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CONTENTS

TECHNOLOGY FACILITATED BEST PRACTICES IN DIGITAL PRESERVATION MANAGEMENT: THE EXPERIENCE OF KENNETH DIKE LIBRARY, UNIVERSITY OF IBADAN, NIGERIA

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Abstract

Digital preservation is a global phenomenon and current trend that guarantees the maintenance of information contents. Libraries should be particularly concerned with digital preservation because digital resources of different types are increasingly becoming parts of their collections and as such need to be preserved for wider visibility, access and posterity. Kenneth Dike Library (KDL), University of Ibadan, Nigeria over the years has developed sets of best practices that have made digital preservation a success. Therefore, this paper discusses the facilities and processes put in place in KDL that ensure effective management of digital information contents that other universities could learn from. In addition, the paper also highlights the challenges of digital preservation that are peculiar to the Nigerian environment. The paper suggests that funding digital preservation project should be given the topmost priority. Other suggestions include: acquisition of modern digital preservation equipment, employment of more staff, development of staff expertise and exploration of other sources of electricity supply.

Keywords

Digital preservation; Academic libraries; Management; Technology application; Kenneth Dike Library

Introduction

Libraries are established to acquire, process, disseminated and preserve information resources. Libraries attend to physical and online users' information needs. They also play a prominent role in digital preservation of resources for posterity and wider visibility. The role of libraries especially academic, research and special libraries cannot be overemphasised in the area of the visibility of their institutional outputs that enhances web ranking. Libraries functions ensure that users' information needs are satisfied at every point in time. Information resources have been in print for decades before the advent of electronic information resources, yet the contents are still relevant till date. Print information resources go through different stages such as manuscripts writing, reviewing, designing, editing, typesetting, printing, collating and binding among others before it is published. Print collections over years seem to face natural and artificial threats which may deny potential users access to their contents. Room temperature of print information resources when high or low could make the materials weak and brittle. Another natural threat to print collections is flood. It is possible for a library to be flooded and this could lead to loss of both the print information resources and

other facilities in the library. Conway (2010) recalled the ensued case of 1996's Italy flood which destroyed information resources such as art works, manuscripts and books of value in their museums, libraries and individual information resources collections.

Artificial ways by which print information resources and other information sources could be affected include fire, infestation, rodents and mutilation. Library information resources can be lost to fire outbreak which could turn such materials to ashes. In terms of rodents attack, print materials could be eaten-up, vital information are deformed and destroyed. Mutilation could occur if users tear some pages of a book off which eventually destroys the entire book. However, in order to forestall these threats and to add value to information provision and access, information technology is deployed.

In addition, information resources availability, access and use are vital to decision making, research and development. It is paramount that potential users get access to information resources needed at any time, in useful format and at physical or virtual location. Distance should not be a barrier to access to information resources needed for use. Users should be able to access and use information resources at the comfort of their geographical zone with the aid of Information and Communication Technology (ICT). It is against the backdrop that there is need for the deployment of digital preservation management with the application of technology to provide best practices at Kenneth Dike Library (KDL), University of Ibadan, Nigeria.

Overview of digital preservation

Globally, digitisation and preservation have been embraced for different purposes varying from posterity, multiple users' access and use at the same time, showcasing the values of an institution, partnership and collaboration. Matusiak & Johnston (2012) posited that digitisation is the act of conversion of traditional resources to digital format for preservation purpose. They also opined that digitisation is a means of long-term preservation of information resources master files. The expansion and innovative initiatives unveiling itself as a result of digitisation are expanding the purpose for which digitisation was initially intended. Matusiak & Johnston (2012) stated that the ideology behind digitisation from inception was to create surrogates for access and reproduction.

Digital preservation entails deployment of technology to preserve information resources for posterity, wider visibility and access without infringing copyright law. Print and born-digital (electronically published) information contents should be preserved for present and future potential information users. Many information resources contents are in paper format and needed to be transformed to digital format for wider visibility, access and use. Witten & Bridge (2003) defined digitisation as the process of converting contents of physical information resources to computer readable format.

