

Study Report on Measures for Long-Term Preservation of Digital Information (2019)

Executive Summary

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1. Purpose

In Japan, efforts for long-term preservation of digital information and sharing of technical information among libraries, archives, and other organizations have not been sufficiently promoted. In 2019, the NDL conducted a survey on recent literature, a fact-finding survey on overseas institutions, and a survey on related products in Japan. This report summarizes the results of the analysis to provide a multifaceted overview of the latest trends related to the long-term preservation of digital information.

The term *digital information* used in this report refers to all materials (also referred to as *digital materials*) recorded in digital format.

2. Structure of this report

Chapter 1 outlines the results of the analysis of the survey conducted this time so that readers can understand the content of this report as a whole, and provides basic information for reading this report, including migration emulation, the OAIS reference model, and metadata for long-term preservation.

Chapter 2 onwards consists of the details of the survey conducted and the results of its analysis. Chapter 2 summarizes the research trends and literature review on preservation policies related to long-term preservation in foreign institutions. Chapter 3 summarizes the questionnaire and the interview survey conducted to understand the actual efforts of foreign institutions, and Chapter 4 summarizes the product survey for long-term preservation available in Japan. In addition, a summary of each chapter is given at the beginning of Chapters 2 through 4.

3. Survey summary

(1) Literature review of foreign institutions (Chapter 2)

i. Survey of research trends

We conducted a survey on articles regarding the long-term preservation of digital information presented at international conferences and papers listed in various literature databases.

As a result of the survey of these dissertations, we noticed that an increase in content regarding cost effectiveness of preservation of the digital information, examination and popularization on the OAIS reference model, development of various software, and progress of the technological development of emulation.

ii. Survey on preservation policies

Based on previous studies of preservation policies of foreign libraries, archives, and other institutions, we surveyed the preservation policies published on websites for the 20 institutions listed in Appendix 1 (in Japanese), after establishing categories for analyzing the content described in the policies.

As a result, we found that there were many cases of “policies regarding the scope of the subject of digital information (content of data)”, “policies regarding organization (roles and responsibilities) to preserve data”, “policies regarding preservation strategies and plans”, and “policies regarding access and use”. Overall, there were a large number of institutions that have adopted standards such as the OAIS reference model, PREMIS, and METS, and participated in standardization activities.

(2) Fact-finding Survey of Overseas Institutions (Chapter 3)

Through questionnaires and interviews with overseas libraries and archives, we confirmed the types of digital information they hold and surveyed how specifically they implement preservation measures. The questionnaire was sent to 138 institutions, and responses were obtained from 11 of them (see Appendix 3 (in Japanese)). The interview survey was conducted for 11 institutions, including national libraries in the United Kingdom, Germany, France, the Netherlands, and the United States.

As a result of the survey, the following features were found:

- The technology and methods used for long-term preservation differed from institution to institution, with some institutions using their own systems or systems that were only popular in their own countries.
- Many of the institutions responded that they are conducting migration, and many of them responded that they had built systems that allow them to save their data together on servers or in cloud environments. Optical disks and USB memory sticks are the target of migration.
- Many institutions adopted common recording media such as hard disks, cloud environments, and tape media as the storage media for migrated data.
- Few institutions had a comprehensive preservation policy that included the use of the data, but many of them answered that they would consider preservation, including the environment for use, in the future if necessary.
- Several institutions indicated PREMIS, METS, Dublin Core, and MODS as the metadata schemas they refer to.
- Many institutions answered that they participated in the activities of related organizations such as the Digital Preservation Coalition (DPC), Open Preservation Foundation (OPF), and Controlled Lots of Copies Keep Stuff Safe (CLOCKSS).
- According to the survey results, the most significant challenge for many institutions regarding the long-term preservation of digital information was how to deal with rapidly growing collections of materials. Some institutions also cited staff training as an issue.

(3) Domestic Product Survey (Chapter 4)

Possible devices and methods used for long-term preservation include optical disks, tape media, RAID and other methods utilizing hard disks, and cloud storage. In this regard, we surveyed 27 products and services available in Japan (see Appendix 4 (in Japanese)).

The life of optical discs varies greatly depending on the product. For Blu-ray discs, DVDs, and CDs, etc., for recording purposes, ISO/IEC 16963 defines test methods for life estimation. Optical discs that

can be stored for 30 years or more are called long-term preservation optical discs, and recently, several discs with expected lifetimes of 100 years or more have appeared based on lifetime estimation tests. However, there are some points to keep in mind for those disks, such as the availability and longevity of the device (drive) and the need to inspect and migrate the media periodically.

The well-known tape media for long-term preservation is LTO (Linear Tape-Open), which was jointly developed by U.S. magnetic tape manufacturers. In addition to being relatively inexpensive and high capacity, the media itself is lightweight and more robust during transportation than hard disks. They are expected to have a life of 30 years and are often used for backup purposes.

RAID is another possible method of utilizing hard disks. RAID can be operated as a single virtual hard disk with redundancy by combining multiple hard disks that are not suitable for long-term preservation when used alone.

When using a cloud storage service, each institution can entrust the maintenance of storage devices and measures against deterioration of recording media to an external service. However, it is important to note that there is a risk that users may need to change their storage plans for each service, or that users may have to pay for data retrieval, making it difficult to migrate from one service to another. Users should have a good understanding of the characteristics of each product or service when using them, and should select the product or service that suits the situation of each institution.

4. Reflections on the Survey

At present, no solutions that can be called best practices have been found in foreign institutions, but each institution recognizes that the long-term preservation of various digital information is an issue and is working on it. We will continue to monitor trends in foreign institutions and share information.

As for domestic trends, the Digital Archive Japan Promotion Committee and the Practitioner Review Committee (control tower: The Intellectual Property Strategy Promotion Bureau, Cabinet Office), of which the National Diet Library is a member, are currently formulating guidelines for long-term preservation in digital archives, while compiling a report on the status of members' long-term preservation efforts and domestic issues.