

THE ROLE OF TECHNOLOGY IN THE PRESERVATION OF RECORDS IN THE DIGITAL AGE

ORIM, Faith Sylvester

fateorim@gmail.com

Department of Library and Information Science
University of Calabar, Calabar

EDAM-AGBOR, Imelda Barong

imeldakejuo6@yahoo.com

Department of Library and Information Science
University of Calabar, Calabar

&

OLANIYI, Olukemi Titilola

The Library

Federal College of Education (Technical), Akoka, Lagos.

ABSTRACT

The explosion of Information Communication Technology has expanded the scope of information and records creation and the tools of information delivery. The integration and adoption of Information and Communication Technology particularly in the preservation of records at this digital age is now becoming common place. No doubt, preservation of records is necessary as records are memories of the internal and external transaction of an organization. Preservation of record enhances easy access to record when needed for referencing or in an attempt to retrieve information from them. Preservation practice for long time now has been linked with information technology in the areas of production, organization, storage, dissemination, and retrieval of records, using the available technology. On this note, this paper examined the role of technology in the preservation of records in the digital age. It discusses other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to the preservation of records.

Keywords: ICT, Records creation and proliferation, Records preservation and conservation, Digital age,

INTRODUCTION

The revolution which occurred consequent on the development in the use of Information and Communication Technologies has resulted in the availability of such information in documents and records formats. The integration and adoption of Information and Communication Technology particularly in the preservation of records at this digital age is now becoming

common place. This is because many records are now being born digitally. On this note, Anamuah-Mensah and Asabere-Ameyaw (2009) and Osakwe (2012) also observed that record keeping was also enhanced through the use of ICT, hence enhancing productivity and cost-effectiveness.

ICTs are computer-based tools used to meet with the Information and Communication needs of individuals and organizations (Haliso, 2011). They comprise computer hardware and software, network and several other devices (video, audio, photography, camera, etc) that convert information, images, sound, and motion, among others into common digital form (Osakwe, 2012). ICT involves the use networks, hardware and software and media for the transmission and presentation, collection, storage of information (voice, data, text, images) and related services (World Bank, 2007). It is a broad term that has to do with the harnessing of process, the methods and the product of electronic communication related technologies. Other related resources in today's knowledge-driven society, for enhancing productivity, the spread and efficiency of set programme activities are geared towards the achievement of clearly defined goals (Obanya, 2002).

ICT is an eclectic application of computing, communication, telecommunication and satellite technology (Yusuf, 2005). Therefore, ICT can be defined as an electronic device for managing and processing information with the use of soft and hard wares to convert, store, manipulate, protect, transmit, manage, control and retrieve information for the enhancement and productivity of personal and organizational activities. Information Technology coupled with transformation in organizational structures and methods of working have resulted in an increasing amount of information and also to totally new forms of information and in the creation of the record. The records so created and available in large quantities need to be preserved for future purposes. As indicated by Santos (2016), preservation is the set of activities that aims to prolong the life of a record and relevant metadata to improve its value or facilitate access to it via non-interventive means.

As Asunmo and Yahaya (2016) emphasized, the art of preservation is as old as human civilization itself and it may be said to derive from the instinct of self-preservation common to all animate beings. Preservation can be seen as a branch of Library and Information Science that concerned with maintaining or restoring access to artefacts, documents and records through the study, diagnosis, treatment and prevention of decay and damage. No doubt, preservation of records is necessary as records are memory of the internal and external transaction of an organization. Preservation enhances easy access to records when needed for referencing or in an attempt to retrieve information.

No doubt, the advent of information communication ICT has enlarged the scope of records creation and the tools of information delivery (Ridwan, 2015). Preservation practice has long time been integrated with information technology in the areas of production, organization, storage, dissemination, and retrieval of records using available technology (Abdulrahman, 2015). This paper focused its discussion on the role of technology in the preservation of records in the digital age. It discusses other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to preservation of records.