In the same vein, Fatoki (2007) submitted that digitisation could actualise transformation of traditional forms of information resources to digital formats with the aid of computers. She further posited that such act would enhance African local contents development. However, it should be noted that as technology evolves, rapid development unfold itself which brings about born-digital or born-electronic information resources. This

development has led to explosion of information resources which requires preservation for posterity, visibility and access. Ilabunmi (2013) submitted that application of technology in higher education would enhance education for development. Amaoge (2015) posited that purpose of digitisation is to prevent content of physical information resources for longevity and wider access.

Digital preservation at Kenneth Dike Library (KDL)

Kenneth Dike Library (KDL), University of Ibadan, Nigeria was established seventy (70) years ago. Since inception its collections in terms of information resources acquisition through purchase, gift, endowment and deposit have continued to grow. Majority of the information resources are in paper format which are prone to mould as a result of temperature level, rodents, mutilation, theft, flood and fire attacks. KDL over the years have been managing information resources of estimable values such as rare collections, manuscripts of Nigeria's past heroes such as Funmilayo Ransome-Kuti, Bishop Akinyele, newspaper as far bank 1950 and gazettes among others which cannot be found in any other library. These information resources are being preserved through binding of volumes and issues of periodicals, fumigation of library collections spaces and maintenance of room temperature using fans and air-conditioners. It is borne out of the need to preserve the contents of these estimable values from destruction and the need to increase access to the information resources that the digital preservation management initiative in KDL was initiated.

Kenneth Dike Library (KDL), University of Ibadan, Nigeria in the year 2010 embarked on digital preservation of the information resources such as part of the library's rare collections like manuscripts and other print materials of Bishop Akinyele, and Olufunmilayo Ransome-Kuti among others. Theses and dissertations, lecturers' publications, journals and different lectures such as convocation, inaugural, faculty, public and personality emanating from the institution were also meant to be digitally preserved. In order to achieve this aim, eleven computers, flat bird scanners, unit uninterruptable power supply (UPS) and one terabyte storage device were acquired (Ojo & Ilesanmi 2016). Software such as HP Solution, Adobe Photoshop, Macromedia Fireworks and Antivirus were subscribed to in order to function optimally. The computers, scanners, other hardware devices and software packages were installed and ready for use. Digital Preservation Management (DPM) requires adequate planning and acquisition of necessary equipment and other facilities like hardware and software.

Acquisition of hardware and Software

This is the actual procurement of computers: desktop, laptop, mouse and keyboard. Other hardware acquired were scanners such as Hewlett-Packard (HP) flat bird scanners, book drive scanner, cameras and server. Further, printers, UPS, storage devices such as flash, external terabyte devices, CDs and DVDs were purchased to store and preserve digitsed works. The latest additions were the two Mustek A3 scanners.

In 2010, MacArthur Foundation donated the initial eleven systems, ten scanners, one printer and ten UPS to start-of the digitisation initiative at KDL. One of the eleven systems served as storage system and back-up for all

digitised works. Decabod through Journal Archive (JSTOR) donated two cameras and its accessories to support digitisation processes in the year 2011. Moreover, server for managing the Institutional Repository, book drive scanner and two A3 scanners which were the latest additions was procured through Tertiary Education Trust Fund (TETFUND). Storage devices such as external disk, CDs and DVDs were acquired through the university library fund. It is evident that digital preservation initiative at KDL received support from the university and library management, national library development organisation as well as from international bodies.

Software packages are programmes that enable operation system to execute instructions or command given to the system. Majority of the scanners acquired comes with software packages that can automatically perform digitisation exercise. All scanners acquired came with their software packages which enable users to scan to Portable Document File (PDF), PDF searchable Tagged Image File Format (TIFF), and Joint Photography Experts Group (JPEG) among others. However, software was still required to perform task effectively such software are Macromedia Fireworks, PDF Professionals and Adobe Photoshop. These software and Antivirus were subscribed to for optimal performance in the year 2010. DSpace is software that manages and preserves digital information resources and their metadata for effective and easy access and retrieval. It is open source software hence, was freely downloaded from the Internet and installed for use. The above hardware and software were installed and tested by the technical unit of KDL. After certification of the equipment, the digital preservation unit started using them.

