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PRESERVATION OF DIGITAL RESOURCES: STRATEGIES AND TECHNIQUES

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ABSTRACT

The advancement in information and communication technology has made libraries to think of digital or electronic resources that enable speedy, easy and fast searching of vast information. This paper narrates the concept of digital information resources preservation, need for the preservation and further, deliberates some of techniques library professional can apply for preserving the digital information resources.

KEYWORDS: *Digital Resources; Preservation; Electronic Resources.*

INTRODUCTION:

Emergence of information technology has made libraries to think of digital or electronic resources, which enable speedy and easy and fast searching of vast information. The huge amount of information is being published in electronic form. The access and searching is very easy in the case of digital information but preservation of the digital information is difficult as compared to print media; it requires certain special attention and at most care. As per the Pocket Oxford Dictionary, preservation is an 'action of keeping something in its original or existing form' (Soanes et al., 2005), and Association for Library collections and Technical Services, Preservation and Reformatting Section, Working Group defines digital preservation as 'Digital preservation combines policies, strategies and actions that ensure access to digital content over time' (American Library Association, 2014). The digital preservation is nothing but processes or activities and management of digital information for long-term accessibility and the main purpose of preservation of digital resources is to protect information of enduring value for access by present and future generations (Conway, 1990).

Generally digital preservation is defined as: long- term, error-free storage of digital information, with means for retrieval and interpretation, for the entire time span the information is required for. Long term is defined as 'long enough to be concerned with the impacts of changing technologies, including support for new media and data formats, or with a changing user community'. Long term may extend indefinitely (Cornell University Library, 2005). 'Retrieval' means obtaining needed digital files from the long- term, error-free digital storage, without possibility of corrupting the continued error-free storage of the digital files. 'Interpretation' means that the retrieved digital files, files that, for example, are of texts, charts, images or sounds, are decoded and transformed into usable representations. This is often interpreted as 'rendering', i.e. making it available for a human to access. However, in many cases it will mean able to be processed by computational means. Nowadays, most of the libraries are acquiring heavy information in digital form; it is very necessary to manage and preserve the digital information. The paper aims at discussing the strategies and techniques of preservation digital information (Wikipedia, 2014).

Need of Digital Resources Preservation

Less Life Cycle of Digital Resources:

Since ancient period, the mankind started recording of their ideas on various materials such as bone, clay, metal, wax, wood papyrus, silk, leather, parchment, paper and magnetic tape. Now large quantity of information exists in digital forms including emails, blogs, social networking websites, national elections websites, web photo albums, and sites and web portals. As the life cycle of digital information is very less, according to an article by Brewster Kahle, in 1996 founder of Internet Archive, 'Preserving the Internet', Scientific American, the average life of a URL was, in 1997, 44 days (Kahle, 1997). Hence, special care must be taken to preserve the digital information for future use.

Characteristics of Digital Resources:

The unique characteristic of digital forms makes it easy to create content and keep it up-to-date, but at the same time brings many difficulties in the preservation of this content. Margaret Hedstrom points out that '...digital preservation raises challenges of a fundamentally different nature which are added to the problems of preserving traditional format materials' (Hedstrom, 1997). The media on which digital contents are stored are more vulnerable to deterioration and catastrophic loss than some analogue media such as paper (Consultative Committee for Space Data Systems, 2002).

Digital Obsolescence:

Faster, more capable and less-expensive storage and processing devices are developed; older versions may be quickly replaced so software or decoding technology is abandoned, or a hardware device is no longer in production, records created with such technologies are at great risk of loss, simply because they are no longer accessible. This process is known as digital obsolescence.

Strategies for Digital Preservation:

In 2006, the Online Computer Library Centre developed a four-point strategy for the long-term preservation of digital objects that consisted of:

- Assessing the risks for loss of content posed by technology variables such as commonly used proprietary file formats and software applications.
- Evaluating the digital content objects to determine what type and degree of format conversion or other preservation actions should be applied.
- Determining the appropriate metadata needed for each object type and how it is associated with the objects.
- Providing access to the content (Online Computer Library Center, Inc.).

Digital Resources Preservation Strategies:

Library and information centres' first main objective is to build well-balanced library collection and further is to enable the access to the information, which is acquired. Unlike the print media, the electronic media has limited life cycles, and to provide access to the information, which is in electronic form to the future generation, is also a key issue. Therefore, few techniques one can use to preserve the digital information are discussed below.

Refreshing:

This is one of the techniques for preservation of digital information. It can be done by transferring the data from the same old to new storage media, for example, from a decaying 4mm DAT tape to a new 4 mm DAT tape, or from an older CD-RW to a new CD-RW. 'Modified refreshing' is copying to another medium of a similar enough type that no change is made in the bit-pattern that is of concern to the application and operating system using the data, for example, from a QIC tape to a 4mm tape; or from a 100 MB Zip disc to a 750 MB Zip disc. Refreshing is a necessary component of any successful digital preservation program, but is not itself a complete program. It potentially addresses both decay and obsolescence issues related to the storage media. This technique need to be merged with migration

techniques because the hardware and software required for reading the data may not be available for longer time. But refreshing is very necessary to overcome deterioration problem of physical media.

