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Issues and Challenges for Sustainable Digital Preservation Practices in Bangladesh

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Abstract: *Digital Preservation has been critical issue since long time. In recent years much emphasis were given on digital archives preservation and management. Archival institutions and research centers throughout the world are actively planning and developing digital preservation policy for their resources. But this practice is lagging behind in Bangladesh. The study focused on the core concept of preserving information in the digital environment. The paper also tried to articulate present digital preservation practice in Bangladesh. Besides, it also identified major issues and challenges of digital preservation practice in Bangladesh. Finally, some suggestions have been made for successful digital preservation practices. The research revealed that there is ample opportunity of future research for implementing digitization in Bangladesh.*

Keyword: Digital Preservation, Digital Archives, Digitization, Digital Information.

INTRODUCTION

With the advancement of digital technologies, computer-based apparatus have become dominant forces to shape and reshape library systems and services. The applications of information technologies in library operations and services have become a key to satisfying ever-changing complex information demands and expectations of users. Accelerating growth of information technology have forced information professional to rethink how to receive, process, store and retrieve information in more user friendly way. One of the most advantageous ways of information management tool is digital preservation. Traditionally, library collects, disseminates and preserves printed as well as documents in other format. The digital preservation is one of the new trends of present library services. Any modern library has to cope with the rapid acceptance of digital preservation research and development for its survivable. The preservation as well as access to digital information can be seen as one of the major challenges for the library and information professions of any developing country especially for Bangladesh.

DIGITAL PRESERVATION

Digital preservation is a broad term used to describe both the maintenance and the safe guarding of a digital resource into the foreseeable and the distant future. The digital preservation is to maintain the ability to display, retrieve and use of digital collections in the face ofrapidly changing technological, organizational infrastructure and elements. Preservation is a vital part of any digital collection. It is a state of long-term, error free storage of digital information, with means for retrieval and interpretation, with the help of changing technologies including support for new media and data format. Digital preservation is concerned with ensuring that records which are created electronically using today's computer systems and applications, will remain available, usable and authentic, when the applications and systems which were used to create and interpret the record will, no longer be available. During preservation, questions of record context, content, structure, appearance and behaviour must also be taken into account (Mezbah-ul-Islam, 2012). Most commonly used digital materials are Floppy disc, CD ROM disc, DVD, Magnetic tapes. Besides, the hard disc in a computer also can be taken as an item of digital materials.

OBJECTIVES OF DIGITAL PRESERVATION

Digital preservation is a process by which data is preserved in digital form in order to ensure usability, durability and intellectual integrity of the information contained there in. Digital technology is used as a way of producing, distributing and storing information. This offers many apparent accesses for preservation benefits. However, the objectives of digital preservation have been summarized as under:

i) Each item in the archive is quality assessed and functional to the fullest extent by current technical capability.

ii) A gathering schedule can be individually tailored for each selected title taking into account its publication schedule or the frequency with which the website changes, thus enabling the content gathered to be as complete as possible.

iii) Each item in the archive can be fully catalogued and therefore become part of national bibliography.

iv) Each item in the archive can be made accessible via the web to readers immediately. (Philips, 2005)

Besides, there are some more objectives of digital preservation. Those are:

i) Digitization helps in promoting and marketing of resources worldwide and also helps the readers to see the original material.

ii) Helps to search quickly and efficiently and also furthers e-learning opportunities.

iii) Ensure maximum utilization of resources for the sake of society, democracy, education, advancement of science and technology.

