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STRATEGIES FOR PRESERVATION OF DIGITAL RECORDS IN MASVINGO PROVINCE OF ZIMBABWE

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Abstract

Information and Communication Technologies (ICTs) have been embraced by a number of public institutions in the Masvingo province of Zimbabwe as part of the government's drive towards e-governance and improved service delivery. This has resulted in the generation of large volumes of digital records. Currently, the National Archives of Zimbabwe (NAZ), which is mandated to preserve all types of records, is at the moment unable to ingest digital records from public departments due to a lack of adequate digital storage facilities and skilled manpower. The records creating agencies in Masvingo have been left on their own to deal with the digital preservation conundrum. This qualitative study explored the strategies for preservation of digital records in the Masvingo province of Zimbabwe. Data were gathered through interviews augmented by observation and document analysis. Research data was manually processed and thematically analysed in line with the objectives of the study. The study established that public agencies in the Masvingo province were failing to guarantee long-term preservation and security of digital records due to a lack of supportive legislation, standards, policy guidelines, budgets, adequate and conducive infrastructure and skills. This has resulted in swathes of digital memory being lost. The study recommends the adoption of trusted digital repositories (TDRs) that are compliant to the OAIS standards, close cooperation between records-creating agencies, the NAZ, information technology (IT) experts and the academia in tackling digital preservation challenges, and the development of preservation policies and guidelines, as well as continuous training and provision of budgets to cater for preservation of digital records. In the absence of infrastructure, the NAZ should consider cloud computing for preservation of digital records as an interim solution while observing legal obligations.

Keywords: Digital preservation, digital records, Masvingo province, trusted digital repositories, Zimbabwe

Introduction

Strategies for preservation of digital records are critical to ensure continued access to information. As government services are increasingly being executed using ICTs, the resultant digital records are becoming the basis for confirming pension and other entitlements, registering

births and deaths, verifying citizenship and certifying voting rights, and enabling the collection of taxes and census enumeration (IRMT 2004). Furthermore, they are becoming crucial in supporting financial management and enabling audits and evaluation, helping to resolve land claims, supporting litigation, documenting inter-governmental agreements, enabling economic planning, describing the government's accomplishments, monitoring the nation's developments and governance, and enabling countless other information-intensive activities (IRMT 2004). Failure to implement digital preservation strategies would result in a lack of access to archives which is a blow to human rights activists, auditors, as well as the general populace whose rights are usually abused by those in power (Masuku & Makwanise 2012:179).

It is therefore crucial that the created digital records remain reliable, authentic and usable, and have integrity (ISO 15489-1: 2016). The guarantee is only through implementing a robust preservation strategy. Kanyengo (2006:5) argues that countries and institutions that are not taking measures today to handle the rapid digital explosion will be left out in accessing knowledge resources that are in digital form when the print form is no longer available to them. This may result in national amnesia and a gap in national heritage due to the digital Dark Age (Ngoepe 2017). The importance of effective digital preservation strategies is also increasing, as social media and websites are growing as sources of official government and corporate communications.

Ignoring digital preservation challenges such as technological obsolescence and fragile storage media, stifles the potential gains that society would have received in return for the personal, economic and professional investment in information technology (Adu 2015:58). This study utilised the Open Archival Information System (OAIS) reference model as the conceptual framework to investigate the strategies for preservation of digital records in the Masvingo province in Zimbabwe.

Background of the study

The Masvingo province comprises seven administrative districts, namely Masvingo, Gutu, Zaka, Bikita, Chiredzi, Mwenezi and Chivi. Masvingo city, formally Fort Victoria, is the provincial capital and the oldest town in Zimbabwe. According to the National Archives of Zimbabwe (NAZ n.d), the town came into being on 14 August 1890 when the lumbering pioneer column with its 117 wagons emerged from the providential pass into the comparative safety of the

highveld after the dangerous two months' trek through the lowveld from South Africa. The town serves as the administrative, commercial and industrial centre for a rich mining and industrial province.

