as libraries, archives and museums, should also be addressed.

Although South Africa still has a long way to go, research indicates that some important building blocks for a national digital preservation policy are in place (Drijfhout, 2007). Ground-breaking work was done by the Digital Imaging South Africa (now Digital Innovation South Africa/DISA, 2002) project, the National Research Foundation (2002), National Library of South Africa (Lor, 2005) and National Archives and Records Service of South Africa NARSSA (2006). This resulted in the well-established presence of South African government departments and documentation on the World Wide Web. In 2001, a Public Service IT Policy Framework detailing priorities such as achieving interoperability, IT security, bringing economies of scale and eliminating duplication was also published by the Department of Public Service and Administration (Republic of South Africa, 2001, pp. 16-24).

Records management programmes take place within mandates of regulations, laws and policies which affect how records are preserved (Mosweu, 2019). Some laws clearly prescribe what records need to be kept and for how long. South Africa legislative frameworks make provision for acts that govern the institutions which collect and preserve its publications and public records (Drijfhout, 2007). There is a valid basis of existing legislation and policies which may be used to draft a national long-term preservation strategy. The aforementioned *Public Service IT Policy Framework* (Republic of South Africa, 2001) can be used as a point of departure, although it needs to be updated to include establishment of digital preservation. Steps in the development of the e-government policy by the Department of Public Service and Administration have led to a stage at which an e-government infrastructure was envisioned as the best way to secure seamless access to government information.

In their recent assessment of policies and plans for long-term preservation in South African repositories, Balogun and Kalusopa (2021) developed a framework to ensure the authenticity, integrity and trustworthiness of South African resources. Data was collected from eight respondents in four Indigenous Knowledge Systems (IKS) Documentation Centers in institutions that are part of the National Recordal Systems initiative across four provinces using a multiple case study research design. Results indicated that none of the institutions have digital preservation policies, although digital curation and policy development are some of the measures used for digital preservation of IKS.

According to Mutsagondo (2017), the continued absence of digital records management policies and guidelines undermines attempts to effectively manage and preserve digital records. Failure by public sector organizations to put them in place points to a lack of commitment to the creation of an enabling environment for the successful management and preservation of records. These findings confirmed that although ICTs have been embraced through e-government, there has been little effort to introduce measures to control or direct the sustainable management of the resulting records. This indicates that approaches are still mainly based on informal perceptions and unwritten rules. In fact, it would seem that the

preservation of digital records in SA government follows no formal procedure, because of either a lack of current policies or delay in implementation of any existing policies.

Tembe (2019), citing Olatokun (2008), notes that many South African archival institutions had no policies for preservation and conservation, particularly for historically significant or vital records. The absence of documented organizational policies and procedures relating to records and information management overall is a clear sign that organizations were not handling records appropriately. It cannot be overemphasized that the effective management and preservation of records and information depends to a large extent on well-established policies, effective procedures, a well-trained team of professionals and provision of adequate resources and facilities. The lack of these elements results in poorly managed records and inability to ensure long-term records preservation and access (Mnjama, 2017).

From the available analysed literature, it would appear that in Southern Africa at the national policy level, senior officials and legislators are unaware to a considerable degree of what is required to adequately manage and preserve digital records. In contrast to this, a recent study conducted on preservation skills and strategies for electronic information resources by Kwazulu-Natal by Kavishe and Dulle (2016) recorded a high number of institutions with digital preservation policies, which direct digitization and digital resources acquisition practices. It is therefore crucial that records managers and archivists are aware of policy coverage. Hence, there is a need to establish and maintain an effective and efficient central e-records management programme through application of appropriate records management approaches as foundation of good governance, effective and efficient administration and resource management to ensure service delivery (Matlala and Maphoto, 2020, p. 81).

Staff skills and competencies in the preservation of digital records

The purpose of this objective was to determine available staff skills and competencies in preservation of national public sector digital records. Nonthacumjane (2010) notes that skills required for an information professional to work in the digital environment have been a significant discussion topic in the field of library and information science. Umana (2019, p. 29) notes that this expertise plays a vital role towards the success of long-term preservation. Adequate records management necessitates highly skilled staff who periodically receive training to update and broaden their competencies. While the concept of digital preservation is gaining momentum in most government departments, insufficient skills remain a problem throughout the public sector.