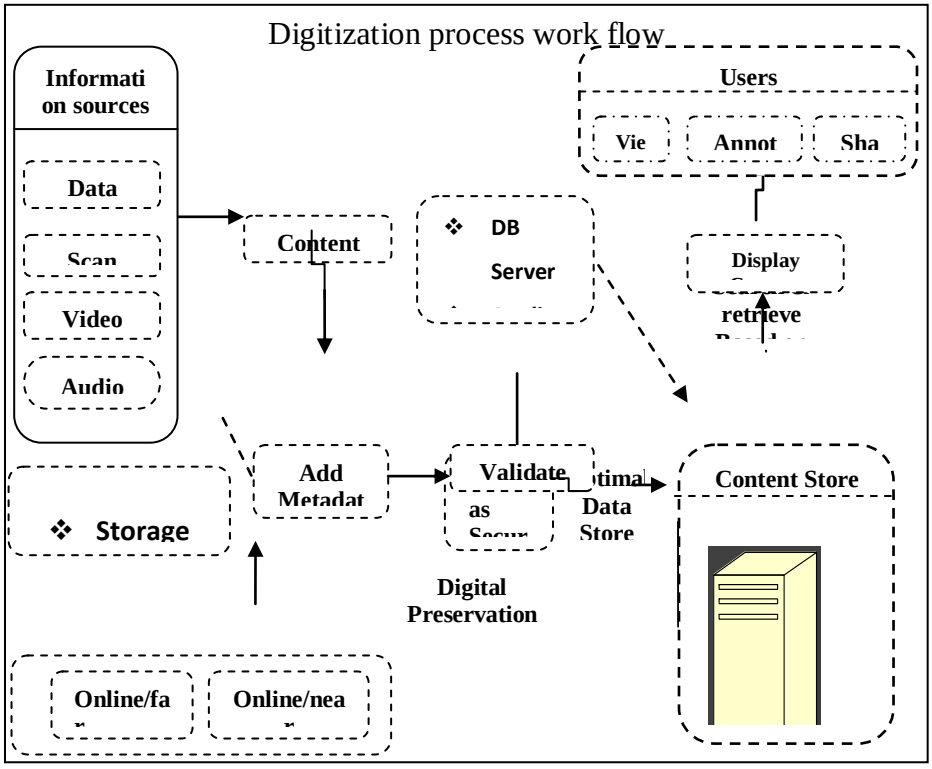
iv) Preservation of rare and fragile objects without denying access to those who wish to use them.

DIGITAL PRESERVATION MODEL

Preservation plans may comprise complex workflows that involve extracting content from a repository, characterizing it, using the results to select one or more services to treat, transform, or encapsulate the content, and then either returning the result to the repository with a detailed record of treatment, or providing a capability that can be used

in a delivery environment so that end-users can get appropriate access (Farquhar & Hockx-Yu, 2007). Following model can be followed for digital resource preservation and management:

Digital Preservation Life Cycle



The proposed digitization activities start from selection of content. These contents may be selected following various criteria of resource selection. Content may be acquired from various sources and format like scene, data entry, video, audio and so on. After receiving content document, the archivist or preservation official has to define/add metadata describing the resource content. Metadata validation is also needed in this stage. After defining metadata, contents are being sent to server for preservation. This server must have two parts: storage server and application server. Storage server is used to store data. These data may be stored in online storage server and offline storage server. Application server- after necessary execution of data in

database server, documents are sent to application server as secure file. This part is known as content store. Content store is connected with user interface where user can access, use and share their requirement.

ISSUES OF DIGITAL PRESERVATION

The major issues in digital preservation are migration, emulation, file formats, storage media, technology infrastructure, organization stability, financial sustainability, and administrative and accountability etc.

Migration: Periodic transfer of digital materials from one hardware/ software configuration to another or from one generation of computer technology to subsequent generation (Ferreira, 2007). Migration relates to copying digital information from a medium that is becoming obsolete or physically deteriorating to newer one, and converting from one format to another, and/ or moving documents from one platform to another. Migration is undeniably an important strategy for preserving digital objects.

Emulation: Emulation refers to creating new software that mimics the operations of older hardware or software in order to reproduce its performance. Emulation has recently attached attention as a potential strategy to assist preservation recognizing that some electronic materials that are dependent on particular hardware and software will not lend itself to migration.

Storage media*:* This strategy should be the object as a whole and preserve content and to some extent layout. A hybrid strategy of creating both microfilm and digital copies is more supportable as a technique for reformatting original.

Technology infrastructure: *A*ccess to digital objects requires to kept older technology available for use. This will help future generations to view digital objects in their native format with original layout and functionally, creating hardware or software museums is prohibitive in cost, space and technical support requirements.