LITERATURE REVIEW

In this current information society, there are important functions in the society such as the issuance of national identity, national registration. All of which have to be accessible for long periods. In the absence of authentic, accessible, searchable, and reliable records, these functions are practically impossible to maintain (Asproth, 2007). The implication of technical developments and the transition to electronic media is that traditional methods have dated or least inadequate. Access to the relevant information is essential in a democratic era. The increasing rate of public electronic services implies that there will be an improvement in the amount of document and information coming in to or being created by the authorities, which will be in electronic form. This information must be managed and stored by the authorities and at a later stage be sorted out or transferred to long-term archives. Viewed this in terms of longevity, it is also essential that these electronic records are preserved as a cultural heritage and collective memory of human engagement.

Preservation of Records

The term preservation refers to the passive protection of archival materials in which no physical or chemical treatment to the item occurs (Vasanta, 2015). Viewed from the archival perspective, preservation is the totality of processes and operation involved in the protection of records and archives against damaged or deterioration (Mutero, 2015). Four related activities are involved in preservation. These are maintenance, examination, conservation and restoration.

Maintenance: This activity involves the daily care of records and archives, essentially in the current and semi-current records environment, when they are kept in offices or records centres (Kootshabe & Mnjama, 2014).

Examination: This involves the preliminary process of taken to determine the original materials and structure of an item and to determine the extent of its deterioration, alteration or loss (American Institute for Conservation of Historic and Art and Artistic Works of Arts AIC and ICOM- CC, 2018).

Conservation: This activity involves the intrusive protection of archival material by the minimal physical and chemical treatments necessary to resist further destruction which will not negatively affect the integrity of the original (Mutero, 2011).

Restoration: This activity has to do with the repair of the document when aesthetics and reproduction of the original appearance are more vital than the preservation of the integrity of the item (Vasanta, 2015). However, is not viewed as an archival activity.

Records whether or not they are properly maintained, examined, conserved and restored, there are associated issues, particularly in this digital age. These are discussed in the next section.

Issues with Preservation of Records at the Digital Age

As stated by (Kumar, 2012), if we assume that libraries are able to build and/or acquire some types of digital collections, there remains a significant challenge inherent in preserving these collections. Pre-digital libraries have had to worry about climate control which is time

consuming and the de-acidification of books which is costly, but the preservation of digital information proffer solution to these two problems. For example, digital storage is delicate with a limited shelf life. However, the digital information on those storage media, even if they do survive will be rendered unreadable by the fact that as information technology evolve, older systems erode or fade away taking with them obsolescence of technology the ability to read the information they managed. To preserve digital information, digital libraries will continually have to “migrate” information from one digital hardware and software configuration to another. The Report of the Task Force on Archiving of Digital Information suggests that "rapid changes in the means of recording information, in the formats for storage, and in the technologies for use threaten to render the life of information in the digital age as, to borrow a phrase from The Digital Library: Myths and Challenges (Asproth, 2007).

At the digital age, there are many challenges associated with the preservation of electronic information that needs to be solved. Organisational, legal and technical are issues of concern (Asproth, 2007).

Technical issues

Issues at stake in this domain are of various entities. The huge amount of electronic record requires storage for active use and in turn demands new mass storage media (Asproth, 2005). Fragility is another problem of the media which lead to low durability. There is also lack of knowledge pertaining to durability of different media for storage. Furthermore, poor security exists for many electronic files. The software problem concerns the rapid development of new versions of the software product and occasionally change over to new software products. Additionally, the software is not always accurate for the purpose (Kumar, 2012).

Legal issues

Several issues other than legal have an impact on digital preservation particularly access to archives. Data protection –Human Rights and Act- Freedom of Information – Defamation – Access for Disabilities. Digital preservation is often a grey area not understood or considered by legislators. Lack of legal certainty prevents digital preservation actions (JISC, 2004).

Organizational issues

Many of the challenges associated with digital preservation are organization and not technical. The argument against the loss of valuable information rests with the creators, providers, and owners of digital information (Kumar, 2012).

