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DIGITAL PRESERVATION: ISSUES AND CHALLENGES ON LIBRARIES AND INFORMATION RESOURCE CENTRES IN INDIA

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Abstract

Purpose – This paper focuses on operational digital preservation systems specifically in information resource centre (IRC). It considers the wide range of digital objects of interest to IRC, including e-journals, technical reports, e-records, project documents, scientific data, etc. The report also discusses archiving based on format types – text, data, audio, video, etc.

Design/methodology/approach – This paper presents the concepts and observations on the contents of digital preservation. It discusses about the overview of technological approaches and strategies to digital preservation and challenges on information resource centre (IRC). This paper is also describes the main objectives, process and technological issues involved in preservation of digital materials. Finally, the paper highlights the process ladder of digital preservation initiatives.

Findings – The paper discovers to facilitate digital preservation goal can be achieved by the implementation of several technologies but on the other hand managerial environment and nature of the materials are also the study points before adopting techniques involved in digital preservation. It is also find out that the Digital preservation of documents restores it from loss, theft and decay.

Originality/value – The paper explains the overview of technological approaches and strategies to digital preservation and challenges on information resource centre (IRC).

KEYWORDS:

Digital Preservation, Documents, Preservation Planning, Digital resources, Preservation Initiatives, Preservation strategies .

1 INTRODUCTION

In the electronic age, Information technology has facilitated preservation of the documents, i.e. digital preservation. Texts or documents are the primary sources of information significant. The information and communication technology (ICT) system has brought revolutionary changes in the organization and management of information. At present, the information technology brings the inimitable opportunity to the field of preservation with the digital preservation facility of the non digital documents. Digital preservation of documents is now given appropriate meaning. Digital materials include texts, databases, still and moving images, audio, graphics, software, and web pages, among a

wide and growing range of formats. They are frequently ephemeral, and require purposeful production, maintenance and management to be retained. Many of these resources have lasting value and significance, and therefore should be protected and preserved for current and future generations. Digital preservation is the processes of maintaining accessibility of digital objects over time. It has turn out to be as a vital part of the contemporary environment. Digital material refers to any material processed by a computer and includes both which is digitized as well as those resources that are 'born digital'. Long term in this context should be taken to mean long enough to be concerned with the impact of changing technologies and should include times scales of decades and a centuries.

PRESERVATION

Preservation is a branch of library and information science concerned with maintaining or restoring access to artifacts, documents and records through the study, diagnosis, treatment and prevention of decay and damage. The concept of preservation knows how to be characterized as communication with the future. It is known that in the future new technology will be used that is more cost effective and more sophisticated than modern technology.

DIGITAL PRESERVATION

Digital preservation is about a series of actions that need to be taken and managed to make sure there is continued access to digital materials for as long as is necessary. As long as is necessary could mean long term - into the indefinite future, or short-term – for a specific time limited business requirement. According to ALA (2007)¹ defines 'Digital preservation combines policies, strategies and actions that ensure access to digital content over time.' According to Encyclopedia of Information Technology defines the term digital reservation as “The process of maintaining, in a condition suitable for use, materials produced in digital formats. Problems of physical preservation are compounded by the obsolescence of computer equipment, software, and storage media. Also refers to the practice of digitizing materials originally produced in non digital formats like print, film, etc. to prevent permanent loss due to deterioration of the physical medium.”²

TWO TYPES OF DOCUMENTS:

Digital preservation concerns two types of documents namely born digital documents and digitally created documents. Born digital documents: This refers to those materials that were initially created using some form of digital technology. They are often called as Electronic Records. Digitally created documents: This refers to those materials which have been transformed from analog to digital form through some reproductive means such as rekeying the information or scanning the document or objects etc....,

OBJECTIVES OF DIGITL PRESERVATION

The main objective is to preserving and providing continued access to digital material, together born digital and digitized material, others are;

- To ensuring that preserved digital materials are authentic;
- To preserving damage and deterioration of the physical media by ensuring an environmental control;
- To reversing damage, if it's possible and
- To changing the format of digital materials to preserve their intellectual content, if it's necessary.³

PRINCIPLES OF DIGITAL PRESERVATION

The basic principles of preservation that are being practiced for preservation of analogue media are also applicable to preservation in the digital world:

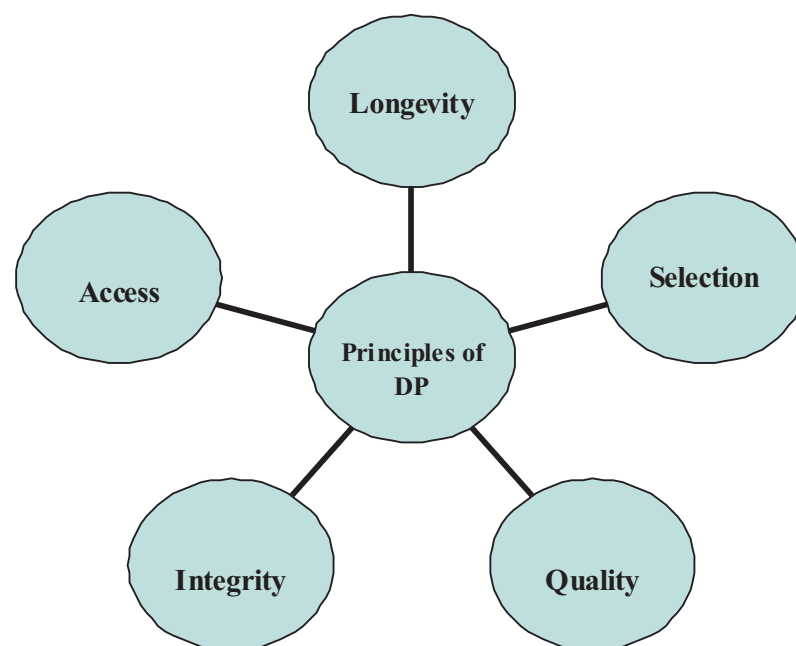


Figure.1: Principles of DP

Longevity: Information stored in digital format does not live forever because of fragility of digital works. There are replication adoptions and redundancy of hardware, software and data formats which implies that what is readable and interpretable today will be usable long into the future.

Selection: Selection is here multistage process. Each stage has possible ways to go ahead with different options. Either it is a Selection of materials for digital preservation or selection of tools and technology or selection of media and formats. Each selection plays very important role in the success of preservation plan.

Quality: The quality of digital content is required at three stages. First, during the preparation of the specification for workflow; second, when selecting and handling digital capturing; and third, at the delivery or access time to evaluate download time and user friendly formats. Consistency is the key to ensuring the quality of digital files.

Integrity: Integrity is required to protect the access of digital content even we discard the original storage medium, software and hardware on which the digital content was created, maintained and accessed. Preserving the digital integrity of digital content also involves developing techniques for verifying its alteration from original format.

Access: Access to digital content is again major factor of consideration when we are putting valuable resources for online access. It is a policy matter of any library to give access to its digital contents.⁴

DIMENSIONS OF DIGITAL PRESERVATION

Digital preservation activities can broadly be divided into two components, i.e. (1) Activities that promote the long- term maintenance of digital image; (2) Activities that provide continued accessibility of its contents.⁵

Long –Term Preservation: Continued access to digital materials, or at least to the information contained in them, indefinitely.

Medium- Term Preservation: Continued access to digital materials beyond changes in technology for a defined period of time but not indefinitely.

Short- Term Preservation: Access to digital materials either for a defined period of time while use is predicted but which does not extend beyond the foreseeable future and/ or until it becomes inaccessible because of changes in technology.

DIGITAL PRESERVATION CHALLENGES:

It is a great challenge for libraries and information resource centers to cop up with the transforming technology involved in digital preservation. In-depth analysis of the risk factors associated with the digital preservation should be performed at an early stage to identify them and scope their potential impact. The following are some major challenges can be found before digital preservation.

Nature of digital materials: The changes in technology means that the timeframe during which action must be taken is very much shorter than for paper-timeframes during which action needs to be taken is measured.

Dependency of Machine: In order to access the all digital materials require specific hardware and software.

Fragility of the media: The digital materials are stored on is inherently unstable and without suitable storage conditions and management can deteriorate very quickly even though it may not appear to be damaged externally.

Shorter life span of digital media: The ease with which changes can be made and the need to make some changes in order to manage the material means that there are challenges associated with ensuring the continued integrity, authenticity, and history of digital materials.

Formats and styles: The implications of allocating priorities are much more severe than for paper. A digital resource, which is not selected for active preservation treatment at an early stage, will very likely be lost or unusable in the near future. The nature of the technology requires a life-cycle management approach to be taken to its maintenance.