File format: Deciding appropriate file format is an important issue of digital preservation. In this case importance is given to the

quantity of file that covers maximum resources. The universal standard for high quality electronic record is Adobe systems, acrobat portable document format (pdf). The other most common format for storing text is XML (Extensive Markup Language). They have their own place in the preservation strategy.

CRITERIA FOR PRESERVING DIGITAL RESOURCES

Selecting materials for digital preservation depends mainly on the following three criteria:

(1) Whether the materials are both valuable and endangered;

(2) Whether appropriate digitization procedures and standards for these materials exist; and

(3) Whether copyright allows reasonable access for educational and research purposes.

Besides, there are some other criteria that should be considered while preserving digital resources. Those are:

Longevity

The importance of any information resources may be felt after hundreds of years later. But traditional printed document cannot ensure such durability. Besides, there may be threat of fire, water or any other male destructive activities. Besides, information stored in digital format does not live forever because of fragility of digital works. In this regard, preservation in appropriate digital format can ensure longevity of the resources.

Access

Selecting digital material with long term value bears responsibility for producing long term access to the digital sources. Whom and how the access will be ensured is one of the major considerable factors of digital resource management.

Quality

Quality of the digital image, including richness of both the images and the associated indexes, is the heart and soul of preservation in the digital world. For ensuring quality emphasis should be given during the preparation of the specification for workflow; at the time of

selecting and handling digital capturing; and also at the delivery or access time to evaluate download time and user friendly formats.

Integrity

Integrity is required to protect the access of digital content. Ensuring integrity of digital content involves developing techniques for verifying its alteration from original format. Authentication of access procedure and documenting successive modifications are also required for maintaining integety. Structured indexes and bibliographic linkages within well developed and well understood database standard should be ensured.

Archiving system

Archiving is nothing but preservation. Appropriate archiving strategies are to follow strictly to make information accessible. The archive should have digital objects according to their expected frequency of use. The speed of access will be directly linked to expected frequency of use with the level of access being provided by different storage topologies. It needs to be duplicated to ensure security for storage and it will never allow technical failure to harm for destroy any of its collection.

BENEFITS OF DIGITAL PRESERVATION

Digital preservation of resources ensures considerable benefits over traditional hard copy resources. Some major benefits of digital preservation are listed below-

Cost Savings*:* Create digital images and microfilm more economically and efficiently than possible with in-house operations.

Longevity: As storage media is likely to have longer life span, preservation on such media can ensure longevity. Microfilming collections with OCLC preservation service centers can ensure for proven longevity.

Searchable Repositories: Enhance access to digitized collections by creating searchable repositories.

Ensure protection of resources: Preserving valuable resources in appropriate media can ensure protection from heat, wet or other natural threats.

Loss prevention: As documents are preserved in secure file system and user can access only certain image copy of the resources, digital preservation can ensure protection from theft of resources.

Access: Digitization can ensure greater access for your patrons and researchers worldwide.

***Improved search ability*:** Using metadata may enhance digital collections more searchable.

Quality: As user can see the exact image of original documents, digital preservation can ensure quality.

CHALLENGES FOR DIGITAL PRESERVATION

Despite evidence of increasing concern about digital preservation, there are numerous technical, organizational, legal and economic challenges to a comprehensive infrastructure for protecting and preserving digital assets.

Technology problems: The success of digital preservation depends on the use of appropriate medium of technology. But the technology relating to hardware and software are changing rapidly making the existing technology fragile and backward. The concerned institution must have to upgrade required hardware and software otherwise the system may not be provided expected output.

Nature of Content: Digital information exists in several forms and types. Most of the objects that are true replica of their print document like books, reports, correspondence etc. can be converted into digital documents and preserve but materials that cannot be replicated in traditional hard-copy, for example interactive web pages, geographic information systems and so on may create problem.

Machine dependency: As digital contents are machine-dependent, access to digital contents may require specific hardware and software that were used for creating them. But since computer as

well as storage technologies are in a continuous flux of change, preservation components should be changed and upgrade accordingly. Otherwise, it may create greatest technological threat to ensure continued access to digital contents.