The management of digital preservation at KDL involves the following processes: receipt of information resources to be digitally preserved, record keeping, booting of the hardware and software for digital preservation activities, creating of folder for works to be digitsed, digital preservation of works in formats, cleaning of digitised works, optimisation of digitised works for different purposes, generating of metadata with Dublin Core template, quality assurance certification, preservation of digitised works offline and into Institutional Repository (IR), and return of received information resources to source.

Receipt of information resources: Materials to be digitised are received at the digitisation unit. For instance, manuscripts are received from the Special collection unit of KDL for digital preservation. Copies of Inaugural lectures and Faculty lectures delivered are received from the university for digitisation purpose. Similarly lecturers also submit their print collections for digital preservation. Lecturers with born-digital (electronically published) information resources also submit them for preservation. All the aforementioned information resources are received with covering letters from different faculty, department and lecturers stating the purpose of submission which is ultimately for preservation and wider visibility.

Record keeping: Each information resource is checked to ensure completeness of the resources. It has been observed overtime that some of the received resources had one or two missing pages. In fact some do not have source such as where the paper was published and information about where the conference paper was delivered and date. This issue was common

among information resources submitted by lecturers. Hence, their attention was called to it through meeting face-to-face, phone calls and emails to gather necessary information to represent the bibliographic details of such information resource.

Booting of the systems: The computers, scanners, UPS are put-on to facilitate the digitisation of the information resources. These facilities are shut down after use. In cases where government electricity supply faltered, the UPS served as a support to finish the work at hand.

Creation of folders: Folders carrying the name of the works to be carried out are created. For instance, lecturers' faculties are identified. The faculty name will serve as the parent folder. There will be sub-folder for each department inside the faculty folder. Sub-sub folder on each lecturer is created and their digitised works stored against their names.

Digital preservation of works in formats: Received print resources are converted to digital format using computer, scanner, and camera where deem fit. Traditional library resources such as manuscripts and print collections are digitised into PDF, TIFF, JPEG and other formats with software packages like Macromedia Fireworks, HP solution and A3 1200S Panel. Text and images are digitised to different resolution to cater for preservation and either offline or online visibility purposes. Born-digital word files are also converted to PDF where necessary.

Cleansing exercise: Digitised information resources which were deformed before conversion are cleaned with Macromedia Fireworks and adobe Photoshop software tools to eliminate deformed parts in digital version.

Optimisation of digitised materials: Optimisation is the reduction in file size of digitised materials. Digitised information resources file sizes are optimised to enable fast uploading and downloading of such works into the online platform such as Institutional Repository, LinkedIn, Academia.edu and ResearchGate among others.

Metadata generation: Bibliographic information of digitised materials is obtained from the materials using the 15 fields of Dublin Core schema. Some of the fields are author, date, title, International Standard Serial Number (ISSN), language, type and subject among others. It enhances searching and easy retrieval of information from storage devices and online platforms.

Quality assurance: The digitised information resources and metadata are checked, edited where necessary to guarantee accurate information been represented on the metadata template. All pages of a particular file are checked to ensure there are no omission or miss-out pages in the digitised information resources.

Preservation: Preservation means storing of digitised resources and born-digital resources on storage devices and platforms. Digitised work and metadata are preserved into different platforms. Offline storage devices such as terabyte, gigabyte, flash drive, CDs and DVDs are used to preserve digitised information resources. Digital information resources can also be preserved online. There are different types of ways by which digitised information resources are preserved online. They can be preserved in the Cloud. Space is secured in the cloud to preserve digital information resources. Another way by which digital format information resources could be preserved is through organisation's Institutional Repository.

Institutional Repository can be referred to as a central platform that enhance preservation and at the same time make digital format information resources visible widely. These resources could be displayed on the Institutional Repository as open access or restricted access information resources (Ojo & Ilesanmi 2016).

