

APPLICATION OF ICT IN DIGITAL PRESERVATION STRATEGIES IN ACADEMIC LIBRARIES

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ABSTRACT

Facilitating teaching, learning and research is the major role of academic libraries, to do so effectively libraries rely on documented information resources born either as print or digital. The paper highlighted the various strategies employed by academic libraries in digital preservation of their scholarly publications by the application of the appropriate information and communication technologies. Identified strategies for digital preservation by academic libraries as highlighted by this paper includes the following, Investment strategies, short-term and long-term strategies. The study identified that re- use of ICT, especially the software component play a vital role in the digitization and preservation of scholarly publications. The paper went further to highlight the Technical Know-How and the ICT requirements in the digitization and preservation of scholarly publications which includes among others, identifying the items to be digitized, pulling the them into loose sheets and digitize, ICT requirements highlighted includes Scanners, Digital Cameras, use of AbbyyFine Reader and uploading the items to DSpace. In conclusion, digitization and preservation of scholarly publications has to deal not only with the maintenance of files but also ways of keeping them accessible bearing in mind the current trends in technology.

Key Words: Digital Preservation, Information and Communication Technology, Academic Libraries.

1.0 INTRODUCTION

The digital Era can be seen as the development of an evolutionary system in which knowledge turnover is very high and increasingly uncontrollable because of the explosion in the growth of information created, disseminated and accessed in digital form.

The use of computers and internet in many universities, research institutions, business, information centres and many other government agencies and parastatals are attributable to the information explosion. The globalization movement has been taken with the seriousness it deserves that is why the policies of the Federal Government of

Nigeria emphasized that information technology resources are readily available to promote efficient national development [1].

Every document is first created in digital form, even if it is eventually published and preserved on paper which is an indication of the pertinence of this format. This assertion is also supported by [2] who stated that administrative or embracing technical, legal, medical and other kinds of information are increasingly created digitally, or converted in to digital form from existing analogue resources. Digital objects are information born digital or those converted from analogue to digital form. Digital objects exists in form of texts,

databases, still and moving images, audio, graphics, software, and web pages among a wide growing range of formats.

Preservation of these digital objects for future re-use is a long time commitment which information professionals must provide to their user communities. For the digital object to be reused, gadgets are however required which comprised of hardware and software for access, use, re-creation and re-used. Brendan and Ifeanyi [3] asserts that due to changes in hardware and software, there is no guarantee that the electronic resources created in previous years using older technologies may be accessible or compatible with the new technologies. This has remained the worry of a digital professional. Digital preservation goes beyond saving digital objects on storage medium and maintaining them against dust, virus, tear and wear.

Digital preservation is the maintenance of digital material for continued accessibility. It can also refer to series of managed activities designed to ensure continuing access to all kinds of records in digital formats for as long as necessary and to protect them from media failure, physical loss and obsolescence [4]. Digital preservation is the act of physically and intellectually protecting and technical stabilizing the transmission of the content and context of electronic records across space and time, in order to produce copies of those records that people can reasonably judge to be authentic [5].

For digital resources to be preserve, the need of digital preservation strategies is very necessary. Digital preservation strategies are approaches taken to safeguard and allow access to digital objects for as long as possible. According to [6], strategy is a general framework that provide guidance for actions to be taken and shaped by the actions been taken. Strategies can be viewed as the steps to be taken for the actualization of

formulated policies. Long term access and future benefits from preserving digital objects may be heavily dependent on implementation strategies put in place.

Academic libraries are at the forefront of providing information services to their respective communities which comprises of students, lecturers, and researchers in order to support their teaching, learning and research needs. Scholars have emphasized on the crucial role of academic libraries in research and scholarship in institutions of higher learning. Sometimes academic libraries are referred to as the heart or nerve centres of institutions of higher learning where all academic activities revolved.

Academic libraries are libraries attached to tertiary institutions such as universities, polytechnic institutions, colleges of education, colleges of agriculture, colleges of technology and also research institutes [7]. Singh and Kaur [8] stressed that preservation and access to knowledge and information is the main mandate of academic libraries alongside supporting the mission of their parent institutions which is teaching and research.