Effective management and preservation of digital records have the potential to improve service delivery and to enhance accountability in the government sector (Wamukoya and Mutula, 2005). To realize this potential, the need for essential skills has to be recognized and met across the digital records lifecycle of creation, classification, appraisal and disposal, as well as preservation. However, the exponential growth of digital records constitutes a serious challenge with regard to their longevity and accessibility (Asif, 2011, p. 12). These challenges may result from the fact that professionals are not open to acquiring new skills and competencies necessary for adapting to, and effectively using, new technologies, which imposed immense challenges and opportunities for archivists when it comes to long-term preservation. It is necessary for employers to adopt strategies to deal with long-term digital preservation, so they can ensure digital records are accessible over time on a standard platform (Matlala, 2019, p. 96).

Much of the literature reviewed for the present paper emphasizes the perception that records managers are often insufficiently skilled and lack the necessary knowledge for

digital records preservation in the networked environment (Mosweu and Ngoepe, 2019). This leads to an increased risk of digital records loss. If digital records are not properly managed from the moment of their generation, there may be nothing to preserve (Duranti, 2010). Egwunyenga (2009) confirmed that skill gaps prevented suitable management of public service materials. Kamatula (2010) added that archivists also lacked proper procedures, standards and practices for the management and preservation of e-records. This state of affairs made a major contribution to a shortage of qualified staff in institutions of higher learning. The scarcity of professionals locally trained in Southern Africa as records managers and archivists, and other IT staff, persists, while educational materials and programmes are no longer relevant because they are outdated (Katuu, 2015, 2009).

In more recent years, efforts have been made to establish African training facilities, but archival skills generally remain inadequate (Matangira, 2016). There are very few education programmes related to the training of archival and records managers in Africa, particularly in South Africa (Maluleka, Nkwe and Ngoepe, 2018). That records management programmes in the public sector are in a state of disarray is the result of the absence of adequate relevant training, including in the digital preservation of records in most African institutions of higher learning (Ngoepe and Katuu, 2017). Similarly, scholars such as Marutha (2016) and Ngoepe (2012) pointed out a shortage of well-qualified personnel appointed as records managers in the SA public health sector. The challenge, as Ngulube (2003) correctly pointed out, lay in the fact that those responsible for training personnel in digital information management have insufficient expertise and are therefore ill-equipped to prepare others for such tasks.

For digital records management African countries tend to rely on strategies borrowed from the global hub which are usually difficult to implement in the periphery (Harris, 2007). A 2015 Archival Platform report showed that archival institutions in South Africa were under-capacity and unable to effectively deliver their mandates. An earlier study (Murray, 2002, cited by Ncala, 2017) conducted on education and training for South African library and archive professionals and students indicated that courses and modules did not adequately cover essential preservation issues. The findings of a more recent study by Nsibirwa (2015) support these conclusions.

Nsibirwa (2012) and Ngulube (2003) observed that graduates in information science had insufficient practical skills in records preservation, especially those in digital formats. Modules on archives and records management appeared to be an insignificant part of those degree and diploma programmes (Ngoepe, 2008). Thus, a strong bias towards traditional theory has kept archival programmes from being relevant to current requirements. Maluleka *et al.* (2018) reiterated that few institutions of higher learning in South Africa provide training in archives and records management.

This lack of solid professional training was also stressed by Keakopa (2006) who found a shortage of relevantly trained staff, in spite of the fact that scholars, researchers and commentators view South Africa as the most advanced African country in the implementation of software applications to manage digital records (Kemoni, 2009). This is compounded by the fact that educators lack expertise and are ill-equipped to train others in digital records preservation (Ngoepe, 2017, p. 39). Additionally, current training programs have included very little if any practical training. This is even more evident in specialized areas such as preservation and conservation, and film and sound archives as well as digital records management (Ngoepe, 2017, p. 40).

Records management by creating agencies cannot constitute preservation because many of the institutions lack the capability to locate records after a certain period of time

(Ngoepe, 2017). This incompetence has led many government entities to destroy records once they were no longer required for current needs. Khayundi (2011, p. 63) noted that a number of archivist and records managers have learned on the job or have attended short workshops, which hardly provide the required educational background and competencies. Ngulube (2016, p. 1687) remarked that a lack of adequate training has a negative impact on the quality of preservation of, and access to, records. Unfortunately, it is clear from the available literature that desired changes are often not implemented owing to a lack of financial and personnel resources to support a digital curriculum (Garaba, 2015). This conclusion is corroborated by Chikomba *et al.* (2020), who observe that some participants in their research study did not even know basic terms related to digital records management, in spite of the fact that they possessed records management qualifications.