Work flow chart of digital preservation management in KDL

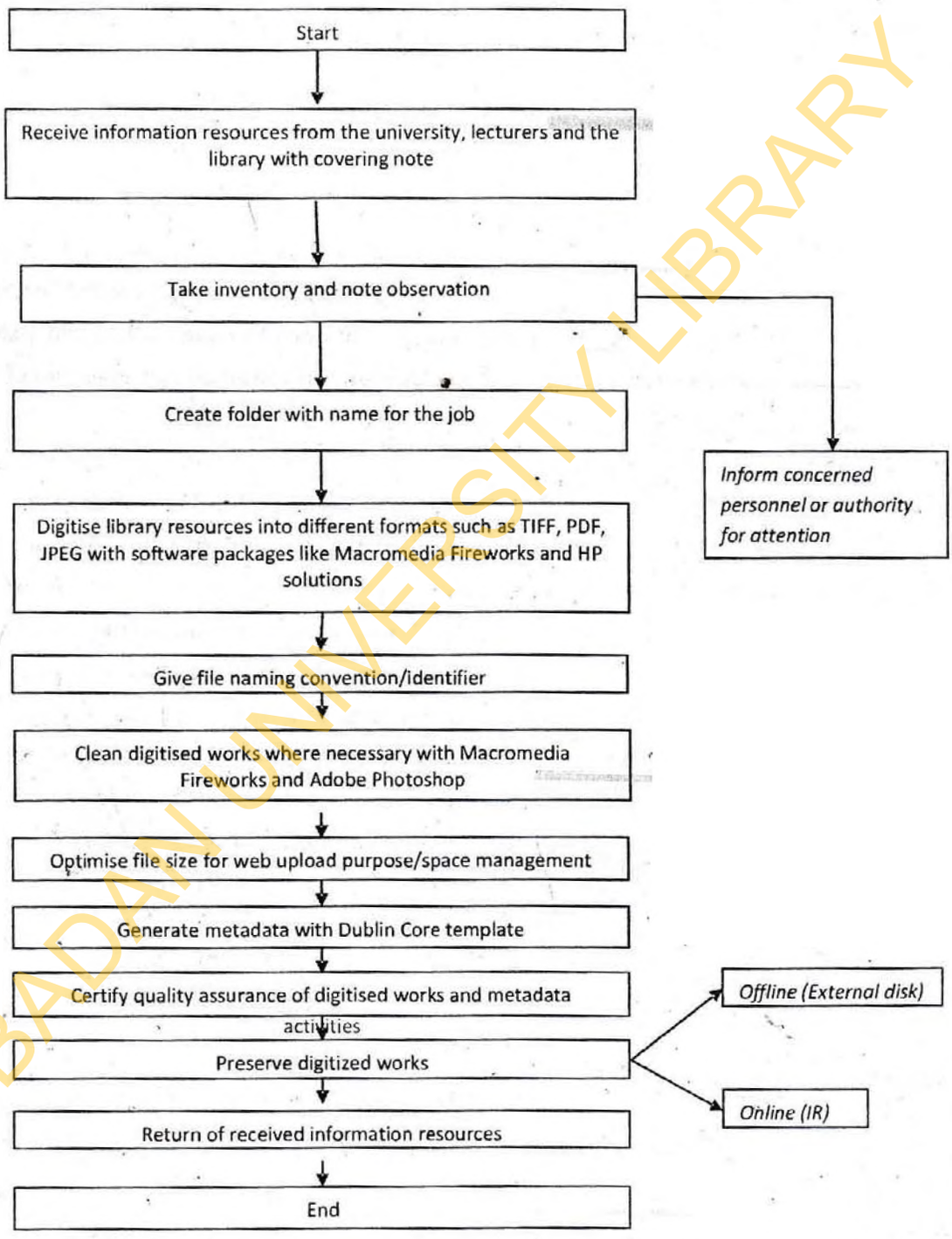

Fig. 1: Self constructed work flow chart representing the process of digital preservation management.

Prospects of digital preservation

Digital preservation initiative at KDL could be referred to as a laudable one. Many intellectual contents in analogue formats such as grey materials, manuscripts and other print collections of great value would be transformed and preserved in digital formats. Digital information resources can be viewed in different file formats such as Word document file, Portable Document Format (PDF), Joint Photographic Experts Group (JPEG), Tagged Image File Format (TIFF) to mention but a few. High and low resolution sizes of digitised works could be achieved through digital preservation. Moreover, contents of digitised works are free from effects of mould, rodents and mutilation.

Longevity of original works is enhanced as there will be reduced or no-contact with the original works but consultation of the digital version would be more in terms of regularity. Digital preservation would enhance simultaneous access and use of the contents of digital resources. Contents of digitised works are showcased beyond the local shore of the authors and publishers domain which have no web visibility. It is worthy of note that digital preservation guarantees easy and quick access to information contents.

