

Long-term preservation of digital records at the University of KwaZulu-Natal archives

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Abstract

The long-term preservation strategies used for digital records are significant in that they can ensure access to records and archives. This study examines the strategies used for the digital preservation of records at the University of KwaZulu-Natal Archives. It describes how care is taken in order to ensure that the various plans of action that are adopted are appropriate for the university archives. A qualitative research design with an interpretivist world view was used in this exploratory study. In this study, interviews, observations and document analysis were employed as data-gathering techniques. The research sample was purposively selected from members of the archivist staff at the university archives. Findings revealed that staff members had started a data preservation project; however, it became clear, that there was no decisive policy framework for the preservation of digital records for the UKZN Archives. Therefore, it is recommended that these issues be dealt with via the implementation of an Information Communication Technological (ICT) infrastructure and the devising of policies and strategies to help ensure the long-term preservation of digital records.

Key words: preservation, digital records, digital preservation, University of KwaZulu-Natal, archives

1. Introduction

The advancement of Information Communication Technology (ICT) has given birth to records that exist in digital format. However, the expansion in volumes of digital records constitutes a serious challenge with regard to their longevity and accessibility (Asif 2011:12). These challenges instigated information specialists and archivists to keep in touch with the ICT tools. Asogwa (2012:207) notes that the development of ICT affected archival institutions in Africa to manage and preserve records in their custody. There is a need for staff to be well informed with the ICT tools. According to Jain and Mnjama (2016:157), most archivists and records managers are not technologically skilled in dealing successfully with the challenges of ensuring long-term preservation of digital records, which leads to the archivists not participating in the selection and digital preservation of electronic records.

Sambo, Urhefe and Ejitagha (2017:120) argue that digital records are vulnerable to loss and destruction because they are stored on fragile magnetic and optical media which deteriorate rapidly; moreover, they could fail suddenly from use on faulty reading and writing devices. Digital records “are inherently software-dependent, regardless of their format” (Dar & Ahmad 2017:37). This has imposed immense challenges and opportunities for university archivists when it comes to long-term preservation. Therefore, it is necessary for archives to adopt strategies to deal with the issues confronting long-term digital preservation, so that they can preserve digital records perpetually on a standard platform and make them accessible. Without preservation of digital records, there will be no historical information in the future.

Kalusopa and Zulu (2009:99) define digital preservation as a “series of adapting management activities necessary to ensure continued access to digital materials.” This applies to materials “born” digital and those that have been digitized from analogue materials (Perry 2014:1). For the purpose of this study, digital preservation strategies and frameworks refer to “all of the actions required to maintain access to digital materials beyond the limits of media failure or technological change. Those resources may be records created during the day to day business; born digital materials or the products of digitization projects” (Samiee & Davallu 2014:3). Therefore, digital preservation entails techniques or methods aimed at managing the risks of information loss as well as ensuring long-term and meaningful access to digital information.

The long-term preservation of digital records is a challenging task and is one of the unresolved problems associated with the impact of ICT applications in record-keeping (Keakopa 2007:35). The problems associated with the preservation of digital records are not new. According to Jain and Mnjama (2016:158), preservation of digital records includes the following problems and challenges: lack of knowledge, shortage of adequately trained personnel to handle digital records, insufficient funding for human and physical resources required to establish and maintain the programmes and the technological obsolescence and fragility of storage media. It is known that the long-term digital preservation of resources in the archives is the preferred strategy for curbing the decay of materials and addressing the problems of hardware, software obsolescence, and backup issues (Sambo et al. 2017:120).

The rationale underpinning digital preservation is the need to maintain the ability to display, retrieve and use digital collections in the face of rapidly changing technological and organizational infrastructures and elements (Kalusopa 2018:168). Hence, strategies for digital preservation within the archives have

been instrumental in initiating a range of frameworks and strategies to extend their longevity and while maintaining their authenticity. However, it is critical that the created digital records remain reliable, authentic, usable and that they have integrity (ISO 15489 2001). The future of digital preservation is in implementing robust digital preservation strategies. Preserving digital records involves preserving the ability to recreate that observable product in order for the records to continue fulfilling the purpose for which they were created (IRMT 2009:23).