Formal record-keeping in the Masvingo province can be traced back to the colonial administration which commenced with the granting of the Royal Charter by the queen of England in 1889 to the British South Africa Company (BSAC). The Charter gave mandate to the company to develop and administer the territory (now Zimbabwe) as a British protectorate (Matangira 2016:23-24). Archival services incorporating both records and archives management came about with the promulgation of the Archives Act on 12 April 1935, which paved the way for the formation of the National Archives of Southern Rhodesia (NASR) on 1 September 1935 (NASR 1969:xxxi). With the increase in the volumes of records generated, the 1935 Act was replaced by the 1964 Act, as it was making it difficult to pursue a dynamic policy in the management of these records (Matangira 2016). The 1964 Act was also replaced by the 1986 Act because it restricted the National Archives to managing non-current records only of conventional paper-based materials (Dube 2011:281). The 1986 Act, which is still in use mandates the National Archives to manage all government records from creation to disposition, irrespective of format.

However, the provisions of the 1986 Act did not yield the much anticipated improvements in records and archival management services. The country went through a tough political and economic crisis since the dawn of the 21st century and the NAZ's records management outreach programmes were negatively affected (Murambiwa 2012). This situation was made worse by the new challenges brought by the generation and dissemination of information using ICTs. Records management systems are steadily changing from primarily paper-based administrative systems to digital systems. This transition is characterised by the production of large volumes of digital records, created and stored in structured databases, unstructured content management systems, social media platforms, web technologies, mobile platforms and on various inherently fragile media (Lemieux 2016:6; Ngulube 2012:114). Mutsagondo and Chaterera (2014:1) note that the current archival legislation in Zimbabwe does not adequately provide for the management of these fast-proliferating digital records and lacks clear clauses on creation, storage, appraisal, destruction and transfer of digital records to an archival repository. This has resulted in records management practitioners resorting to a hit-or-miss approach when managing digital records (Mutsagondo & Chaterera 2014). In practical terms, the NAZ at the moment has left the task of

managing and preserving digital records to the creating agencies (Bhebhe 2015:118). The institution currently does not have skilled personnel and adequate infrastructure like servers to cater for digital records preservation (Bhebhe 2015).

The production of digital records also received a boost in Zimbabwe with the launch of the electronic government programme in 2011 (Mutsagondo & Chaterera 2014:2). The Ministry of Information and Communications Technology tasked with its execution has been developing infrastructure all over the country, as well as setting up base stations in remote areas so that every Zimbabwean can benefit from the use of technology. By 2011, fibre optic cables linking Zimbabwe to the rest of the world through South Africa, Zambia and Botswana were laid and duty on ICT products was removed to promote electronic business (Mambo 2012). However, Zimbabwe as a nation is yet to put its ICT policy strategic plan document of 2010 – 2014 into practice (Nkala, Ngulube & Mangena 2012:99). It is, therefore, apparent that the execution of ICT-based projects in government are done in a piece-meal approach without any policy, strategy or framework of principles to support the creation, maintenance and preservation of digital records and archives (Bhebhe 2015; Nkala, Ngulube & Mangena 2012; Ruhonde, Owei & Maumbe 2008). The problem is compounded by the new type of digital records created on a plethora of social media platforms. According to Nduna and Chigodora (2015), Zimbabwe has no clear social media policy to guide and govern the use of social media within the public sector. It is in view of the above circumstances that the researcher felt it relevant to establish how public departments generating digital records in Masvingo under the auspices of the NAZ Act are preserving those of enduring value to guarantee continued access to them.

Statement of the problem

The main problem this study seeks to address is that public departments in the Masvingo province are losing significant digital records that should be strengthening their accountability, transparency and effectiveness in delivering their core mandates. For example, Chaterera (2016:128) found that digital records held in public registries in Zimbabwe are not effectively managed and this directly compromises the attainment of good governance, transparency and effective service delivery. The records are also at risk of misuse, unauthorised alteration and deletion, among other consequences, due to a lack of professional guidance in their management (Chaterera 2016:128). The inevitable loss of digital records is also due to the absence of supporting policy framework and guidelines, lack of adequate and suitable digital storage

facilities, financial resources and skilled personnel in digital archiving (Bhebhe 2015; Ngulube & Tafor 2006; Nkala, Ngulube & Mangena 2012). The trend also has other negative implications such as depriving future generations of valuable digital documentary heritage. Digital records were embraced in the Masvingo province on top of a chaotic manual paper records system (Maboreke 2007). As Ngulube and Tafor (2006:69) would argue, automating a chaotic records management system creates more chaos that can stifle the preservation of digital information. Consequently, public departments that have embraced digital records in Zimbabwe are grappling much to contain the adverse effects of technological obsolescence (Chaterera 2013:88). Therefore, it is necessary for public departments to come up with sustainable digital preservation strategies and for the NAZ to be proactive and play a leading role in the preservation of digital records.