1.1 Implementation Strategies for Digital Preservation

Digital preservation strategies are ways for keeping stored digital objects for long term access and re-use. Implementing a digital preservation strategy is part of managing the risk associated with rapid changes in hardware and software obsolescence. The implementation strategies for digital preservation can be categorized in to the investment, short-term and long-term strategies.

(a) Investment digital preservation strategies

This is usually adopted at the start of a digital object lifecycle which include the following:

Use of standards

This strategy involves the use of preferably open, widely available, supported or agreed standards and file formats, for which there is an increased likelihood of stability and longer term support. Reliance on standards may lessen the immediate threat to a digital document from obsolescence for example; the PDF/A standard had been widely adopted as the standards for long-term preservation of documents due to its omitting embedded scripts [9]. For example the thesis works submitted to the academic library on the compact disc comes in Microsoft word. It is then been copied and converted to portable document format (PDF) in order to lessen threat to digital document make it portable and allow easy access and retrieval.

Normalization

Is a formalized implementation of reliance of standards within an archival repository, all digital objects of a particular type (e.g. color, images, structured text) are converted in to a single chosen file format. For example, images are converted from their original format (such as JPEG) to Uncompressed Baseline tagged image file format (TIFF), and all word processed documents might be converted to Open Document Text (ODT).The representation of content can be liberated from specific software applications and achieved using different applications. Normalization involves migration of digital object from its original software to an open source standard format so that it can be use without having to rely on the original software system used to create it.

Encapsulation

This may be seen as a technique of grouping together a digital object and metadata necessary to provide access to that object. Ostensibly the grouping process

lessens the likelihood that any critic component necessary to decode and render a digital object will be lost. According to [9], encapsulation is a storage technique in which metadata is added to a digital object. Ferreira [10] argues that encapsulation strategy is generally oriented at collections of objects that are expected to remain unexploited for long period of time. In the academic library metadata is attached to digital object that is about to be uploaded just to give a brief description about the work such as the keywords, author, citations, series the creator, the title of the work, the abstract, the publishers and year of publication this is done to allow easy access and retrieval of documents.

(b) Short-term digital preservation strategy

The short-term strategy for preservation is considered to be between 1-5 years. This strategy includes:

Technology preservation

Preservation of the original technology used to create the digital object in order to preserve the look and feel of the product. The technology approach focuses on the technological environment rather than on the digital object. It preserves the original technology used to create the digital object. Instead of mimicking the original environment, it involves preserving the digital object together with the actual rendition system. Rahman and Muhammed [4], posited that access to digital objects requires keeping older technology available for use. This will help future generations to view digital objects in their native format with their original layout and functionality. Creating hardware or software museum is prohibitive in cost, space and technical support requirement.

Refreshing

Refreshing is the process that involves the copying of digital information from one long term storage medium to another of the same type or a newer version (e.g. copying from a decaying tape to a new tape or from an older CD ROM to a new CD ROM) it is therefore seen as the periodic moving of files from one physical medium to another in order to avoid the obsolescence or degradation of the storage medium which could lead to inaccessibility of the materials. Refreshment is the transfer of data between two types of the same storage medium so that there are no changes or alteration of data. Andrews and Law [11] affirms that refreshing only involves the change of storage medium such as the tape, CDROM; removable disk e.t.c. MIT [12] asserted that it is a periodically moving of files from one physical medium to another in order to avoid obsolescence or degradation of the storage medium.

(c) Long-term digital preservation strategy

Migration and emulation are the two strategies for long –term digital preservation strategy:

Migration

Migration is the process of transferring data or digital objects from one computer format to another format in order to ensure access to the digital object using new technologies. Digital preservation is concerned with ensuring that records which are created electronically using today's computer systems and applications will remain accessible, use able and authentic when the applications and systems which were used to create and interprets the records will no longer be available. Ferreira [10] describes migration as the periodic transfer of digital materials from one hardware/software configuration to another or from one

generation of computer technology to subsequent generation. Migration is the copying of digital information from a medium that is becoming obsolete or physically deteriorates to a newer one, converting from one format to another and moving documents from one platform to another. The aim of migration is to change the object in such a way that hardware and software developments will not affect its accessibility. This includes content migration, which transforms data from a source format in to a target format, and media migration from one digital medium to another (either a digital or non digital) medium [13]. An example of migration process in the library is the moving from the use of an old hardware to a current one for example copying an event from one generation hardware to another e.g from diskette to CD and also from an old software to a current one for example migrating from windows operating systems to linux and to dspace or from word to Adobe .This is done in order to allow continuous access to digital object.