2. An overview of the three university-based archives

The University of KwaZulu-Natal has three archives centres as the University of KwaZulu-Natal Archives in Pietermaritzburg, Alan Paton Centre Archives and the Killie Campbell Collections.

2.1 University of KwaZulu-Natal Archives

These archives reflect the history and development of the University of KwaZulu-Natal (UKZN). This repository collects papers, publications and photographs of the university, as well as the minutes of meetings and departmental documents, from all three campuses (Durban, Pietermaritzburg and the Medical School). The holdings are entered onto the Cataloguing Network in Pietermaritzburg (CATNIP) and the Southern African Bibliographic Information Network (SABINET), and also entered onto the National Automated Archival Information Retrieval System (NAAIRS). All three of these databases are accessible from the UKZN Archives (Koopman 2002:42).

2.2 Killie Campbell Collections

The Killie Campbell Africana Library has valuable and unique collections of manuscripts, books, photographs, maps and government publications, covering a variety of topics about South Africa in general, and KwaZulu-Natal in particular. The acquisitions policy of the Campbell Collections accommodates the accepting of relevant donations from members of the public. Aids for locating materials that previously consisted of a card catalogue, inventories, and UKZN's Durban URICA computer catalogue. In 2001, the Killie Campbell Africana Library chose to set up its own website which could provide an online catalogue of archival descriptive lists (Koopman 2002:42).

2.3 Alan Paton Centre Archives

The Alan Paton Centre (APC), which was established in 1989, remained in the original archive house. The APC grew out of the donations of copies of Alan Paton's book, *I Cry, the Beloved Country* and the contents of Paton's study, including journals, books, plaques, awards and photographs. The collection of the original manuscripts of Paton's poetry, short stories and correspondence was also donated. Added to the core collection, is the records of the Liberal Party of South Africa, the Black Sash Midlands region, the Detainees' Support Committee (DESCOM), and many other non-governmental organizations (NGOs) which were active in the Natal Midlands and Pietermaritzburg during the struggle against apartheid from 1948-1994 (Koopman 2002:43). The APC's acquisitions policy continues to focus on collecting the manuscripts and papers of individuals and organisations involved in the anti-apartheid struggle.

3. Statement of the problem

Digital preservation has become a serious problem faced by the Library and Information Services (LIS) sector which imposes huge challenges for the university archives that attempt to preserve their digital records (Masenya & Ngulube 2019). Indeed, the digital preservation of records is acknowledged as a universal challenge (Jain & Mnjama 2016:157) and remained predominant. The development of ICT, which led to the vast creation of digital records, has created the challenges in preserving the records in digital format (Ngoepe & Saurombe 2016:25). This is despite the extensive amount of research which has been conducted on long-term preservation of records. The problem is to find ways to ensure the long-term preservation and continued accessibility of digital records (Kootshabe & Mnjama 2014:26). It is therefore critical to develop appropriate digital preservation techniques that will maintain digital records through time and ensure that they remain accessible, authentic and usable for future generations.

The major issue that archival institutions have to deal with is the efficient management of the digital records in order to ensure their long-term preservation. This is due to the evolution of the technological hardware and software used as new systems are introduced that replace the traditional ways in which institutions used to record, store and retrieve information (Ngoepe & Saurombe 2016). Although many have attempted to offer solutions, the debate about which technical methods can be used best is still raging globally and in South Africa in particular (Ngulube 2018:168). Its complexity stems from the

fact that it is interwoven into the process of creating, using and preserving a wide variety of digital records and resources. Therefore, the University of KZN archives risk losing irreplaceable digital information if all these issues are not resolved.

The outcome of the study would pave the way for policy, practical and managerial interventions in the area of digital preservation of records in the archives. The objective of preserving digital records and ensuring access has many benefits and opportunities: however, it is not without challenges. Some of the alarming issues that need to be dealt with include human error, data loss, fading computer memory, lack of effective training and technological obsolescence (Kastellec 2012).

4. Purpose and objectives of the study

The purpose of this study is to examine the strategies for the preservation of digital records at the university's archive department, with a view to making recommendations for their effective preservation, in order to ensure their continued accessibility. The specific objectives were to:

- identify the strategies to preserve digital records by the UKZN archives.
- identify the issues relating to the preservation of digital records at the UKZN archives.
- make recommendations for the preservation of digital records.