Purpose and objectives of the study

The purpose of this study was to examine the strategies for the preservation of digital records in the Masvingo province of Zimbabwe with a view to making recommendations for their effective preservation to guarantee their continued accessibility. The specific objectives were to:

- Identify the strategies the province is using to preserve digital records.
- Analyse legal, standards and policy guidelines supporting the preservation of digital records.
- Assess infrastructure and resources to cater for the preservation of digital records.
- Assess the knowledge and skills levels of staff responsible for the preservation of digital records.
- Establish how public departments provide access and security to digital records.
- Suggest recommendations for the effective preservation of digital records.

Research methodology

This study used a qualitative research approach and adopted a multiple case study design. Face-to-face interviews and semi-structured interview guides were used as the main instruments for data collection. Data were also collected through observation and document analysis to enhance trustworthiness of the findings. The population of this study comprised 71 public departments. A preliminary contact with all these departments yielded that only 15 of them preserved digital records. The 15 departments were purposively selected and targeted to inform this study.

However, permission was granted in 13 departments. Targeted participants were also purposively selected and comprised three participants per department drawn from top administration officers, records management officers and IT officers involved in the preservation of digital records. However, actual interviews were carried out with 13 top administration officers, 13 records management personnel and six IT officers. The other departments had no IT officers at provincial level. Data were manually processed and analysed using thematic content analysis. The research objectives formed the basis of the themes and were used as categories of analysis. Investigated departments were assigned alphabetical code letters ranging from A to M.

Findings and discussions

This section presents research findings according to the objectives of the study.

Strategies for preservation of digital records

The purpose of this objective was to identify the strategies used by departments in the Masvingo province to preserve digital records. This research established that backup and byte replication, migration, printing and filing, capturing preservation metadata and cloud computing were the preservation strategies used in the Masvingo province. The usage of these strategies is summarised in Table 1. The major reason participants cited for using these strategies was that they were cheaper for them as they have inadequate infrastructure, resources and budgets. Furthermore, the records management officer at Department M commented that:

> The major attraction for using backup and byte replication and cloud computing strategies is that they require little technical expertise, yet they can serve records from hardware and software failure as well as disasters.

Table 1: Digital preservation strategies used in the studied departments

Digital preservation strategy	Department(s) using the strategy
Backup and byte replication	A, B, C, D, E, F, G, H, I, J, K, L and M.
Migration	A, C, D, E, F, H, I, K, L and M.
Printing and filing	A, B, D, E, F, I, J, K and L
Capturing preservation metadata	C, F, G, H, I, L and M
Cloud computing	A, D, F, G and M

The records management officers also conceded that they have limited technical skills and knowledge of how other strategies such as emulation and encapsulation can be implemented. The records management officer at Department G lamented and said:

> I am stuck on ways of harvesting and preserving information on our website and social media platforms. I did not receive adequate training on how most of the digital preservation strategies work as I just learnt about them in theory.

This study also established that none of the departments were practising migration by normalisation.

This situation greatly suggests that the strategies for preservation of digital records in the Masvingo province are at the moment makeshift and interim in nature. As Corrado and Moulaison (2014:4) would argue, backup and byte replication alone cannot guarantee the perpetuity and longevity of digital records, because it provides short-term to medium-term strategy to extend the life of these resources. Katuu and Ngoepe (2015) expound that cloud storage has no guarantee of continued availability of stored data in an authentic and reliable form since data are put on computers you do not have control over. It can only be considered as an interim option (Ngoepe 2017). It is therefore crucial for departments solely relying on backup and byte replication and cloud storage to remodel their strategies for sustainability.

The fact that the departments were yet to embrace open standard and non-proprietary formats in their migration efforts makes the records vulnerable to technological obsolescence challenges. Open formats allow for unlimited use without licence fees or patent issues and their fully available documentation eases their future handling (Barve 2007). However, most of the departments were using proprietary formats such as Microsoft Word Document (DOC), Database format (.dbf), Microsoft PowerPoint Presentation (.ppt) and Moving Picture Experts Group MPEG 4 (mp3) that are not suitable for long-term preservation.

