

Perspectives in Preservation of Digital Materials in Libraries: Skills and Competencies

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ABSTRACT

This paper discussed the perspectives in preservation of digital materials in libraries: competencies and skills in relation to the concept of digital preservation, competencies and skills of the library staff, challenges in the preservation of digital materials and the digital preservation strategies for future prospect of the library digital materials or resources.

Keywords: digital preservation, digital materials, libraries, skills, competencies

INTRODUCTION

The emergence of Information and Communication Technologies (ICTs) has transformed the global information infrastructure leading to the growth of digital resources and fast communication facilities, thus, digital technologies introduced new and improved processes of production, distribution and storage of information. As a result of this development, in order to cope with the present development in Information Technology (IT), libraries are now adopting various electronic resources for its collection developments to fulfill the requirements of different users in a better way. Libraries are focusing on capturing, processing, storing and disseminating information in digital form. Information in digital form is accessible by the use of computers, phones and other devices. They constitute the digital materials which are termed “born digital” or converted into digital files. Born digitals are referred to materials that originated in digital form, for example web pages, pictures taken with a digital camera etc.

To ensure the continued survival of the materials in a way that they survive in a usable form despite changes in technology, it is critical to organize and preserve the digital assets for future research and education. This is the major goal of preservation for both digital and traditional materials. In the words of Ghosh (2015) stated that preservation is concerned with ensuring that collections survive in usable condition for as long as they are needed. Tyagi (2013) opined that preservation is an umbrella term for activities that reduce or prevent damage to extend the life expectancy of collection. He further differentiated preservation from conservation; where the latter refers more specifically to the physical treatment of individual item. The library has continued to evolve over the years from the traditional closed access to the automated, electronic and digital open access libraries (Nworie, 2019). Previously, the library used to house mainly printed materials, but in digital era of ever evolving ICTs, electronic and digital resources have become the central concern of librarians who want to adequately satisfy the library users. Libraries are migrating from the traditional setting to digital libraries. Currently, most libraries are made up of both print and digital collections, services and infrastructure to support lifelong learning, research, scholarly communication as well as preservation and conservation of the recorded knowledge. The digital materials make up the digital libraries.

Concept of Digital Preservation

Information is becoming more and more in digital format as a result of advances in IT. Although despite the

undeniable advantages that information in digital form has, it is prone to significant threat for long term accessibility. The major goal of preserving information in digital materials is to maintain the ability to display, retrieve and use digital collections despite the threats. In other words, digital preservation is all about the preservation of digital documents for future use. Digital media are dependent on the availability of software and hardware through which the content can be read, so long-term preservation is now conceived in terms of continuous refreshment of selected files so that they are compatible with currently available equipment and systems.

Digital preservation is one of several activities that are carried out as part of the records management function. Digital preservation is not simply a process of capturing digital records and holding them in a digital repository. It must be carried out in relation to well-run records systems. Otherwise, the records and the connections between them

cannot be preserved systematically, and much of the meaning will be lost, even within a short period of time (International Records Management Trust, 2016). In another view Rieger (2018) offered that digital preservation involves the management and maintenance of digital objects to ensure the authenticity, accuracy and functionality of content over time in the face of technological and administrative changes.

The term digital preservation is the process to store the information assets in digitized form that never existed in print or analogue form as well as those converted from printed documents or physical objects into images using scanners, digital cameras, or other imaging technologies for preservation purposes for the future users (Hazarika, 2020). Furthermore, it is the activity of selection, storage, conservation and preservation of information, which is available in different formats for the access of future generation and provides longevity to the digital content. Generally, digital preservation is defined as long-term, error-free storage of digital information, with means of retrieval and interpretation, for the entire time span the information is required (Darhmingliana, 2019).

COMPETENCIES AND SKILLS IN PRESERVATION OF DIGITAL MATERIALS

Competence is the “demonstrated ability to apply knowledge, skills and attitudes to achieve observable results”. Hence, a competence is not a skill; on the contrary, a competence embeds skills. Whilst competencies are holistic concepts, skills are precise and definite abilities, either hard technical, e.g. make a cost/benefit analysis, develop user interfaces; or soft, e.g. deploy empathy to customer needs and negotiate contract terms and conditions (European e-Competence Framework [e-CF], 2014). Job profiles typically combine several competencies, and one single competence may be assigned to a number of different job profiles. A core idea in this context is that competencies can be grouped by areas (plan, build, run, enable, manage) and can be categorized by proficiency levels, ranging from the ability to apply knowledge and skills to solve straightforward problems to the overall accountability and responsibility, and to solve critical problems in an innovative way.

