Digital Preservation

[1]Matthew N.O. Sadiku, [2]Adebowale E. Shadare, [3]Sarhan M. Musa
[1, 2]Department of Electrical & Computer Engg., Prairie View A&M University, Prairie View, TX 77446, United States
[3]Department of Engineering Technology, Prairie View A&M University, Prairie View, TX 77446, United States

Abstract: The digital preservation involves developing effective strategies for ensuring the long-term preservation of digital collections. It uses methods and technologies that ensure digital longevity. Its main objective is to ensure long-term access and usefulness of digital materials. This paper provides a brief introduction to digital preservation.

Keywords: digital preservation, digital archiving, data preservation, e-preservation

I. INTRODUCTION

A revolution occurred in the information storage field with the invention of electronic storage media. Today, information is being generated and used in the digital realm.

However, digital information is relatively fragile and can easily be lost. Digital data can be lost, for example, when computer crashes.

Digital preservation (DP) is the management of digital information so that it can be accessed and used in the future. Digital technologies allow information to be created, manipulated, and stored with ease. Efforts are aimed at preserving various digital materials such as electronic records, emails, blogs, social networking websites, national elections websites, web photo albums, learning materials, cultural artifacts, online publications, digital audio resources, e-journals, technical reports, e-records, project documents, scientific data, theses, and dissertations. Archival appraisal is the process of identifying materials to be preserved by using several factors such as their permanent value [1].

II. STRATEGIES FOR DIGITAL PRESERVATION

Preservation of digital information is hard because as newer digital technologies rapidly appear and older ones are disappear, information based on obsolete technologies soon becomes inaccessible. See Figure 1 for the complexity of DP. Techniques for the preservation of digital information include technology preservation, technology emulation, information migration, and encapsulation [2].

- *Technology preservation*: One way to preserve digital information is data redundancy. We make sure we have many copies of important files. We copy the digital information onto newer media before the old media becomes so obsolete that the data cannot be accessed. This copying or refreshing mitigates against lost through computer crashing.
- *Technology emulation*: Emulation involves using a program that imitates the original, obsolete hardware or software. This requires that the emulator be updated periodically.
- *Information Migration*: This involves the periodic transfer of digital objects from one hardware and software generation to another. It is the transferring of data to newer environments. This strategy could be facilitated through application programs that are backward compatible.
- *Encapsulation*: This strategy involves making the details of how to interpret the digital object part of the encapsulated information. It increases the compatibility of data between computer applications.
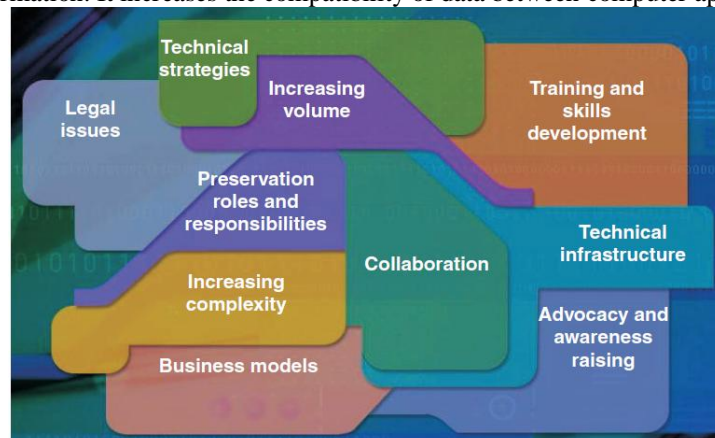

Figure 1:   A complex picture of digital preservation [4].

III. DP INITIATIVES

Although media archives have been implementing digital preservation, a robust take-up of digital preservation standards such as OAIS (Open Archival Information System) has not occurred. However, a number of initiatives have been taken in US, UK, Australia, and other parts of the world.

The Research Libraries Group (RLG) is an international consortium of close to 160 members including universities, colleges, libraries, archives, and historical museums. Its goal is to "improve access to information that supports research and learning" [3].