This research also discovered that Departments A, B, D, E, J and K were not capturing preservation metadata due to ignorance about its importance in digital preservation. All the case study departments were also ignorant about metadata standards such as Preservation Metadata Implementation Strategy (PREMIS), Metadata Encoding and Transmission Standard (METS), Dublin Core Metadata Set, Encoded Archival Context (EAC), e-Government Metadata Standard (E-GMS 3.1) and Encoded Archival Description (EAD). This is a grave flaw with far-reaching

negative consequences because metadata is crucial for the purposes of identifying, retrieving, managing and preserving digital records (InterPARES 3 Project: Team Canada 2013).

The records management officer at Department A also responded that:

> We are printing and filing some of our digital records, especially those transmitted through emails, social media platforms and web pages.

Although this strategy seems easy, it cannot be totally relied upon. Wright (2014) argues that some digitally created records do not translate well into a printed format; for example, a print-out does not allow a user to click on links, and audio and video files do not translate at all into a print-out. Printing digital records also destroys their core digital attributes such as perfect copying, easy access and distribution, among other things.

Through interviews and observation of the preservation systems used, this research established that all the case study departments were yet to use trusted digital repositories (TDRs). The departments also lacked knowledge about preservation software such as Achivematica and Access to Memory (AtoM) that are compliant with archival standards like the OAIS model (ISO 14721:2003). Furthermore, the studied departments were ignorant about preservation assessment toolkits like TRAC, NESTOR and DRAMBORA, among others, which are invaluable for the certification process and risk assessment as well as software tools like DSPACE, FEDORA, LOCKSS and DAITSS, which are crucial for generation of technical metadata to support the preservation of digital records.

The findings of this research correspond well with a study by Ngoepe (2017) who found that storage of digital records in creating agencies cannot be considered preservation for the future since many of these institutions do not have the capability to locate and retrieve records after a certain period of time.

Legal, standards and policy guidelines

The purpose of this objective was to analyse legal, standards and policy guidelines supporting the preservation of digital records. This study established that the National Archives Act of 1986 is the legal framework for the management and preservation of all public sector records in Zimbabwe. However, participants in Departments A, E, G, H, I, J, K, L and M revealed that they were not receiving much help from the provisions of the Act. The records management officer at Department M responded that:

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> The current National Archives Act has little meaning when it comes to the management and preservation of digital records. The Act lacks clear instructions on creation, storage, appraisal, destruction and preservation of digital records.

This response corresponds with the observation of scholars like Bhebhe (2015), Dube (2011), Mutsagondo and Chaterera (2014) and Ngoepe (2017) who identified gaps in the NAZ Act for failing to provide clear clauses on creation, storage, appraisal, destruction and transfer of digital records from records management systems to a digital archival repository. There are also loud calls from scholars like Matangira (2016:218) for the revision of the Act to directly incorporate digital records management and preservation and to put provisions for designing of digital records management and preservation systems.

None of the departments were conforming to any digital preservation standard in their preservation efforts. All participants showed ignorance about digital preservation standards like the OAIS model (ISO 14721:2003); ISO/TR 18492:2005 – Long-Term Preservation of Electronic Document-based Information; ISO/IEC 27001:2013 – Information Technology – Security Techniques – Information Security Management Systems – Requirements, among others. The records management officer at Department J affirmed this and said:

> At this department, we have no knowledge about any digital preservation standard.

The departments were also lacking documents like preservation policy, security and access policy, and guidelines for handling storage media. Responses from Departments B, D, E and J can be summarised in the words of the registry officer at Department J who said:

> The issue of policies looks like both a national and departmental problem, because we are lacking a national framework governing the management and preservation of digital records to guide us in crafting departmental policies.

The studied departments were carrying out digital preservation without conforming to standards as they were doing work against the sustainability of digital repositories. The use and development of standards have long been a cornerstone of the information industry since they facilitate access, discovery and sharing of digital resources, as well as their long-term preservation (DPC 2016). One such standard is the OAIS model which is an international standard (ISO 14721:2003) which identifies processes and functions common to almost every possible digital preservation environment (Gracy 2008:36).