Librarians manage different types of published information and data, and also curate a wealth of information that awaits further exploration and exploitation based on digital methods and tools. To step up skills and competencies of librarians and to some degree research staff, several initiatives have looked into specific areas, e.g. open science, research data management, digital curation, digital humanities, eResearch, data science, etc. (Burdick et al., 2012). Some of these initiatives focus on professional training; others target the development of higher education curricula and explore how librarians can contribute. However, how do we get it done, what skills should be involved? In this digital era, where most of the services provided in all sectors of the economy are now available digitally, where the library is not an exception, with some level of skills and competencies require for effective and efficient service delivery. Therefore, there is the need to re-emphasize some skills and competencies for effective preservation and management of digital materials in our libraries.

Keith (2013) opined that, in order to preserve digital materials on a scale commensurate with mass storage capabilities and in formats that are accessible and usable, it is necessary to articulate some basic requirements from the perspective of the user of digital material and from the view of the library that assumes responsibility for the maintenance, preservation and distribution. Libraries will not accomplish their preservation mission if they do not satisfy the requirement of their users by preserving materials in formats that enable the types of analyses that users wish to perform thus:

1. Initial grant funded digitization projects often enhances technical infrastructure and skill sets in an institution. This includes the use of metadata articulating the provenance of a document and its publication record (Pandey & Misra, 2014). Digitization has increased the scope of librarians' work, adding new challenges and opportunities driven by the continuous changes in technology. This includes the increasing demand for qualifications in digital technology, management and communication skills (Choi & Rasmussen, 2009).
2. Current digital librarians often need web page design experience, internet searching expertise, and effective communication skills.
3. ICT skills and training of staff in preservation of electronic information resources. This entails acquiring new skills and regular training of staff in preserving e-materials. Mloi and Mutula (2007) argued that there is a need to regularly upgrade staff in order to keep updated with the technological advancement as a result of rapid changes in the IT world.
4. Digitizing materials would not be a valuable endeavor without comparable investment in describing them with metadata that aids users in discovering and using the digital objects. Metadata competencies require an understanding of recognized standards, the ability to interpret and apply them and an awareness of metadata mobility including: reusability, interoperability, and flexibility for migration or transfer. Developing a project plan that includes metadata approaches is essential in scoping project work and resources.
5. Skills and competencies in migration, emulation, maintenance and bit level preservation techniques
6. Digital Capture, whether it is done in-house or outsourced to a vendor, competency in digital capture (digitization in the most specific sense) is the key. This competency requires considering the materials to be digitized, how they will be displayed, and how long-term access will be provided to the digital objects. Working in-house, technical mastery is not required, but it is necessary to have a solid idea of what hardware and software capabilities are, as well as whom to consult should difficulties arise.
7. Competency in digital asset management goes beyond identifying the storage capacity necessary for a project. Digital asset management includes the storage, access, and preservation of digital files and their accompanying metadata.

CHALLENGES FOR PRESERVING DIGITAL MATERIALS

Although, the digital technology offers several advantages digital materials face the constant threat of "techno-obsolescence." Keith (2013) observed that more insidious and challenging than media deterioration is the problem of obsolescence in retrieval and playback technologies. Digital materials become unreadable and inaccessible due to the constant advances in technology which renders existing hardware and software obsolete. IT continues to evolve and each new generation of hardware and software tends to displace the hardware and software of the previous generation. Magnetic and optical disc as a physical media are being re-engineered continuously to store more and more data. There is a constant threat of backward compatibility for products, including software, hardware and associated standards and protocols that were used in the past. The challenges in maintaining access to digital resources over time are related to notable differences between digital and paper-based material. Some of the important challenges for preserving digital materials are follows:

Fragile Storage Media

The initial problem with preservation of digital materials is the storage media itself. Materials in digital medium are prone to physical degradation, loss etc. Magnetic storage media is highly sensitive to dust, heat, humidity and other climatic conditions. Tiwari (2011) observed that digital materials are especially vulnerable to loss and destruction because they are stored on fragile magnetic and optical media that deteriorate rapidly and that can fail suddenly from exposure to heat, humidity, airborne contaminants, faulty reading and writing devices, human error and sabotage.