Sustainability of digital object: Digital materials are especially vulnerable to loss and destruction because they are stored in fragile magnetic and optical media that deteriorate rapidly. Besides, it can fail suddenly from exposure to heat, humidity, airborne contaminants, or faulty reading and writing device. In some case digital object have a very short span of life coverage comparing to hard backed traditional copy. This may be a problem for digital preservation.

***Inappropriate budget*:** Digital preservation requires new and sophisticated technology and trained manpower which requires additional expenditure for the concerned institution. In this case if adequate budget is not provided, digital preservation project may be greatly hampered.

Intellectual Property Rights: Digital technology gives libraries an excellent opportunity to improve their services. It also provides new ways and means of preservation and dissemination of library collections. But, as digitization practice involves in migration of original products, Intellectual Property Rights may hinder transforming the originality and also disseminate the same.

Shortage of skillful manpower: Digital preservation requires trained and technologically skilled manpower for proper management of resources. But getting such manpower some times become very difficult.

Lack of national level collaboration: There is no legal framework in Bangladesh for maintenance and preservation of resources that bears national importance. Besides, in most case digital preservation is poorly understood and poorly funded which is a barrier to success.

Nature of storage medium*:* Digital storage media, whether magnetic or optical, are subject to relatively rapid decay: especially when compared with print. The hardware and software - digital information is machine-dependent, and to be 'read' accurately it needs specific computer hardware and software.

Unfortunately, hardware and software quickly become obsolescent or otherwise unusable.

Media failure: The most familiar problems in digital preservation are media failure or deterioration and rapid changes in computer hardware and software that make older systems obsolete on a regular basis.

DIGITAL PRESERVATION PRACTICES IN BANGLADESH

Bangladesh is a developing country of South Asia. The information systems, both in the public and private sectors of Bangladesh, are not effective due to inadequate allocation of financial support of respective authorities. But the developments in information and communication technology (ICT) for the last few years have changed the scenario in Bangladesh. Like other developed countries, Bangladesh embraces the concept of establishing digital preservation. Many public/private universities, government and non-government organizations have initiated their efforts towards digital preservation of their important resources and launched their digital resources to the internet.

Bangladesh National Archives is the pioneer in the field of digital preservation practice in Bangladesh. For ensuring long term preservation, in 2002, BNA initiated a five year (2002-2007) digitization project entitled "Digitization of District Records Collected from 1760-1900". The project's primary aim was to carry out traditional resources into the long-term preservation centre. The project also aimed to establish a strategy and methodology for permanent digital archiving of electronic versions of core resources of the centre. But the project failed to achieve its success due to proper planning and other barriers. As a result when the project ended in 2007 only150 District records on CD and more than 1000 records on DVD were found digitized though the expectation was much grater (Shuva, 2009). In 2012, BNA has taken a new initiative for digitization its resources and also to make available its resources to global community through website. The project is going on till date.

International Centre for Diarrhoea Disease Research and Rehabilation, Bangladesh (ICDDR, B) Library developing the digital preservation using DSpcae software. Research projects/protocols of ICDDR, B, manuscript and published articles in other international

journals, book chapters, conference papers, etc are being uploaded in this system. Till August 5, 2012 about 3845 records preserved in the system.

Ayesha Abed Library of BRAC University started preserving its repository since June, 2008. BRAC University is the first university in Bangladesh to establish a Digital Institutional Repository using open source software DSpace. The program is funded by the International Network for the Availability of Scientific Publications (INASP). Up to August 5, 2012 more than 1478 records on various aspects are being preserved.

Independent University, Bangladesh Library has taken an initiative to manage its intellectual output with the help of open source software: DSpace. The Library's IT personnel are working in this regard. Besides, East West University Library also launched preservation services with Greenstone Digital Library Software. EWU Library is enriching its collection in the form of audio collection, video collection, newsclippings, Bengali collection, e-book and thesis collection (EWU, 2012).

Press Institute of Bangladesh (PIB) has a strong preservation wing. The wing regularly preserves four newspapers in digitized form. Copies of newspapers are scanned and stored in CDs so that users can use it through computer and take necessary information through print out. The library and newspapers archives also preserves about 265 subject wise newspaper clippings on national and international events and issues. Besides, a Chronology of important national and international events and issues related to media and allied areas published in the national dailies in Bangladesh are also preserved in the library and its newspapers archives.