Context and Metadata

A number of questions surround the metadata issue. For instance, how is it going to be possible for anyone in the future to understand the context of the information and the procedures involved in creating it? There is another question considered to be of great importance, this is how can we determine the amount of evidential historicity required and how do we capture and retain it? The place the metadata should reside (in the digital information system, in paper form or both)? Notably, document consists of both medium and content. Paper is the medium

of the paper bound documents and with virtual documents, it is now the metadata which forms the real medium (Asproth, 2007).

Additionally, (Yaya, Asunmo, Abolarinwa, Onyenekwe, 2015; Asunmo and Yahaya, 2016) pointed out that preservation and conservation of archives and records are faced with a number of challenges especially in developing countries like Africa where information communication technology is being incorporated little by little into every sphere of information science operation. Parts of the challenges according to (Yaya et al., 2015; Toyo, 2017) are:

Changes in Hardware and Software: Incessant changes in hardware and software create huge pressure on archival institutions due to preservation of digital archival collections centres on the interim mechanism for storing the digital information, migration to new form and enabling long term access. One of the pressing issues confronting the durability of digital collection in third world countries is not only the storage media dilapidation but the challenge of rapidly changing storage devices. Unlike analogue information which places emphasis on the preservation of physical artefacts, it is the informational contents of the digitized materials that are preserved. It will, therefore, take a conscious effort of archivists in Africa and other developing countries in the world to make sure that the digital information is preserved since changing in software and hardware is creating problems for staff working on digital durability (Besser, 1999:22; Decker, 2015:17).

Inadequate Funding: Digital projects are expensive. Digitization of records requires huge funding as a result of the constant software and hardware upgrading, and rapid hike in the cost of subscription to electronic databases that make them be easily accessed by information seekers worldwide (Jain, 2012).

Computer Phobia: As a result of the inadequate skills in information technology in Africa, many information practitioners including traditional librarians, record keepers and archivists are conservatives and have a phobia for computers. Due to the generational gaps between the new and old professionals, computers are seen as a challenge to their status as experts (Rothman, 2013). Thus, they find it difficult to cope or measure up with the requirements of the electronic/digital age, and hitherto too reluctant to forgo the old practices for new ones (Ojedokun, 2008). Successful integration of information handling technologies in developing countries demands an ability to conquer staff and personal resistance to such innovation.

Technical Expertise: One of the stringent challenges to preservation and conservation of records in the developing nations is educating the record keepers in the community on the best way to handle records. This problem is compounded because the preservation of records is not at the centre of most curricula. Like in the Nigeria case, there are few places where one can receive formal specialized education in preservation and conservation of archives and records. In addition, inadequate technical expertise is common in African countries (Adeyemi, 2012).

Shortage of Personnel/Human Capital: The limited number of librarians that have basic knowledge in computer science and its applications work in archive and records units. Therefore, the result is frequent break down of ICT facilities and disruption of services in digitized records units. In most African countries, human resources with appropriate skills, competencies and attitude are not readily available to inaugurate, integrate and sustain

digitization project and most Africa nations are still lagging behind in technological and telecommunication infrastructure (Otebulu & Ume, 2015, Toyo, 2017).

The paucity of Technological Infrastructure: Constant power outage is one of the serious challenges to digitization in Africa. This has negative effects of damaging digital/ICT equipment and where there is standby alternative power generation, the cost of running them is unbearable. In furtherance to this is the harsh environment of Sub-Sahara Africa which is not always friendly with technology equipment. As reported by Zulu (2008), most African countries do not have adequate and reliable supply of electricity which consequently makes it impossible to maintain a conducive and sustainable technological environment suitable for digitization project in the continent. Similarly, telecommunications infrastructure in most Africa countries are either inadequate or poorly developed and some Africa nations have modern digital and packet switching telecommunications facilities needed for data transmission.

Technological Obsolescence: The continuous changes in computer hardware and software cause technological obsolescence which is a challenge to digitization and records preservation in Africa. It causes the loss of the means to access information in digital form. Technological out-datedness is caused by continuing upgrade in operation systems, programming language application and storage media. It is on this note that, Alegbeleye (2009) was of the view that digital archives should be transcribed in every ten to twenty years to guide against technological obsolescence.