Emulation

Emulation strategy seeks to combine the software and hardware to provide in all essential characteristics the performance of another computer of a different design allowing programs or metadata designed for a particular environment to operate in a different environment usually newer environment. It requires the creation of emulators, programs that translate code and instruction so that it can be properly used in another. International records management trust [14] states that emulation is the process of using a computer device or software program to imitate the behaviors of another device or program, thereby obtaining the same results when accessing or using the digital objects. An emulation strategy uses the software or hardware called emulator to

recreate the functionality of obsolete technical environments on modern computer platforms. However emulation allows access to the original object as though it were still housed in its original computer environment. For example, special software can be used on a present day personal computer to produce exactly the appearance and behaviours of a document such as presentation that was created on an older computer using software that is no longer in use. Proponents of emulation strategies argue that emulation delivers the most authentic possible rendition of a digital object. Critics of emulation on the other hand express concern about the significant technical challenges involved in developing emulation technology as well as the difficulty of establishing whether or not in the end the user is left with complete authentication recreation of the original object. In the library, emulation has to do with upgrading an old hardware or software to be compactable with the current one in use for example moving from Abbyy Fine Reader 8.0 edition to a newer version of 11.0.

1.2 Processes Involved in the Digitization and Preservation of Scholarly Publications

Before embarking upon a digitization task, it is pertinent to note the ICT gadgets that are requisite for a digitization project. The paper categorized the requirements into the following.

2.0 REQUIREMENTS

2.1 Hardware Requirements:

- Scanner e.g. Xerox Documate 752
- Computer with a very good screen Resolution e.g. HP Compaq
- Digital Cameras e.g. Nikon

2.2 Software Requirements

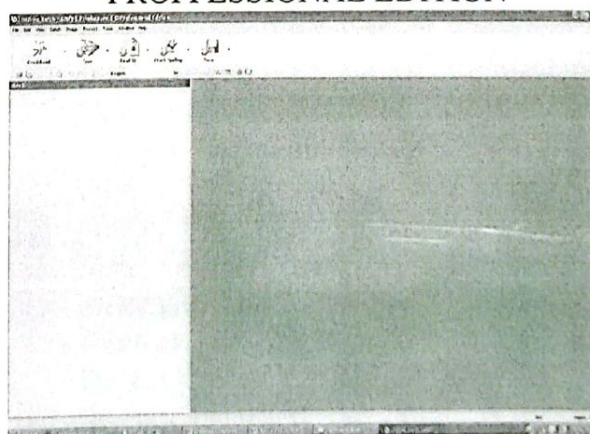
- AbbyyFineReader 8.0 Professional Edition. This is used for the Optical Character Recognition.
- Nitro PDF Converter. This is used for converting documents that are born digital but not in PDF format.
- DSAPCE. This is the Content Management Software.

2.3 Personnel

- Trained persons in the aspect of digitization preservation.