Bangladesh Journals On Line (BanglaJOL) is a service to provide access to Bangladesh published research, and increase worldwide knowledge of indigenous scholarship. Some preservation initiatives have also been taken by BanglaJOL (www.banglajol.info) with the help of International Network for the Availability of Scientific Publications (INASP) and digitize all journal articles published in Bangladesh. The objective of BanglaJOL is to improve the visibility of the participating journals and the research findings they carry. All the

materials available on BanglaJOL are free to search, view and browse. Till August 05, 2012 BanglaJOL preserves around 7936 articles in various disciplines.

D.Net, a new firm has recently been introduced in the knowledge management community, which deals with electronic resources in Bangladesh. They have a separate, Knowledge Management Division (KMD) to digitize their resources with provisions for accessing digitized resources through Internet (Chowdhury, 2011).

Digital Archive on Agricultural Theses and Journals of Bangladesh was established with financial help from Window 3 (University-wide Innovation) of Academic Innovation Fund (AIF) of Higher Education Quality Enhancement Project (HEQEP) under University Grants Commission of Bangladesh (UGCB). MS/M.Sc. and PhD Theses/Dissertations and Journals of Bangladesh Agricultural University (BAU), Mymensingh; Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur and Sher-e-Bangla Agricultural University (SAU), Dhaka are included in this digital archive. This innovation is supposed to link with the websites of BdREN (Bangladesh Research and Education Network) and respective universities for focusing more user groups.

CONCLUSION AND RECOMMENDATIONS

Preservation of digital materials is gaining increasing importance for a wide range of activities in education and research. Many countries have recognized the need of digital preservation and emulated specific programs. Libraries around the world have been working on this daunting set of challenges for several years now. They have instigated many digital preservation initiatives, projects and have formed various national schemes to develop the preservation methods. There are national initiatives springing up in Australia, Netherlands, Japan and other countries. Bangladesh should not be legging behind. Although some libraries and archival institutions in Bangladesh have been initiated to implement digital preservation practices, yet those are in preliminary stage. Hence, government as well as other concerned organizations should take following initiatives for implementing digital preservation practices:

Policy formulation: The Information and Communication Technology (ICT) industry should be made aware of the need to take preservation requirements into account. Formulation and implementation of digital preservation policy is of vital importance and all archival institution should put one together as a matter of urgency.

Specialized training*:* Preservation of digital resources requires new organizational structures, new approaches and new ways of thinking. Programmes will have to focus, not only on technical aspects, but also on training staff to deal with a changing environment and new direction. Library staff should be given on-the-job training in ICT applications relevant to digital preservation. They could undergo external training programmes to attain the person-work-fit in a digital preservation.

Instant IT support: Libraries should engage a reputable IT company for the purchase of reliable ICT facilities/equipment to tackle system failures. A maintenance programme should be part of the park with the vendors.

Enhance collaboration: Preservation of digital resources requires commitment and involvement of government, policy makers, producer of information and software industry. Hence, large scale cooperation and collaboration are needed. Besides, there is also the need for collaboration among libraries and archival institutions for sustainability.

Backup system*:* There should be appropriate backup system of the digitized resources. These may be either on DVDs or any other external hard drives. The digitization team should always make alternative copies to ensure availability in any other damage case.

Development of infrastructural facilities: Required infrastructure should be ensured for the preservation as well as handing of the archives. There should be a modern laboratory equipped with latest technological facilities required for effective conservation of archives.

Adequate fund support*:* Government as well as concerned organization should allocate sufficient funds to implement and run full-fledged digitization environment of resources.

Human resource development**:** Human resources are the most important factors of the successful use of any technology in a library. Special and adequate training programmes should arrange in handling

and exploiting new digitization technologies and their utilities. Special and relevant training is essential for IT administrative personnel. They should acquire the skill of exploiting new technologies to the best of their advantage for increased productivity.

Awareness: Awareness of preservation issues should be raised with producers of digital information. They should realize the importance of the use of standards and open source software and of adequate description and documentation.

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