Lack of Legislation/Policy: Many African countries do not have policy or legislation in place that guides the management of records and information. On this note, Wamukoya and Mutula (2005) observed that legislators in Africa are neither aware of nor conversant with the requirements of digital preservation and for that reason, they either ignore or inadequately cover digital preservation issues. The internet links is also a challenge to digitization due to copyright legislation. The copyright of software needed to access digital files, and the right to copyright for preservation has not been seriously implemented in most national legislation, and if permission for digitization cannot be obtained, digitization of such materials should not be processed.

Although many authors (e.g. Asproth, 2005, 2007; Kumar, 2012) emphasised that challenges are not only technical but other issues (organizational, legal and context) are as important as there has been little progress in this area.

Initiatives on Records Preservation across the World

A few research projects and initiatives are available that focused on the long-term preservation of electronic information and records, although they are generally dealing with overcoming challenges rather than systematic knowledge development (Asproth, 2005). The more important project/initiatives include:

InterPARES

The most common research project or initiative is the International Research on Permanent Authentic Records in Electronic Systems (InterPARES), which aims at development the

methodological and theoretical knowledge necessary to the durability of preservation of vital records created and/or maintained in digital form (InterPARES, 2018). This knowledge should provide the basis from which to formulate model policies, strategies and standards capable of ensuring the durability of such materials and the capacity of its users to trust its quality. At their fourth phase, InterPARES IV (2013-2018) deal with issues of authenticity, delves into the issues of reliability and accuracy from the perspective of the entire life-cycle of records, from creation to the archives where they are permanently kept and preserved. It addresses issues on records produced in complex digital environments in the course of artistic, scientific and e-government activities.

CEDARS

The actual purpose of CEDARS (Curl Exemplars in Digital Archives) project was to address strategic method and practice issues and provide guidance in the success stories for digital preservation. However, as indicated by Cedar (2002), the project was completed in March 2002.

CAMiLEON

The CAMiLEON (2003) with the full meaning Creative Archiving at Michigan and Leeds: Emulating the Old and New project is concerted effort undertaking by the University of Michigan (USA) and Leeds in the UK, funded by the Joint Information Systems Committee (JISC) and national science foundation (NSF). This initiative had the purpose of exploring the alternatives for long terms retention of the real functionality and look and feel of digital objects, to examine technology emulation as a long-term strategy for long term preservation and access to digital objects, and to consider where and how emulation fits into a suite of digital preservation strategies.

NEDLIB

NEDLIB (Networked European Deposit Library) is a collaborative project of European national libraries. Its purpose was to construct the basic infrastructure upon which a network European deposit library can be built. The objectives of Nedlib concur with the mission of national deposit libraries to ensure that electronic publications can be used now and later (The NEDLIB project, 1999).

MINERVA

Ministerial Network for Valorizing Activities in Digitization) Web preservation project was initiated to a broad program to collect and preserve primary source materials (Arms, 2001). A multi-disciplinary team of library staff representing cataloguing, legal, public services, and technology services is studying methods to evaluate, select, collect, catalogue, provide access to, and preserve these materials for future researchers.

PANDORA

The overall purpose of PANDORA with the full meaning (Preserving and Accessing Networked Documentary Resources of Australia) project is to develop and implement

processes for the capture, archiving, and provision of long-term access to electronic publications of the Australians selected for national preservation (National Library of Australia, 2013).

VERS

VERS is otherwise known as the Victorian Electronic Records Strategy) offer a solution to the problem of capturing, managing and preserving electronic records. VERS is model for standards, guidance, training, consultancy and implementation projects which focused on the objective to reliably and authentically archiving electronic records (Public Record Office Victoria, 2018).

ERA

The Electronic Records Archive (ERA) have the purpose to be a comprehensive, systematic, and dynamic means for preserving virtually all kind of digital records, free from relying on any specific hardware for software (National Archives, 2016).