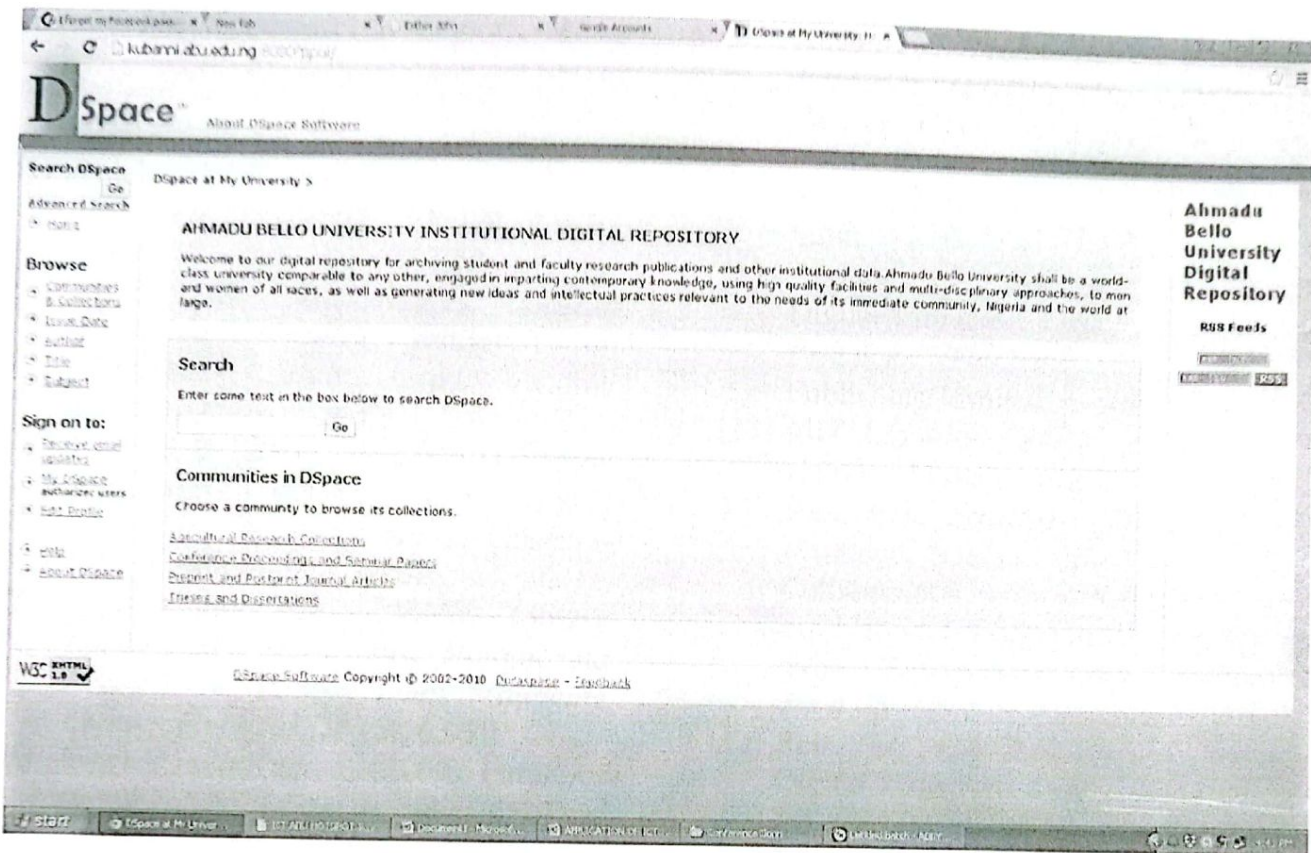
The following are the steps involved in digitization and preservation of scholarly publications:

- **Step 1**
 - Identify the items to be digitized and preserved.
- **Step 2**
 - Pull the Items into loose sheets
 - Load them into the Automatic Document Feeder of the scanner
- **Step 3**
 - Scan items using an Optical Character Recognition Software e.g. ABBYY FINE READER 8.0 PROFESSIONAL EDITION



- Save items into Portable Document Format
- **Step 4**
 - Slot CD-ROM containing scholarly publications into the computer
 - Convert files therein into PDF.

- **Step 5**
 - Upload items into the Institutional Digital Repository using DSPACE as the content management software.



3.0 CONCLUSION

Preservation of digital object dealt with the maintenance of files and ways of keeping them accessible using specialized equipment. Federal government of Nigeria promote efficient national development and also promote the wide spread access to advanced communication technologies and services. Digital preservation is the act of physically and intellectually protecting and technically stabilizing the transmission of the content and context of electronic records across space and time. Strategies for digital preservation encompass investment, software, short-term and long-term strategies for the actualization of formulated policies on digital objects generation, preservation, maintenance and use.

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