Machine Dependency

Digital contents are machine-dependent. It may not be possible to access the information unless there is appropriate hardware, and associated software, which will make it intelligible. Access to digital contents may require specific hardware and software that were used for creating them. Since computer and storage technologies are in a continuous flux of change, the timeframe available for migrating digital contents to new software/hardware is generally very short, typically 3 to 5 years, as opposed to decades or even centuries that may be available for preserving traditional materials. Techno-obsolescence is considered as the greatest technical threat to ensuring continued access to digital contents. Digital contents stored on 5¼ inch floppy disk, for example, cannot be accessed since it has been superseded by 3½ inch floppy disks along with drives to access data from it.

Digital Media Degradation

The greatest concern of digital preservation is relatively short life span of digital media and higher rate of obsolescence of the hardware and software used for accessing the digital records. This media can include Magnetic tapes, floppy disks and optical storage disks (e.g. CDs and DVDs) are manufactured for short-term storage of digital objects, and can quickly degrade, therefore, cannot be used for long-term preservation plan.

Formats and Styles

Information contents that were earlier confined to traditional formats like books, maps, photographs and sound recordings are getting increasingly available in diversity of digital formats. New formats have emerged, such as hypertext, multimedia, dynamic web pages, geographic information systems and interactive video. Each format or style poses distinct challenges relating to its encoding and compression for digital preservation.

Copyright and Intellectual Property Rights (IPR)

IPR have a substantial impact on digital preservation. The IPR issues for digital contents are much more complex than for printed material. IPR issues in digital environment have implications not only on digital contents but also to any associated software. Long-term preservation and access may require migration of digital material into new forms or emulation of the original operating environment which may not be possible without appropriate legal permissions from the original rights owners of the content and underlying software.

Moreover, simply refreshing digital materials onto another medium, encapsulating content and software for emulation, or migrating content to new hardware and software, may lead to infringement of IPR, unless statutory exemptions exist or specific permissions have been obtained from the rights holders.

Furthermore, since migration and emulation may involve manipulation and changing presentation and

functionality to some extent, it is important that these issues are addressed to with the copyright holder of the contents during negotiations ensuring preservation of selected items. Some of the additional complexity in IPR issues relate to the fact that digital materials can be copied and distributed easily. Rights holders are, therefore, concerned with controlling access and potential infringements of copyright. Technology developed to address these concerns can also inhibit or prevent actions needed for preservation. These concerns over access and infringement and preservation need to be understood by organizations preserving digital materials and addressed by both parties in negotiating rights and procedures for preservation.

DIGITAL PRESERVATION STRATEGIES

Outdated technology is one major obstacle in the preservation of digital resources particularly for long-term access. Darhmingliana (2019) gave few techniques which can be used for the preservation of digital information which are discussed below:

Refreshing

This is one of the techniques used for the preservation of digital resources. It is a method in which digital resources or information is transferred from one storage medium to another storage medium. Examples of refreshing of resources may be copying files from old diskettes to new diskettes and copying from older Compact Disc Re-Writable (CD-RW) to a new CD-RW. Even though refreshing is also a necessary component for digital preservation, it can also face outdated issues related to the storage media.

Migration

Migration is the transferring of the data from hardware to hardware, software to another or from one environment to new one e.g. transferring of digital resources from one file format to another format, Word to Portable Document Format (PDF) or from one generation of computer to another. It is a broader and richer concept than refreshing as media refreshing is a part of migration but migration involves the transfer of the entire digital environment, not just the physical storage medium. However, resources that are migrated also faced the risk of losing some functionality. As transfer of digital resources from software to software, converter may be unable to interpret the entire original format.

Emulation

The third technique for the preservation of digital resource is Emulation. It is the process of creation of new software that can copy the operations of older software and hardware in its original form, be it content, physical presence and function ability.

Encapsulation

Encapsulation is also an essential part of emulation and plays an important role in some preservation strategies. It involves retaining a digital object in its original object as a bit stream, and encapsulating it along with instructions and whatever else might be necessary to access it in the future. This might include software viewers or software specifications for emulation, as well as comprehensive preservation metadata.

Technology Preservation

Like emulation, technology preservation focuses on the technology rather than on the digital resource. It involves preserving the digital object with the hardware and software required to maintain access to the object.

CONCLUSION

Digital preservation ensures that digitized resources continue to be discoverable, accessible, and usable well into the future. In the case of digitized library materials; this means that they must be well-documented and trustworthy. Today, many libraries of the world are concerned with digital preservation of traditional information for the future generations. But preserving digital objects in the medium and long run still faced issues because of technological developments.

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