5. Review of the literature

A number of articles have been written on the preservation of digital records. This study would focus on the implications and strategies for preserving digital records, policy for digital preservation, the challenges of preserving digital records as well as the possible solutions that can be used to solve the problems.

5.1 Strategies for preserving digital records

Adu (2015) points out that a perusal of the literature and of databases revealed that few empirical research studies have been conducted on preservation in general. Most studies conducted thus far, underscore the paucity of literature focused on digital preservation, as these studies tended to focus more on general preservation issues and not specifically on digital preservation. A further cursory

assessment of literature on digital preservation shows the dearth of publications on digital preservation strategies.

Meddings' (2011) study on digital preservation revealed that 85% of his survey respondents claimed that digital preservation is very important for their repositories. Moreover, 46% of the respondents indicated that they were taking steps to ensure the long-term preservation of digital content. They indicated that the preservation of their digital materials is of crucial importance, as it would ensure accessibility. Magama (2017:20) notes that appropriate strategies and methods for preserving digital records are indispensable in order to address technological issues, infrastructure, financial resources, security and privacy issues, and the lack of suitable standards, policies and regulations.

The practices by which digital records are created, maintained, made accessible and used must be analysed, and strategies and standards for their preservation must be developed in order to be accurate and authentic (Duranti 2005:107). Thus, there is an urgent need to devise technical strategies which are constructed on the principle that digital records can be maintained and kept accessible, regardless of the software and hardware platforms on which they currently reside (Harvey 2003:16). The absence of the strategies leads to poorly managed digital records and inability to guarantee the long-term preservation and accessibility of digital records in the archives. For example:

5.1.1 Migration

This refers to the process of conveying and transmitting data to a new digital system and involves converting resources from one file format to another. This is the most commonly utilized method as it concentrates on file formats and strives to maintain digital objects on new formats, so as to make the resources accessible (Adu 2015). The main purpose of migration strategy is to preserve and keep the integrity of the digital objects unchanged for the users to retrieve and display, thereby making them accessible despite a constantly changing technological environment (Amenta 2014:32).

5.1.2 Emulation

This process preserves the “original feel of the records by maintaining their appearances and style”, according to Magaya (2009:28). The main objective of emulation is not to focus on the digital object itself, but rather on the hardware and software environment in which the object is integrated; hence it aims to

recreate an “environment in which the digital object was originally created” (Van der Hoeven, Lohman & Verdegem 2007:124). Bradley (2007:154) argues that the technological environment is preserved by replicating and imitating the original operating systems in order to make the digital objects usable in the future. This is a field that requires specialized skills.

5.1.3 Digitization

This process is conducted in order to preserve rare and fragile collections by making them more accessible to a wider audience (Rowley & Smith, 2012:274). Therefore, digitization may be defined as the process of codifying information in order for it to be accessed digitally and on a long-term basis. Hence, it is known as an effective tool for increasing the visibility and accessibility of archival documents (Astle & Muir 2002:67).

5.1.4 Refreshing

This entails a process of copying data from one medium to another of the same type. The key rationale behind refreshing, is to maintain the digital infrastructure but that it is updated with the latest ICT developments (Barateiro, Antunes, Freitas & Borbinha 2010:7). For instance, refreshing consists of copying data from floppy disks onto CD-ROM disks. With the growth and development of technology, archives are required to copy information from one medium to the other, such as to CDs in order to provide long-term preservation and ensure continued access (Adu 2015).

5.1.5 Backup and byte replication

This involves a process whereby digital records are duplicated onto numerous copies of files and stored in diverse locations (Adu 2015). They assist in providing short-term to medium-term strategies to prolong the life of digital records (Corrado & Moulaison 2014:4).

5.1.6 Preservation metadata

This is considered as a means of preserving “the essential information to ensure long-term accessibility of digital resources.” (Dappert, Sebastien, Chou & Delve 2013:106). Hence, preservation metadata is a fundamental aspect of any information retrieval system, as it has peculiar implications for any archival institution that carries out digital preservation of records (Dappert et al.

2013:106). Therefore, it can be used for any formal scheme of resource description and applied to any type of records' system (Segawa 2015:10). According to Oehlerts and Liu (2013:89), preservation metadata encapsulates the information of the digital records in terms of "provenance, authenticity, preservation activities, technical environment and rights management."