According to Garaba (2015), the Eastern and Southern Africa Regional Branch of the International Council on Archives (ESARBICA), of which South Africa is a part, has followed models of in-service or on-the-job training programmes. These training models are problematic as they lack a strong focus on IT-related skills and competencies such as digital curation, preservation, audio-visual and digital archiving and digitization. Tembe (2019) recommends that every archival institution create awareness of the need for both information professionals and information users to be well trained, and to provide such training. This implies that it is the responsibility of archival institutions to ensure that staff members have the necessary skills to guarantee records preservation and access over time to meet user needs (Chigariro, 2014).

Conclusions

The reviewed literature indicates that little progress has been made over the past 20 years to address the long-term preservation of digital information in South Africa. There is insufficient capacity and training to articulate digital records issues and provide guidance and input to policymakers and planners. Skills deficiency is identified as a key limiting factor to move government services online, along with the absence of legislation, policies (including current preservation) and procedures to guide e-records management. This indicates that some government departments still operate in a paper-based environment and struggle to make the policy decision to move to an electronic operational environment; other issues include the lack of awareness by national archival institutions about the potential of digital preservation and an absence of common standards for digital heritage materials preservation.

It is therefore imperative that the government departments put in place mechanisms that strengthen digital records management so as to better support daily management and service delivery activities as well as government records research that informs policy development decisions. Positive results can only be achieved when there is an environment conducive to the preservation of digital records (Nkala *et al.*, 2012). A lack of formal and practical training has resulted in existing knowledge and training gaps. The findings of this study indicate that records management professionals in the South African public sector are ill-equipped in this area. This makes it difficult for public sector departments and organizations to push for the normalization and application of ICT tools, and successful preservation of government sector records may be impeded.

The preservation of digital records in the public sector in South Africa is inhibited mainly by a lack or shortage of the necessary tools and skills. These tools include adequate policies; guidelines and standards; infrastructure; senior management

support; dedicated budget and proper equipment; and a skilled workforce. The absence of policies, guidelines and standards affects the efficacy of digital records preservation. Moreover, the study revealed that the digital preservation of records in South Africa continues to face a shortage of storage equipment; operates under poor environmental conditions; practises poor archival handling practices by both staff and users; storage facilities are inadequate; works with underdeveloped facilities, experiences inadequate preservation funding; and lacks trained and experienced staff members.

Recommendations

In addressing some of these challenges, plans to ensure training programmes or workshops, capacity building, establishing legislation that will give archival institutions the mandate to manage records and establishing organizational access to ICT development access as part of digital government initiatives in South African would be an encouraging development, as they would impart the necessary skills to the relevant people through, for instance, more support from the private sector and other institutions. On this basis, the study recommends elements of a policy framework needed to improve the state of digital preservation in South Africa so as to ensure long-term records access.

For instance, government departments should formulate and implement in-house policy frameworks, guidelines and plans that specifically address digital records preservation; adequate power supply via standby generators; employment of professionals with required ICT backgrounds; continual training and retraining on digital preservation; identification of hardware and software that require emulation as they become obsolete; digital storage media care and handling; support of long-serving professionals to accept new technology as a way of service improvement; identification of refresh requirements for existing digital storage media; provision of adequate funding to acquire and maintain new high-capacity digital storage devices; and to provide for regular migration of digital information to ensure its long-term preservation.

Development and adoption of shared standards such as Open Archival Information System (OAIS), Preservation Metadata, Implementation Strategies (PREMIS) and PRONOM online file format registry (Rieger, 2018, p. 5) would also be instrumental in facilitating access, discovery, management and preservation of digital resources. The 2012 OAIS Reference Model provides a much-needed framework for establishing a common vocabulary for the description of roles, processes and functional components required for long-term preservation. In addition to general models, format-specific standards such as the "Guidelines on the Production and Preservation of Digital Audio Objects" (Rieger, 2018, p. 5) should be applied locally.

The OAIS Reference Model is an approved ISO standard considered the high-level benchmark for digital preservation systems that defines base functional components, key internal and external interfaces and characteristics of information objects managed in the system. It addresses all aspects of long-term preservation of digital information: ingest, archival storage, data management, access, dissemination and migration (Ngoepe,2017 p. 34).

Finally, sufficient funding and resource allocation should be provided to advance electronic records management programmes with formulation of proper strategies that incorporate appropriate tools and media software into existing business operations for the creation, capture, appraisal and preservation of digital records.

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