Copy rights and intellectual property rights (IPR): The greatest obstacle to making works available to the public in digital form is not related to technology, but rather to copyright issues. A digital library which makes its collection available over the Internet is not only a place where one gathers, preserves and lends what others have produced; by virtue of its digital presentation, one creates new copies which have the same status as the digital original. A digitized library which makes its collections accessible over the Internet will function in more or less the same way as a distribution department in a publishing house. 6

PRESERVATION STRATEGIES

Digital preservation involves choosing and implementing an evolving range of strategies to achieve the kind of accessibility discussed above, addressing the preservation needs of the different layers of digital objects.7 The strategies include:

Placing the material in a safe place

Recognizing that it is not practical to try to preserve everything, selecting what material should be preserved

Controlling material, using structured metadata and other documentation to facilitate access and to support all preservation process

Protecting the integrity and identity of data

Choosing appropriate means of providing access in the face of technological change
Managing preservation programmes to achieve their goals in cost-effective, timely, holistic, proactive and accountable ways.

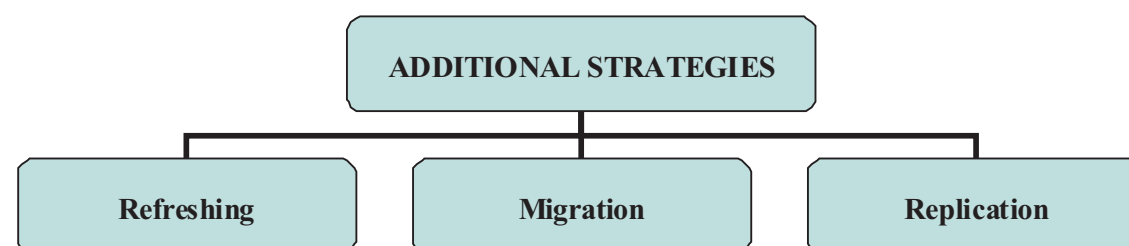


Figure .2: Additional preservation Strategies

Refreshing: Refreshing is the transfer of data between two types of the same storage medium so there are no bitrate changes or alteration of data. For example, transferring census data from an old preservation CD to a new one.⁸

Migration: Migration is the transferring of data to newer system environments (Garrett et al., 1996). It includes conversion of resources from one file format to another -e.g., conversion of Ms Word to PDF or OpenDocument, from one operating system to another e.g., Windows to Linux or from one programming language to another e.g., C to Java

Replication: Emulation is the replicating of functionality of an obsolete system. Examples include emulating an Atari 2600 on a Windows system or emulating WordPerfect 1.0 on a Macintosh. Emulators may be built for applications, operating systems, or hardware platforms.⁹

PRESERVATION PLANNING

The purpose of the Preservation Planning function is to monitor threats to accessibility, and to specify action to pre-empt or respond to them. The relevant threats mostly relate to changes in the technology that underlies access, so this function looks for such changes and takes action to maintain accessibility despite these changes. Frequently, the action will involve changing the information package: transforming the digital object itself to a different coding (as happens in migration), or changing the metadata that describes the means of access and links to current access tools.¹⁰

BENEFITS OF DP

- To ensure and reinforce accountability
- To plan coherent digital preservation programmes
- To develop a digital preservation strategy
- To demonstrate that such funds can and will be used responsibly and consistently
- To ensure digital materials available for current and future use
- To define the significant properties that need to be preserved for particular classes resources
- To assist agencies in designing digitization programmes
- To provide a comprehensive statement on the digital preservation
- To provide security measures that ensure the protection of digital materials during use¹¹

DIGITAL PRESERVATION POLICY

The digital preservation policy could guarantee many benefits at each institutional level, such as ensuring digital materials available for current and future use, providing a comprehensive statement on this theme and planning coherent digital preservation programmes. Besides, the formulation of a policy

allows to deal with difficult subjects as the short-lasting life span and small capacities of digital materials, the obsolescence of the hardware required to access them, the obsolescence of software for reading the data and file formats and, finally, the structural and technical heterogeneity of the different types of digital materials.