Methods of Preservation of Records with the use of ICTs

Due to the advent of ICT, a number of preservation methods of records have now been invented. While some are currently fading out, other new ones are emerging. Some of these methods include but not limited to: Photocopying using photocopying machines, controlling pollution using air filter systems to save Images of materials from fading or dirtying by pollutants, controlling light using devices like lighting with bulbs removed or filters over lights and using a camera to measure light levels controlling temperature and relative humidity using various monitoring technology including thermo hygroph, writing hygrometer, thermometers, digital reproduction using digital media, including optical disks, CD-ROM disks, reprography using devices such as reader-printer, rewind bench, splicer microfilm, microfiche, micro film reader and so on. Others that are worthy to mention are:

Sensing Technologies: They are the equipment that collects data or information translate them to a form that can be understood by computer. These sensing technologies are sensor, scanner, keyboard, mouse, electronic pen, touch or digital board, bar code or reader, voice recognition system and others.

Communication Technologies: These are facilities that allow records to be transferred from the source to the user. They are used mostly to overcome challenges of records/information transfer such as speed and distance. Examples of such equipment are facsimile machine (fax), telecommunication system, telephone, email, internet, teleconferencing, and electronic bulletin boards, among others.

Display Technologies: They referred to as output devices that constitute the interface between sensing, communication, technologies and users. Examples are computer screen such visual display unit (VDU) or monitor, printer, television and others.

Analysis Technologies: They are technologies that assist in querying of data, records analysis, in-depth query for answers from simple to complex phenomena in research procedures.

Storage Technologies: They are technologies that facilitate efficient and effective storage of records, the information in a form that can be easily accessed. They are magnetic tapes, disks CD-ROMs, Optical disks, cassettes and others.

Other methods that are not ICTs inclusive but not limited to (Kumar, 2012) are Testing of P.H using testing paper and P.H pen so as to find the acidity of the information material so as to find the favourable condition for its storage, avoiding bad management habits like leaking figures when opening documents underlining should be avoided, fumigation that is treating documents with toxic chemicals to per cent insect monitoring light levels.

Fundamentally, Ojo and Ugwuanyi (2006) highlighted various types of ICT facilities used to enable the preservation and management of records. They include but not limited to:

Websites: Websites are a collection of related web documents that web servers make available to the users (public). Websites contain index page or home page displayed as users enter the site.

Email: Otherwise known as electronic mail. This is usually accessed through the internet and provide an instant way to send or receive correspondence.

Compact Disk: Read-only memory (CD-ROM): CD-ROM is an optical-disk used to store recorded text, graphics and sound such as music CDs. CD-ROM is a read only disk. Read only disk implies that the manufacturer cannot be written to or erase the user. It can store as much as 650 megabytes of data which is equivalent to 300,000 pages of text.

Internet: This referred to as the interconnected computer networks. One of the most prominent ICT facilities in the digital era. Internet services are usually on the airwaves and can only be downloaded by a local carrier or internet service provider. It contains information on nearly everything and varieties of knowledge are available through it. These are of permanent values and can be accessed anytime they are needed.

In other words (Chidiobi, 2015) emphasized some importance of ICT in the record management and preservation indicating that it is helping in promoting and maintaining standard and quality work at a higher level of time compare to traditional labour, it saves cost, time and labour and increases efficiency and productivity.

CONCLUSION

This paper has been able to discussed issues relating to the role of technology in the preservation of records in the digital age. The paper addressed other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to the preservation of records. It is evident that most organizations are not adopting ICT facilities to a great extent in record management and preservation. It should be noted that managing records manually will not yield any positive results because preservation demands clear strategies, workflow and organizational structures, standards and common metadata, new competencies as well as cooperation of numerous professions from traditional preservation management to computing science. Therefore, it is the right time for library and information scientists, informatics and computer science researchers to address the issue of electronic

information preservation more importantly. All of these are interconnected and imply that a crucial strategy is needed in order to preserve records in this digital age.

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