# Digital Preservation Tools and Techniques

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**Abstract:** Digital Preservation is the management of digital information so it can be preserved for a long time and can be accessed for current and future use. Digital preservation is not a single task, but it includes all strategies and actions taken to maintain access to digital information. This paper highlighted the definition of digital preservation, the need of digital preservation, strategies and methods used in digital preservation and challenges encountered in digital preservation.

**Keywords: Digital Preservation, Strategies, Digital Libraries, Access Control.**

## Introduction:

Digital Preservation is the management of digital information so it can be preserved for long time and can be accessed for current and future use. Digital preservation is not a single task but it includes all strategies and actions taken to maintain access to digital information. In this digital age, libraries have accepted digitisation to provide better library services beyond the physical boundaries. Technology is upgrading rapidly so it is essential to preserve the digital information for a longer time. If these resources are to be preserved over the long term one has to overcome the obstacles such as data deterioration, format obsolescence, and technical obsolescence etc. We can preserve this digital information by using digital preservation techniques.

## Definition of Digital Preservation:

Digital preservation involves maintaining and ensuring long-term access to materials that originate in digital formats as well as those that have been transformed from physical formats—such as printed texts, photographs, or artefacts—into digital form through scanning, photography, or other imaging methods for the purpose of both accessibility and preservation.

Digital preservation refers to a 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 (Cornell University Library, 2005).

The Wikipedia (Wikipedia, 2006) defines digital preservation "as long-term, errorfree storage of digital information, with means for retrieval and interpretation, for all the time span that the information is required for", where "retrieval" means obtaining required digital files from the long-term, error-free digital storage, without corrupting the errorfree stored digital files and "interpretation" means that the retrieved digital files,

which may be texts, charts, images or sounds, are decoded and transformed into usable representations for access to human.

**Importance of Digital preservation:** Digital preservation is important for several key reasons:

1. **Save Important Digital Information:** For saving important digital information digital preservation is necessary. Information may be lost by various reasons such as technology upgrade, technical failure, data degradation etc.

2. **Guaranteed Future Access:** Digital technology is evolving so rapidly. If the old software becomes obsolete or file format changes so it's not easy to use that information. But with the help of information preservation techniques, we can get guaranteed future access.

3. **Enhances Learning and Research:** Students, teachers and educators largely depend upon the information. For continued access to them information preservation is necessary.

4. **Reduces Risk of Data Loss:** Digital data may be lost due to various reasons such as accidental deletion, a virus, and system crashes. Preservation techniques help to reduce the risk of data loss.

5. **Continued Accessibility and Functionality:** For continued access to the digital information and its functionality for a longer time, digital preservation is essential.

**Strategies for Digital Preservation: The** following are the strategies that are used for digital preservation.

1. **Bit-stream copying:** In Bit-stream copying exact digital replica is created to safeguard against data loss caused by hardware failure, corruption, or disasters. Bit-stream copying only ensures short-term protection. For better resilience, it is often combined with remote or off-site storage. It is considered the minimum strategy for less critical digital content.

2. **Refreshing: It is the process** that copies digital data from one storage medium to another or a similar type without changing the data. Risk of data loss due to deterioration or obsolescence can be decreased with the help of refreshing. Though durable media like Gold CDs may reduce the frequency of refreshing, it cannot protect against all risks, such as format or hardware obsolescence. In a digital preservation strategy regular refreshing is very.

3. **Replication**: Replication is a process in which multiple copies of digital content is created to ensure its longevity, authenticity, and integrity. Replica includes several strategies like bit-stream copying and systems like Lots of Copies Keep Stuff Safe (LOCKSS). Replication helps to prevent data loss and supports long-term digital preservation. Replication helps to protect data from various manmade and natural disasters such as cyber-attacks, hardware failure and natural disasters. For getting continued access to the data, the replicas should be regularly updated.

4.  **Technology Preservation:** In digital preservation, original hardware, software, operating systems, and media are maintained to create and access digital content. Often referred to as the computer museum approach. It is not a sustainable long-term solution because it can provide temporary access to outdated media and file formats. Technology preservation needs necessary resources, maintenance of aging equipment and skilled personnel to manage the systems.

5.  **Software Re-engineering:** Software re-engineering is the process of modifying and restructuring existing software to improve its internal structure, maintainability, and adaptability. To safeguard continued access to digital materials software re-engineering method modifies or rebuilds software as per the requirements to open absolute files. The software reengineering process is very complex and time-consuming because it needs source code to modify the software and source code is not available of all software so it is accessible for in-house software and open source software.