Digital preservation would lead to visibility of the intellectual contents of an institution through the institutional repository (Ojo and Ilesanmi 2016; Library Technology Report 2008). As intellectual contents are digitised for preservation, they are simultaneously made available on Institutional Repository platform that is visible to the immediate community and the larger society for their awareness, access and use.

Challenges of digital preservation initiative at Kenneth Dike Library

Libraries in the developed and developing countries have key in-to digital preservation. Its effective management is paramount to longevity, visibility and access to its contents. The following are the challenges faced at KDL as digital preservation initiative is concerned:

i. Inadequate funding: Over the years digitisation initiative has been underfunded. The essential equipment needed for carrying out digitisation activities are lacking. Inadequate funding has denied the placement of necessary modern facilities to work with. Even fixing of the digitisation chamber's air-conditioner since 2012 till date is difficult.

ii. Obsolete equipment: The flat bird scanners that had been acquired since inception of the digitisation initiative have done enormous work but they need replacement as majority of the scanners are in bad condition. Lack of upgrading of information and communication technology facilities could lead to total breakdown of such facilities. Some information resources that needed to be digitally preserved may be running to thousands of pages and would require the deployment of sophisticated scanning machines. There is lack of specialised scanners that can digitise different types of information resources such as feed-in scanners, scanners for handling bound theses and dissertations and fragile information resources among others.

iii. Shortage of staff: Since the inception of digital preservation initiative, only three staff is managing the unit till date. With the years of existence and volumes of information resources needed to be preserved digitally, the staff

strength is small to cope with the tasks of digitisation unit.

iv. *Lack of expertise:* Majority of the staff in the unit lack technical know-how. As the activities involved are dynamic, there is need for time-to-time capacity development to remain relevant on the job. The outcome of the development will enhance staff performance and such knowledge could be pass-on to other staff and industrial training students who undergo the activities of the unit.

v. *Unsteady electricity supply:* Irregular electricity supply is another obstacle to effective digital preservation management. Government electricity supply cannot be controlled by the institution hence, the need for alternative sources of power supply. The library procured two generating sets but problem of regular diesel supply has denied their effective use. An environment where electricity is not steady would negatively affect digital preservation. This is because every aspect of digital preservation largely depends on constant electricity supply. Many times, due to shortage of electricity supply, information resources that needed to be digitally preserved are kept on-hold. In fact, active digital preservation works got lost due to bad state of UPS that could have sustained the process to the end, thus repeating the processes involved.

vi. *Inadequate external storing facilities:* External storage problem is seen as another barrier to digital preservation management. Presently the Digitisation unit has two terabyte external drive for storage purpose. Looking at the digitised works done over eight years, the storage provided cannot cater for digitised work hence need for the acquisition of more storage devices with special consideration for the fire proof type. There is also lack of offsite storage of digitised works.

vii *Problem of Antivirus renewal:* Considering the value of digitised resources, its content should not be toyed with by applying free Antivirus for their contents protection. Yearly renewal of the Antivirus has not been regular and this pose treats to the digitised works and other information on the systems.

Conclusion

Digital preservation is essential especially for university libraries with long years of existence. As a university grows, there is need for digital preservation management initiative in order to preserve for posterity, showcase the strength of the institution and attract collaboration research and partnership. It is evident that digitisation initiative should be sustained through provision of the needful.

Suggestions

This paper suggests the following:

i. Staffing of the digital preservation initiatives should be strengthened. Adequate staff that can cater for the present and future activities should be put into consideration from the on-set.

ii. Alternative electricity supply such as solar energy should be in place to take care of government and generator electricity supply outage

iii. It is of primary importance that equipment such as scanners, computers, cameras and other facilities that serve different types of information resources and aspects of digital preservation should be acquired to enhance productivity. It is necessary that maintenance of the equipment should be carried out regularly in order to ensure

their long time span.

iv. External storage devices for digital resources such as fire proof type that can protect content in case of fire attacks should be acquired to manage digital information resources. Moreover, space should be secured in the cloud to manage digital information resources remotely.

v. There should be adequate budgeting and dedicated allocation of funds to cater for the optimisation and sustainability of digital preservation management initiative.

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