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Carrying out digital preservation without adhering to policies and guidelines is also precarious. According to the DPC (2016), a digital preservation policy enables digital preservation to be carried out within an agreed framework and provides a clear line of responsibilities. The importance of an access and security policy also needs no over-emphasis. Asogwa (2012) argues that databases containing personal, financial and medical records can pose security, confidentiality and privacy violation challenges if proper access and security precautions are not put in place in the form of a policy. Lacking an ICT policy also poses a great threat to the preserved records. According to Anie (2011), an ICT policy spells out the objectives, goals, principles and strategies, among other things, intended to guide and regulate the development, operation and application of ICTs for sustainability.

Paucity of a retention and disposal policy in the studied departments is another indicator of faulty digital preservation in the Masvingo province. This status quo leaves chance for preservation systems to be clogged with records of ephemeral value and collapse under their own weight. A retention and disposal policy is one of the secrets for a successful preservation programme. Smith (2007) also argues that it is dangerous to think that an office can keep everything in digital form because, if systems are upgraded, it may not be easy to migrate the information to new software. Similar to the findings of this study, Bhebhe (2015), as well as Nkala, Ngulube and Mangena (2012) observe that the execution of ICT-based projects in Zimbabwe is done in a piece-meal approach without any policy, strategy and framework of principles to support the creation, maintenance and preservation of digital records and archives.

Infrastructure, resources and tools for digital preservation

The purpose of this objective was to assess infrastructure and resources to cater for the preservation of digital records. This study established through interviews and observations that the infrastructure and resources that public departments in Masvingo have at the moment were inadequate to sustain long-term digital preservation strategies. The province lacked purpose-built records storage rooms or facilities with humidity and temperature controls, smoke detectors and dust filters or suckers. One top administration officer at Department M responded that:

> The infrastructure that we have can be best described as makeshift just to avoid the loss of valuable information on a short- to medium-term basis. We are operating without adequate basic infrastructure, budgets, resources and tools for digital preservation.

This state of affairs is not ideal if the Masvingo province is to have effective digital preservation strategies. Dust can damage servers and lack of smoke detectors and adequate firefighting equipment in the departments put records at greater risk in the event of a fire. Ngoepe and Van der Walt (2009) argue that a good policy and legal framework does not help much if there is no capacity to implement it and sound infrastructure to ingest archival digital records. Uncontrolled environmental conditions are detrimental to digital records, especially those on external storage media like CDs and DVDs. Although researchers are not in consensus about the suitable temperature and relative humidity levels that support long-term preservation of digital records, the DPC (2016) suggests that temperature of around 20^0C and relative humidity of about 40% could be suitable for mixed collections. A controlled temperature and relative humidity environment also prolongs the life expectancy of external storage media. The DPC (2016) adds that the life expectancy of both CDs and DVDs is predicted to range from approximately two years at temperature of 28^0C and relative humidity of 50% to seventy-five years at a temperature of 10^0C and relative humidity of 25%.

The systems the departments were using were not conforming to the OAIS reference model, which is an ISO standard and a benchmark of preservation work. The systems were not fully developed to allow for interoperability in the event of a change in the hardware and software environment. On top of that, Departments A, B, D, E, F, J and K were operating without power backup. The IT officer at Department F responded that:

> One of our challenges is that we are carrying out digital preservation without adequate power supply and power backup.

This is another big threat to the survival of digital records in the Masvingo province. According to the Minnesota History Society (2012), appropriate and sufficient power supply must be delivered to the server room because inadequate power causes servers to overheat and fail, and loss of data is inevitable. Insufficient budgets or lack of budgets is another big factor militating against achieving sustainable strategies for preservation of digital records in the Masvingo province. The IT officer at Department I lamented and said:

> We are lacking funds to purchase software packages, for system maintenance as well as for continuous training.

It is therefore difficult under these circumstances to implement comprehensive digital preservation strategies. According to Ngulube (2003:288), funding is key to formulating and implementing preservation programmes.

The findings of this study which indicated that the available infrastructure and resources were inadequate to support the long-term strategies for preservation of digital records in the Masvingo province confirm Matangira's (2016) observations that Zimbabwe is far from complying with the expectations of the records management standard ISO 15489-1, which prescribes that facilities should be in place to ensure the capture and management of records in all formats throughout their life-cycle.