Migration:

Migration is transferring the data from old system environment to new one, for example, Windows to GNU/Linux; one file format to another format, for example, Word to PDF; and from one programming language to another, for example, C to Java. So the resources remain fully accessible and functional. Resources that are migrated run the risk of losing some type of functionality since newer formats may be incapable of capturing all the functionality of the original format, or the converter itself may be unable to interpret all the nuances of the original format. The latter is often a concern with proprietary data formats. Migration is a broader and richer concept than 'refreshing' for identifying the range of options for digital preservation. Migration is a set of organised tasks designed to achieve the periodic transfer of digital materials from one hardware/ software configuration to another, or from one generation of computer technology to a subsequent generation. The purpose of migration is to preserve the integrity of digital objects and to retain the ability for clients to retrieve, display and otherwise use them in the face of constantly changing technology. Migration includes refreshing as a means of digital preservation but differs from it in the sense that it is not always possible to make an exact digital copy or replica of a database or other information object as hardware and software change and still maintain the compatibility of the object with the new generation of technology.

Replication:

Replication is nothing but creation of duplicate copy of data on more than one system that are situated in different locations. Data that exists as a single copy in only one location is highly vulnerable to software or hardware failure, intentional or accidental alteration, and environmental catastrophes such as fire, flooding, and so on. Digital data is more likely to survive if it is replicated in several locations. Replicated data may introduce difficulties in refreshing, migration, versioning and access control since the data is located in multiple places.

Emulation:

It is nothing but creation of new software that can copy the operations of older software and hardware to ensure its originality in terms of physical presence, content and functionality. To access digital resources, one need particular hardware and software, the technique is useful in those cases circumstances. However, emulation for preserving digital information over the long term has not been tested. However, the widespread use of emulation as a long-term digital preservation strategy will require the creation of consortia to perform the technical steps necessary to create functioning emulators as well as the administrative work to assemble specifications and documentation of systems to be emulated and obtain the intellectual property rights of relevant hardware and software.

Encapsulation:

In general, encapsulation is the inclusion of one thing within another thing so that the included thing is not apparent. Decapsulation is the removal or the making apparent a thing previously encapsulated. Encapsulation is an essential element of many emulation approaches and also plays a key part in some other preservation strategies. It involves retaining a digital object in its original form as a bit stream and encapsulating it along with instructions and whatever else might be necessary to maintain access to it in the future; this might include software viewers or software specifications for emulation, as well as comprehensive preservation metadata.

Technology Preservation:

Like emulation, this approach focuses on the technological environment rather than on the digital object. Instead of mimicking the original environment, it involves preserving the digital object together with all the actual hardware and software required to maintain access to the object; this includes operating systems, original application software and media drives. It could be argued that

maintaining the original technology is the most effective and obvious means of preserving the look and feel of a digital environment, and there is certainly merit in keeping samples of old computer systems as a resource for researchers in the future; however, while it might offer a short-term solution, this is not a viable strategy for long-term digital preservation, for various reasons: cost and space implications for acquiring and maintaining large quantities of hardware (from computers and peripherals to connectors) are prohibitive for many organisations. Older operating system and application software and appropriate licenses must also be acquired and maintained. Over time the machines will degrade and ultimately fail, so the number of machines capable of reading certain types of old files will continually decrease. Technical support for both software and hardware will also disappear over time. Documentation for older computing environments can be difficult to locate.

Metadata Attachment:

Metadata is data on a digital file that includes information on creation, access rights, restrictions, preservation history and rights management. Metadata attached to digital files may be affected by file format obsolescence. ASCII is considered to be the most durable format for metadata (Reagan, 2006). Because it is widespread compatibility when it is used with Unicode, and utilises human-readable characters, not numeric codes. It retains information, but not the structure information it is presented in. For higher functionality, SGML or XML should be used. Both mark-up languages are stored in ASCII format, but contain tags that denote the structure and the format.

Trustworthy Digital Objects:

Digital objects that can speak to their own authenticity are called trustworthy digital objects (TDOs). TDOs were proposed by Henry M. Gladney to enable digital objects to maintain a record of their changed history so future users can know with certainty that the contents of the object are authentic (Gladney, 2004; Reagan, 2006). Other preservation strategies such as replication and migration are necessary for the long-term preservation of TDOs (Gladney, 2006).

CONCLUSION:

The advancement in information technology made it possible to publish plenty of information in digital form, libraries also started procuring information in digital form, but the major drawback of digital information is its preservation for longer time. The library professionals must know how to preserve the digital information using strategies and techniques, such as refreshing, migrating, replication, emulation and digital object trustworthy and so on, which could be used for preservation of digital resources.

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