5.1.7 Encapsulation

Sadiku, Shadare and Musa (2017:5) note that this strategy involves keeping information about digital objects for as long as possible since their formation and inception. This creates the details on how to interpret the digital object part of the encapsulated information and increases the compatibility of information between computer systems.

5.2 Policy for digital preservation

Ndenje-Sichalwe (2010:166) states that records management activities function on the basis of the framework, policies, rules and procedures that ensure guidance in terms of practice procedures. Policies, laws, rules and strategies are vital for guiding the creation, use, management and preservation of digital records. The appropriate digital preservation policies and frameworks give direction, while a lack of appropriate policies will hinder good management (Knight 2010). The lack of written organizational policies is an indication that organization are not preserving their digital records properly.

Within the ESARBICA region, Mnjama and Wamukoya (2007:279) indicate that one of the main issues with preservation of digital records has been the lack of organizational policies, rules, frameworks and procedures. Luyombya (2010) conducted a study on the use of a framework for the effective digital records' management in Uganda. The findings indicated that the records and archives legislation and policies in Uganda have not been enforced. This in turn has resulted in the absence of appropriate institutional and organizational structures. The lack of policies, rules and frameworks in archives' management affects the initiatives for digital preservation in the long run. In such cases, digital records may not be captured, stored and preserved in a systematic fashion. As a result, this presents the danger of losing access of digital records.

6. Methodology

The qualitative research methodology with an interpretivist perspective was used. This study adopted an exploratory case study approach. The study triangulated qualitative data collection techniques comprising interviews with staff, observations and document analysis from the Killie Campbell Collections, Alan Paton Centre (APC) Archives and the UKZN Archives. Thus, the study population was comprised of eight archivists. The participants' selection was based on Creswell's (2009) proposition that in qualitative research, the chosen participants should be the subjects who are best equipped to provide answers to the research questions.

7. Data presentation and discussions

The findings are presented in line with the objectives of the study.

7.1 The strategies the University of KwaZulu-Natal Archives used to preserve digital records

The first objective of this study was to identify all the strategies the UKZN Archives are currently using to preserve digital records. Hence, it was decided that the following issues be highlighted:

- 1) When did the archivists began to generate and preserve digital records.
- 2) The types of digital records preserved at the archives.
- 3) The storage of the digital records.

The respondents were asked through interviews to identify what strategies the UKZN Archives were using to preserve their digital records. The study established that the three archives of the university started to preserve digital records at different times. For example, the interviews revealed that the Alan Paton Centre (APC) started in November 2016. However, the project to preserve their digital records was very slow in starting and was still ongoing. The APC started to generate and preserve digital records in November 2016, while the Killie Campbell Collections started only two years ago. The view of the Killie Campbell archivist regarding the project for preserving digital records two years ago, can be inferred from the following comments:

Digital Innovation South Africa (DISA) undertook digitization at Campbell Collections in the early 2000s - digitizing many of the historical photograph albums. Digital Innovation South Africa (DISA) ceased to function, and their website was taken over and maintained by UKZN Libraries. Digitization was resumed two years ago and the digitized material placed on the DISA website. We are currently digitizing quite a small operation and we're still experimenting with the work we are doing. We have begun with the photographs, as these are easier to get started with (Emily-Ann Krige personal communication 12 March 2019).

All the archivists in the study highlighted the fact that they all started preserving photographs digitally. For example, the Killie Campbell archivist said that:

For our current digitization work we scan the material in TIFF format (as a master-copy version), and then save into JPEG for access. The TIFF and JPEG files are saved on a couple of computers and backed-up on an external hard-drive. The JPEG files are uploaded onto the DISA website. Then UKZN libraries manage the preservation of these off-site files (Emily-Ann Krige personal communication 12 March 2019).

This research established through interviews and observation that the university archives are using the following digital preservation strategies: migration, backup and byte replication, filing, digitization, capturing preservation metadata and cloud computing. For example, in the interviews, the archivist from UKZN said that “the photos that are already in digital format are stored in different locations, including the external hard-drive storage media.” This concurs with Magama’s (2017:73) findings which indicated that backup and byte replication was considered a useful strategy to preserve digital information. One of the respondents interviewed by Magama (2017:73) said that “the strategy’s major attraction is that it requires little technical expertise, yet it can save records from hardware and software failure, and intentional or unintentional alterations, as well as disasters.”

