

## Digital Preservation Strategies: An Overview

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## ABSTRACT

This paper covers all the techniques that are being used for digital preservation in the industry. Digital preservation means the preservation of rare and delicate materials and objects through digitization using computers, electronic equipment's, mobile phone, digital cameras, recorders, and digital displays. Digital preservation strategies have to be examined carefully considering all the factors including cost-benefit. There are many techniques to preserve digital assets, and each one has unique advantages and disadvantages.

## INTRODUCTION

Digital preservation refers to the processes and strategies employed to maintain and ensure the longevity of digital information and resources over time. Given the rapid pace of technological change, effective digital preservation is crucial for ensuring that digital content remains accessible and usable in the future. Here are some key strategies for digital preservation. The developments in information communication technologies notably digitization has provided a new outlook to libraries, archives and museums. Digital preservation is a vital part of the creation and management of digital collections. If we do not have a proper preservation strategy, digital information one day will be inaccessible totally. The prime reason for delicacy in digital technology includes frequent updating of application software, OS, other related technologies and their quick obsolescence (Granger, 2000).

Active digital preservation is one way to overcome the obsolesce of application software and operating system problems. The applications of digital technologies are well recognized and its use in libraries, archives and museums appear to be quite obvious. However, there are numerous key related areas in the long-term digital preservation are still unanswered.

## **DIGITAL PRESERVATION**

Digital preservation means the preservation of rare, delicate materials and objects through digitization using computers, electronic equipment's, mobile phone, digital cameras, recorders, and digital displays (Chen, 2007). The digital preservation activities are undertaken for an object that is prone to be lost or ruined because of bit decay, degenerate activities, obsolete, etc. however, in digital preservation, there is no 100% assurance that all objects will be protected and well-maintained (Kastellec, 2012). A proven method is required for functioning and managing records; steps to be considered for digital preservation are given below (Rothenberg, 1999; UNESCO, 2003; Holdsworth, 2006).

## **NEED AND IMPORTANCE OF DIGITAL PRESERVATION**

According to Beagrie Digital preservation refers to the series of managed activities necessary to ensure continued access to digital material for as long as necessary. The challenge for digital preservation is not only the volume of data. The hardware and software which is used to store and access digital information are constantly upgraded and superseded. The speed of changes in technology means that the timeframe during which preservation action must be taken is very much shorter than for paper. Institutional repositories as a means to manage and preserve effectively in institution knowledge base and intellectual assets results in the contents of institutional repositories expanding beyond e-print to include research data, e-learning materials and other forms of intellectual outputs, which are generally not published and preserved elsewhere.

**The importance of digital preservation** comes from the factors associated with the nature of Library Materials. The growth of digital resources in different libraries summons a new era in their development. Historically, libraries have always been concerned with the management and preservation of documents, today they must be increasingly concerned with preservation of 'bits'. The conservation of the physical book and journal issue has its own problems, but national libraries and university libraries have copies of books which are centuries old and which, in many cases, have been preserved in original condition.

## **TYPES OF DOCUMENTS FOR DIGITAL PRESERVATION**

Digital preservation is concerned with two types of documents namely born digital documents and digitally created documents. Born digital documents refers to those materials that were initially created using some form of digital technology. They are often called as Electronic Records. Digitally created documents 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.

## **PRINCIPLES OF DIGITAL PRESERVATION**

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

**Longevity:** Information stored in digital format do not live forever due to the 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 multistage process. Each stage has different 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 a very important role in the success of preservation plan.

**Quality:** The quality of digital content is required in three stages. First, during the preparation of the specification for workflow; second, when selecting and handling digital capturing; and third, during 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 very much required to protect the access of digital content even when 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 involves developing techniques for verifying its alteration from original format.

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

## DIGITAL PRESERVATION STRATEGIES

### Many digital preservation strategies have been proposed

1. **Bitstream Copying:** This is the process of creating exact duplicates of digital objects to protect against data loss due to hardware failure or disasters. While essential, it is not a standalone long-term solution, as it does not address issues of media decay or obsolescence.
2. **Refreshing:** This involves copying digital information from one storage medium to another of the same type to prevent data loss from media degradation. It can also include modified refreshing, where data is transferred to a similar but newer medium.
3. **Technology Preservation:** This strategy focuses on maintaining obsolete technology to ensure access to digital objects stored on outdated media. While it can extend access, it is not sustainable long-term due to the inevitable obsolescence of technology.
4. **Digital Archaeology:** This emergency recovery strategy involves rescuing content from damaged media or obsolete hardware. It typically requires specialized techniques and is often performed by data recovery companies.
5. **Documentation of Standards and Procedures:** Organizations like the National Archives (NARA) emphasize the importance of documenting internal procedures and standards for managing digital records. This includes guidelines on metadata, preferred file formats, and risk management.

6. **Risk-Based Prioritization:** Many organizations adopt a risk-based approach to prioritize digital preservation actions, focusing on at-risk formats and assessing the technical complexity of preservation actions.
7. **Comprehensive Digital Preservation Programs:** Institutions like the Library and Archives Canada (LAC) and the UN Archives implement structured digital preservation programs that align with international standards, ensuring ongoing access to digital heritage.
8. **Use of Open Standards:** Promoting the use of open standards and widely accepted community-based standards is crucial for facilitating preservation and ensuring future access to digital content.

## ADVANTAGES AND DISADVANTAGES OF EMULATION

### ADVANTAGES

- i) Emulation method targets to reproduce the functionality of the original hardware as closely as possible.
- ii) An emulation approach is focused on changing the environment instead of the digital object.
- iii) Emulation is economical for preserving large collections and it involves only one-time investment.
- iv) The emulation approach can be used as a standby mechanism to offer admittance to the ‘digital original’ of respective record and can be used for the abstraction of digital objects from old technology (Rothenberg, 1999).

### DISADVANTAGES

- i) Defining a hardware description language, which specifies a spectrum of hardware components with a sufficient degree of precision is a difficult task and costly.
- ii) Most emulation approaches involves commercial applications and systems software thus exist copyright issues.
- iii) It demands users to understand inexperienced technology to apprehend archival record.
- iv) Emulation approach requires resources, and extremely skilled computer programmers to write the emulator code (Rothenberg, 1999).

## CONCLUSION

Implementing these digital preservation strategies can help organizations and individuals safeguard their digital assets against loss, corruption, and obsolescence. As technology continues to evolve, staying proactive and adaptable in preservation efforts is essential for ensuring long-term access to important digital information. Digital preservation is a multifaceted challenge that requires a combination of strategies tailored to the specific needs of the digital content being preserved. By employing a mix of these strategies, organizations can effectively manage and protect their digital assets for future generations.

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