Professional knowledge and skills levels of staff

The purpose of this objective was to assess the professional knowledge and skills levels of staff responsible for the preservation of digital records. Through interviews, this study established that all the participants in this study had professional qualifications ranging from certificate level to master's level. However, the top administration officers had no qualifications inclined to records and archival management. The records management officers in the studied departments had qualifications in records management and information science, but they were lamenting that they lacked the practical expertise and skills to execute most of their digital preservation duties. The records management officer at Department J said:

> The curriculum I studied was more inclined to the management and preservation of paper records with little depth on management and preservation of digital records. Our department has not been prioritising staff development in the past five years due to economic hardships and partly because we are headed by officers who place little importance on records management issues. We therefore lack basic skills in appraisal, management and preservation of digital records.

The IT officer at Department J also responded that:

> I am lagging behind the pace of technological developments as a professional due to lack of budgets for purchasing modern machines and softwares, as well as for continuous training.

The records management and IT officers also lacked knowledge about the OAIS digital preservation model and digital repository audit criteria. This also partly explains why the

ingestion of digital records was not given thorough attention. Furthermore, there were no validation systems to verify the integrity, completeness and correctness of records at ingestion stage. The findings of this research are similar to the observations of Malemelo, Dube, David and Ngulube (2013) who note that computer systems at the Marondera Municipality were not being used extensively in the day-to-day activities and members of staff were not well versed with some information technology programs used in financial records management. Similarly, Matangira (2016) argues that the issue of basic training in records is no longer the biggest problem in Zimbabwe, but rather the type of training.

Access, security and privacy issues

The purpose of this objective was to establish how public departments provide access and security to digital records. This research established that access to preserved digital records in the studied public departments in the Masvingo province was online. The IT officer at Department M clarified that:

> Access to the preserved records is online from server storage through user authorisation and authentication processes which also technically protect records from unauthorised access and tempering. Users of records have access rights that correspond to their duties.

However, the top administration officers in Departments A, B, D, E, F, J and K complained that accessing some of the digital records was a mammoth task due to poor arrangement, description, indexing and inadequate metadata. Through interviews, this study also established security and privacy challenges in the studied departments illustrated in Table 2.

Table 2: Security and privacy challenges faced in the studied departments

Security and privacy challenge	Departments affected
Files left open on shared client computers	C, F and J
Unauthorised access	C, F and J
Viruses	F and K
Crushing of machines	F and K
Hacking	L
Deletion of records	B, E, F, J, K and L
Migration errors	E, I, F and M
Technological obsolescence	M

Although the challenges were yet to be rampant, they have the potential to cause unprecedented loss of valuable digital records in the province. Necessary steps to mitigate their effects must be considered as a matter of urgency. The slightly lower prevalence of these challenges at the moment may be due to the fact that all the departments were running hybrid systems of both paper and digital records. However, with the projected exponential increase in the generation of digital records, these challenges if, not addressed, are bound to become widespread, leading to more loss of records.

All the departments were also operating without access policies, digital records disaster management plans and guidelines for managing digital storage media. This situation is not ideal for digital preservation strategies to succeed. An access policy is critical in all preservation efforts because it is developed with sensitivity to strike a balance between the right to access information and protection of privacy. In addition to that, it ensures the safety of the record, compliance with legislation and archival practices, and guarantees the existence of materials for future users (National Archives of St Kitts and Nevis 2011).

Operating without a disaster management plan, as the studied departments were doing, poses a great risk of completely losing the preserved records. A disaster management plan is critical because it provides detailed instructions for staff to follow in the event of different types of disaster. Additionally, it provides instructions for restoring the content of the digital collection from backup copies, among other things (IRMT 2009). A lack of guidelines for handling storage media, as was the case in the studied departments, is also another quick recipe for digital records to become irretrievable.

The departments that had social media accounts, that is, A, D, F, G, H, K, L and M, were also lacking guidelines pertaining to the use of such records. Above all, the departments were also ignorant about other access legislation in Zimbabwe like AIPPA. Poor security and confidentiality controls have also been identified as major factors contributing to the failure in capturing and preservation of digital records in the ESARBICA region (Wamukoya & Mutula 2005).

Conclusion and recommendations

The strategies for preservation of digital records in the Masvingo province are compromising the long-term preservation and security of these resources. At the moment, the strategies are makeshift and interim in nature, giving room for the province to continue losing more information. The preservation strategies are implemented in an ad hoc fashion due to a lack of sound legal, standards and policy guidelines for preservation of digital records. There are no checks and balances to guarantee continued access to digital records and standard benchmarks that can lead to effectiveness of the digital preservation strategies. The infrastructure and the resources in departments were not adequate to sustain long-term digital preservation strategies and show that a thorough cost benefit analysis and digital readiness assessments were not done before departments started preserving digital records. At the present moment, digital preservation in the Masvingo province is yet to be fully developed.