AREAS OF COVERAGE

Authority and responsibility
Conversion and reformatting
Appraisal, selection and acquisition
Storage and maintenance
Access and dissemination
Implementation
Standards
Procedures
Quality control, auditing and benchmarking
Cooperation
Technical infrastructure

The digital preservation policy must be structured in several specific and distinctive areas, such as those above-mentioned. It should be introduced by two sections, respectively the purpose and the scope of the policy, to better explain, show and clarify all the questions that will be then largely discussed in it; in particular, referring to the purpose, a digital preservation policy should view the mandate of the repository, possible external legal pressures, the value of the digital material and, finally, the expected use in the future. A special area should be dedicated to the cooperation between institutions in the policy process; usually, the cooperation regards archives, libraries, museums or other repositories can be local, national or even international and provides that the work and engagement can be distributed equally or in a different way between participant members.¹²

Moreover, standards relevant to preservation are of immense value as they facilitate cooperation and grasp the knowledge and experience of other initiatives; therefore, a policy should include the intention to stick to relevant standards. Another essential section concerns the responsibilities involved particularly with reference to the implementation and the related human resources and tools, such as management, employees, special task force, external advice, resources or models; in some cases, outcome of internal analyses, risk analysis, are the major actors in the sketch up of the policy. Really, an accurate list of risks inherent in systems that preserve digital materials can assist to prepare a more comprehensive policy on these themes; therefore, it is indispensable to emphasize that a digital preservation policy should aim to minimize the risks connected with technological changes and allow for other changes. In this way, materials in digital form can be preserved and forever remain understandable.

NOTABLE PROJECTS WITH URLs

Table.1: Notable Projects

PROJECT	URLs
American Institute of Physics	www.aip.org
Aerospace Industries Association/Boeing Co.	www.aia-aerospace.org/
Digital Information Archiving System (DIAS) Dutch National Library	www.5.ibm.com/nl/dias/
DiVA- Electronic Publishing Centre, Uppsala University Library	www.diva-portal.se/
DSpace at MIT	www.dspace.org
Earth Resources Observation Systems (EROS) Data Center	www.earthexplorer.usgs.gov
Fedora™ (Flexible Extensible Digital Object Repository Architecture) Cornell University and the University of Virginia Library	www.fedora.org
International Union of Crystallography	www.iucr.org
JSTOR	www.jstor.org
Life Science Data Archive	www.lsda.nasa.gov
LOCKSS (Lots of Copies Keep Stuff Safe)	www.lockss.org
National Motor Museum	www.heritageimages.com/
OCLC’s Digital Archive	www.oclc.org/digitalpreservation/
PANDORA - National Library of Australia	www.pandora.nla.gov.au/index.html
Profiles in Science, National Library of Medicine	profiles.nlm.nih.gov/
PubMed Central, National Library of Medicine ¹³	www.pubmedcentral.gov

PRESERVATION EDUCATION -THROUGH ORGANIZATIONS

The additional preservation education is offered to librarians through various professional organizations, such as:

- American Institute for Conservation of Historic and Artistic Works
- American Library Association
- Amigos Library Services Preservation Service
- Association for Information and Image Management (AIIM)
- Association for Recorded Sound Collections
- Buffalo State College. Art Conservation Department, Buffalo, NY
- Campbell Center for Historic Preservation Studies, Mount Carroll, IL.
- George Eastman House. School of Film & Video Preservation Rochester, NY
- The Kilgarlin Center for Preservation of the Cultural Record
- Library Binding Institute
- New York University. Conservation Center, Institute of Fine Arts, New York, NY
- North Bennet Street School. Boston, MA
- Northeast Document Conservation Center (NEDCC)

The Conservation Center for Art and Historic Artifacts in Philadelphia, PA
Queen's University. Master of Art Conservation Program, Ont, Canada
Rare Book School (RBS) at the University of Virginia
Society of American Archivists
Southeastern Library Network (SOLINET)
University of Delaware. Winterthur Art Conservation Program, Newark, DE
The National Archives¹⁴

CONCLUSION

In the recent trends in information and communication technology and the emerging potentials with which to construct a global knowledge base offer exciting opportunities for libraries and information resource centres. Digital preservation- presents itself as an enormous challenge for both archival institutions and libraries. Committing to digital preservation means to undertake a systemized project, which requires the existence of a whole of the principles, policies, and strategies that controls the activities designed to ensure physical and technological stabilization and protection of intellectual content¹⁵. This paper has described a methodology for expanding existing offerings and building new ones. While these offerings will undergo transformation, we are building them with the certainty that users in centuries to come will find our early collaborative efforts in digital preservation to have been valuable.

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