6.  **Reliance on Standards:** In this method or strategy, importance is given to use widely used file formats to ensure its long-term access. It avoids poorly supported standards to reduce the risk of format obsolescence. Formats like JPEJ, PNG for images and PDF for documents are commonly used due to their compatibility and stability. It is not a complete preservation solution but by using such standards one can give long term access, and this approach must be complemented by other strategies for preservation of digital content for long time.

7.  **Migration:** Migration refers to the process of transferring digital content from obsolete or old formats to newer one so it digital information can be accessed for longer time. Migration can be categorised as forward and backward in forward the content is shifted in to newer formats and in backward- converting to older formats to maintain functionality. This approach largely depends on various factors like nature of content, technical requirements, and the preservation goals.

8.  **Emulation:** Emulation is a strategy in which original environment is recreated in which digital materials were created. It helps access to absolute or out-dated file formats. It is especially valuable for preserving interactive multimedia content.

9.  **Metadata: Creation and Management: In** digital preservation, metadata plays an important role. It provides administrative, structural, and descriptive details about digital objects. Metadata helps users to locate, access, and manage digital content. Effective metadata management is essential for digital preservation. For ensuring accessibility and relevance of the digital content it is essential to regularly creation and upkeep of metadata records throughout the entire lifecycle.

10. **Storage Solutions:** Secure and efficient storage is important for preserving digital materials. All types of digital content such as text files, images, audio-visual media, and large datasets require appropriate storage architectures. There are various storage technologies are available such as HDD, SSD, cloud storage, optical discs, and magnetic tape, and so on. For efficient storage management one should choose best option as per the requirement, cost, capacity, reliability and scalability. To protect from data loss, data

corruption, or unauthorized access, various strategies have to be used such as encryption, and regular backups.

**11. Digital Rights Management (DRM)**: DRM is a set of technologies and practices used to control access to and usage of copyrighted digital content. Digital Rights Management help to ensure that digital materials are accessed only by authorized users, usage restrictions, and copyright protection. It helps to protect from unauthorized access, copying, sharing, and modification of copyrighted digital content.

## Challenges for Preserving Digital Content:

Digital technology provides many advantages than the printed one. Information technology, as well as other related technologies is always changing. It is difficult for libraries to preserve digital information for a long time as technology is changing very rapidly. There are so many challenges are available such as evolving technologies, media deterioration, lack of standardization, and the need for sustained technical and financial resources.

1. **Dynamic Nature of Digital Contents:** One of the biggest challenge in preservation of digital information is the dynamic nature of the digital content. Information is available in various forms. Some information can be preserved for a long time and accessed easily but information available on interactive websites and virtual models that cannot be replicated in print.

2. **Machine Dependency**: Accessing digital content for a long time it requires compatible hardware and software. Technology is changing rapidly so old software and devices become absolutes after some years. It means preservation of the digital content largely depend on machines only. As technology upgrades, we have to change our strategy of digital preservation.

3. **Fragility of the Media:** Fragility of the media means the quality of storage media that is quickly broken. Digital information storage devices such as magnetic and optical media are highly vulnerable to heat, humidity, dust, and physical degradation. Information available in such media can disappear or lost anytime if the proper care is not taken.

4. **Technological Obsolescence**: Technological obsolescence is a major challenge in digital preservation. Technology such as hardware, software and file formats are rapidly updating. Even if the information is preserved for a long time it can become difficult to access it if the software and hardware is updated. Long-term access is increasingly difficult if the frequent updates, lack of compatibility, and proper formats are not available.

5. **Shorter Life Span of Digital Media**: Digital storage devices like magnetic tapes, CDs, and DVDs are designed for short-term use. Long-term digital preservation in such storage devices poses risk of data loss or data becoming inaccessible over time.

6. **Formats and Styles:** Due to the diversity and complexity of the formats and styles in digital content present unique preservation challenges. Now information is stored in variety of digital formats and in

various styles. These formats and styles also change after some days. The encoding, compression, and storage of these file formats create numerous challenges to libraries.

7. **Lack of Experts**: For the digital preservation process and manage the resources properly it requires trained and technologically competent staff. However, for libraries getting such experts often becomes difficult.

8. **Intellectual Property Rights:** In digital preservation Intellectual Property Rights plays an important role. Digital preservation data is altered or duplicate copies of the original material is prepared which may create legal problems. So it is important to take necessary permission from the right holder to ensure lawful and ethical preservation of digital resources.

**Conclusion:**

In the present era, libraries have transformed from traditional to digital formats. In a digital library, information is available in a variety of digital formats. Technology is changing rapidly and every four to five years new technology and file formats emerge. As a result old software's and file formats are becoming absolute. To ensure long-term access to the digital information, it must be preserved by using preservation strategies. Although there are many obstacles in the preservation of digital information but by using proper strategy, one can overcome these problems.

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