The officers charged with the preservation of digital records were more conversant with the preservation of paper records than digital records. The development of digital preservation in Masvingo is therefore in limbo. A lack of appraisal and ingestion skills noted in this study means that digital preservation strategies in the Masvingo province are bound to be unsustainable. The province is yet to thoroughly deal with access, privacy and security issues as the departments were operating without access policies, ICT policies, digital records disaster management plans and guidelines for managing storage media. Departments therefore are bound to lose more records and to fail to ensure accountability, transparency and improved service delivery. The departments are also at risk of suffering the adverse effects of litigation due to negligence on issues of privacy and confidentiality.

Departments should consider using TDRs that can manage digital resources to their designated community now and in the future and are OAIS compliant (ICA 2016). TDRs can be audited to ensure appropriate performance and quality management with assessment toolkits like TRAC, NESTOR and DRAMBORA, among others. They also work well with software tools for digital preservation like AtoM and Archivematica, among others. The model is also an approved ISO standard (ISO14721) that is currently considered the benchmark for digital preservation systems (ICA 2016). It addresses all aspects of long-term preservation of digital information, that is, ingest, archival storage, data management, access, dissemination and migration to new media and forms (Ngoepe 2017).

The departments should make sure that their preservation systems capture all forms of metadata; that is, technical, management and discovery metadata. The departments should also strive to perform migration by normalisation whereby the data file is migrated to standard open source format that is always available, accessible and promotes interoperability between differing systems (Joint Technology Committee 2014:14). Other tried and tested archival non-proprietary formats such as PDF/A may also be considered for use to prolong the life of digital records that can be converted into such formats.

The departments should explore for adoption the use of Application Programming Interfaces (APIs) for harnessing and preservation of social media and website content. The use of cloud storage for less sensitive information may also be considered as a viable and cost-effective interim strategy for use by both the NAZ and the records-creating departments to reduce pressure on the inadequate preservation infrastructure. Above all, there should be closer cooperation between records-creating agencies, IT experts and the NAZ for improved digital preservation strategies.

The current NAZ Act should be amended to give adequate and specific guidelines for the management and preservation of digital records. Alternatively, the NAZ should devise a digital preservation policy and guidelines that augment the Act for the departments to follow in the execution of digital preservation. A policy on distributed custody may also be desirable at the moment to give creating agencies the mandate to preserve digital records until such time when the NAZ is able to ingest digital records from public sector departments. All digital preservation strategies and activities should conform to standards for sustainability and effectiveness. Adhering to standards such as ISO 15489:2016, OAIS reference model and other relevant ISO standards is recommended for preservation efforts to be in line with global trends and best practices. The departments should also come up with ICT, retention and disposal, and access policies as well as disaster management plans. These instruments are crucial for digital records preservation strategies and activities to be executed in compliance with legislation and archival practices.

The departments in the Masvingo province should consider having special rooms for storage of digital records with controlled temperature, humidity, dust and sunlight for proper working of servers and long-term storage and survival of external storage media. Substantial budgets should also be put in place to support digital preservation activities. Top management should also change their mind-set and start to consider records and archives management as key to service delivery and start to prioritise this sector in resource allocation. The infrastructure and resources crisis in the Masvingo province is a wakeup call for the Government of Zimbabwe to capacitate the NAZ to devise provincial and national data centres to ingest digital records from public sector departments for future use.

Substantial investment should be channelled towards improving staff skills in digital records management and preservation. The departments should consider funding continuous training of staff through workshops, conferences, short courses and college or university programmes with more emphasis on the practical side of digital preservation. All the relevant stakeholders, that is, records-creating agencies, the academia, the NAZ and the government, should come together and consider revising the records and archives curriculum. Furthermore, they should work towards equipping tertiary institutions with TDRs and other necessities that will give hands-on experience and technical skills to students. Access, security and privacy issues should be thoroughly addressed through policies. The physical infrastructure and the computer systems should be tightly protected to inhibit unauthorised access, alterations and viral attacks on information.

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