Information gathered from the interviews established that for the Killie Campbell Archives, there was no written policy to support their preservation work. This is because they were still experimenting with the digitization of the photographs. Through document analysis, this study has established that the Alan Paton Archives (APC) and the UKZN Archives do have policies. For

example, the APC has a draft digital policy that outlines the ethical issues relating to the scanning of records. Their in-house policy addresses issues such as processes to follow apropos ethical issues and agreements between the donor and the centre. However, document analysis indicates that the UKZN's archive policy involves an arrangement with African Media Online, a company that does digitization of photographs for the archives. The policy also covers copyright agreements between the archivists and the company. However, these policies have no relevance to the technical strategies concerning the preserving of digital records. Kalusopa and Zulu (2009:105) note that the materials in digital formats are being created and collected without policy guidelines, which makes the digital collections susceptible to being lost, destroyed and stored in an unsafe condition for longer preservation.

According to Sejane (2004:124), there is a need for archival institutions to enact digital preservation policies, which would be able to redress the prevailing issues and challenges facing the preservation of digital records. The formulation of appropriate strategies and policies would help to ensure the maintenance and "retrievability" of digital records over time. Effective policies need to delineate the procedures and techniques necessary for ensuring the accuracy and authenticity of digital records by specifying provisions for quality control, including retention and setting of parameters under which access to digital records can be allowed or denied.

7.2 The issues relating to the preservation digital records

The UKZN archives system faces a number of issues and challenges that impede its ability to ensure the preservation of digital records. The archivists acknowledged that the challenges they are facing include a backlog of un-digitized records that are still maintained in hard copies, shortage of staff, low awareness of digital preservation issues, software obsolescence and shortages of proper equipment. These findings concur with the findings of Kalusopa and Zulu (2009:99) who identify several issues and challenges amongst different institutions concerning the preservation of digital records; for example, insufficient human capacity, lack of skills, lack of proper policies and poor ICT infrastructure.

These findings concur with the findings recorded by Yadav (2016) who lists the problems of constantly changing software and hardware, lack of technical expertise, insufficient funding for digital preservation projects, inadequate ICT infrastructures, technological obsolescence, lack of relevant legislation and the

deterioration of digital media. These kinds of issues all pose a serious threat to sustainable digital preservation initiatives in an institution if the management does not take instant action (Cullen 2003:249).

8. Conclusions and recommendations

In the light of the findings, the study concluded that the UKZN Archives need to source human and financial resources, capacitate the staff members with technological skills and preservation mechanisms in order for them to ensure long-term preservation of digital records in its custody. This will ensure maximum benefits for all the university archives to be able to deal with the digital records. The UKZN archival system is marred by insufficient digital preservation policies and frameworks and a lack of trained staff who are fully equipped to engage in digital preservation. The findings of this study indicate that the university archives have been plagued by digital preservation challenges. The major issues include lack of human resources, insufficient funding for digital preservation projects, lack of ICT skills, poor technological infrastructure and equipment obsolescence.

The UKZN archives deploy cloud computing as a strategy for preserving their digital records. All the archival institutions noted that the creation of backup of their records was sufficient to ensure their long-term accessibility and preservation. As this will ensure a significant aspect of the need to prolong the lives of records and archives for future access and use. This study, therefore, recommends that the positive outcomes will only be realized when the preservation programmes are established, such as the following:

- Considering sourcing external expertise to support the preservation of digital records programmes, and recruiting more human resources equipped with ICT skills. This could be achieved through the development opportunities such as training of staff members through workshops that will lead to career growth.
- Procuring extra funding and necessary infrastructure to assist with preserving digital records. Lack of funds contributes negatively to the development of a preservation programme for digital records.
- The formulation of policies and standards prevents the problems that are bound to occur in preserving digital records in the archives. It is important that the university archives develop a clear policy for long-term preservation of records, which ought to specify the standards

necessary in digital preservation, such as Open Archival Information System Standard (OASIS-ISO 14721:203).

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