The Digital Preservation Coalition (DPC) was formed in February 2002 in the United Kingdom in the belief that no single organization or country, can adequately address all the challenges facing digital information. Memoranda of Understanding have been established between the DPC and the UK National Preservation Office, the National Library of Australia and the Library of Congress [4].

In Australia, the National Library of Australia (NLA) has taken a number of collaborative initiatives. They include the Preserving Access to Digital Information (PADI) project AND the Preserving and Accessing Networked Documentary Resources of Australia (PANDORA) strategy [5].

IV. CHALLENGES

Can we preserve a digital material for a long time, say for one-hundred years? Is preservation cost affordable? What do we gain by preserving them? Digital preservation faces a variety of challenges including legal issues, intellectual property rights, digital rights management, systems interoperability, metadata standards, and proliferation of document and media formats. These challenges affect all major public archives, both in the United States and around the world. In developing countries, other challenges include digital divide, lack of institutional support, lack of awareness of the challenges surrounding digital preservation, lack of standards, lack of funds, lack of skilled manpower, and lack of equipment [6].

It is not clear whether the government will allow the copying required for digital preservation. In the United States, the Digital Millennium Copyright Act (DMCA) permits authorized institutions to make up to three digital preservation copies of an eligible copyrighted work [7].

Software programs and other technologies can be easily superseded by newer ones and become obsolete. For example, finding a computer with a 3 ½" floppy drive is hard.

Digital documents are vulnerable to loss due to decay and obsolescence of the media. There is as yet no guarantee that digital information will be readable in the future. Libraries and archives continue to struggle with decrease in financial resources.

V. CONCLUSION

Digital preservation ensures access, authenticity, and integrity of digital objects over long periods of time. It is a technical process, a social and cultural process, is a legal process, and a question of responsibilities and incentives. Preservation strategies must conform to nationally and internationally standards and practices. It is hoped that libraries will commit themselves to archive their digital materials and that digital preservation will ensure that library materials remain accessible for future generations. Since the future is hard to predict, no digital preservation can be guaranteed to work.

REFERENCES

[1] "Digital preservation," *Wikipedia*, the free encyclopedia https://en.wikipedia.org/wiki/Digital_preservation
[2] K. H. Lee et al., "The state of the art and practice in digital preservation," *Journal of Research of National Institute of Standards and Technology*, vol. 107, no. 1, Jan-Feb. 2002, pp. 93-106 (published online).
[3] M. Hedstrom and S. Montgomery, *Digital Preservation Needs and Requirements in RLG Member Institutions*. Mountain View, CA: Research Libraries Group, December 1998.
[4] M. Jones, "The Digital Preservation Coalition," *The Serials Librarian*, vol. 49, no. 3, 2006, pp. 95-104.
[5] A. Howell, "Perfect one day—digital the next: challenges in preserving digital information," *Australian Academic & Research Libraries*, vol. 31, no. 4, 2000, pp. 121-141.
[6] E. S. Gbaje and Z. Mohammed, "Digital preservation policy in national information centres in Nigeria," *The Electronic Library*, vol. 31, no. 4, 2013, pp. 483-492.
[7] A. Muir, "Digital preservation: awareness, responsibility and rights issues," *Journal of Information Science*, vol. 30, no. 1, 2004, pp. 73–92.

ABOUT THE AUTHORS

Matthew N.O. Sadiku is a professor at Prairie View A&M University, Texas. He is the author of several books and papers. He is an IEEE fellow. His research interests include computational electromagnetics and computer networks.

Adebowale Shadare is a doctoral student at Prairie View A&M University, Texas. He is the author of several papers. His research interests are in the area of smart grid EMC, computational electromagnetics and computer networks.

Sarhan M. Musa is a professor in the Department of Engineering Technology at Prairie View A&M University, Texas. He has been the director of Prairie View Networking Academy, Texas, since 2004. He is an LTD Spring and Boeing Welliver Fellow.