Research on Accessibility of Digital Documentation on Physical Media across Different Versions of MS Windows

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ABSTRACT
This poster presentation describes the results of a research project conducted by the National Diet Library (NDL), which investigated the accessibility of digital documentation stored on physical media across different versions of operating systems. This project was conducted from 2012 to 2013 as a part of a larger research project to investigate the practicality of long-term preservation and use of digital library materials stored by the NDL on physical media.

General Terms
Preservation strategies and workflows

Keywords
Long-term accessibility, Media Collection, Digital Preservation

1. BACKGROUND
The National Diet Library (NDL) is the sole national deposit library in Japan and is responsible for developing and preserving a comprehensive collection of material published in Japan as part of the cultural heritage of both the present and future generations.

Since the NDL Law was amended in 2000, the NDL has been collecting digital material stored on physical media such as floppy disks, MOs, CD-ROMs, DVD-ROMs, USB flash drives and Blu-ray Discs under the legal deposit system. The NDL classifies these digital materials into three categories: audio material (e.g. audio CDs), video material (e.g. films on DVD), and digital documentation that is neither audio nor video.

There is a great variety of digital documentation that cannot be classified as either audio or video. For example, applications that retrieve corporate information from databases stored on CD-ROMs, residential and other special-purpose maps, archival databases of past issues of newspapers and magazines, supplements to monographs, software programmes, and conference proceedings. The NDL also collects video games. This digital documentation comes on a wide variety of physical media, including optical discs such as CD-ROMs, CD-Rs, CD-RWs, DVD-ROMs, and Blu-ray discs, as well as magnetic storage media, such as floppy disks and USB flash memories. The majority of digital documentation held by the NDL, however, is stored on optical discs, and therefore we specifically focused on optical discs in this research.

As of FY2014, the NDL had acquired some 121,000 optical discs and continues to acquire roughly 8,000 new items each year.

Digital documentation is only accessible via service terminals (Windows PCs) located in the reading rooms at the Tokyo Main Library or other NDL facilities. There are also some stand-alone terminals used for viewing certain materials that must be isolated from any network for security reasons. The digital documentation of most interest to patrons appears to be archival databases of newspapers, specialized maps, databases of securities reports or other corporate information, and conference proceedings.

2. OBJECTIVE
During 2011, the NDL completely replaced its integrated library system, including the service terminals in reading rooms. At the same time, the operating systems for service terminal were changed from Windows XP to Windows 7. This upgrade caused some trouble in terms of the accessibility to digital documentation. As a result of this change, a significant number of digital documents were no longer readily available for use due to incompatibility with the new operating system.

To better understand this issue, the NDL conducted a research project from 2012 to 2013, which examined the accessibility and usability of digital documentation by determining which versions of the operating system were needed for the digital documentation to function properly.

3. METHOD
For this research, 52 digital documents were selected as test documents. 21 of the test documents were documents that had been reported as having failed to install or execute properly on the Windows 7 service terminals. Another 31 materials were chosen at random based on publication date, versions of Windows, or other attribute. All 52 documents were stored on optical discs.

A breakdown of the 52 test document is as follows: 7 documents were designed to operate on Windows 3.1, 6 items on Windows 95, 4 items on Windows 98, 1 item on Windows ME, 8 items on Windows 2000, 13 items on Windows XP, 8 items on Windows Vista, and 5 items on Windows 7.

These documents were tested in the following environments: Windows 7 (32 bit), Windows 7 (64bit), Windows XP (SP3), Windows 2000, and Windows 95.

We attempted to open each test document in each of the environments listed above from the latest (Windows 7) to the oldest (Windows 95), and rated each document as being playable, playable with additional application attached to the material, partly playable, or unplayable. Some documents were rated as unplayable,

because an additional application needed to open the document was not attached.

Each document was tested to see if: the necessary files could be installed, the document could be opened, the document could be used properly (including searches or operations), and the document could be displayed properly (text, graphic image, video, audio).

4. RESULT

The final results of this evaluation process are shown in Table 1. The figures shown represent a percentage, calculated by dividing the number of documents that passed the test by the total number of documents. There were 8 documents that were excluded from the figures for Windows 2000 and Windows 95, because they were not tested due to hardware problems.

Table 1. Percentage of documents that were compatible with each environment

	Playable	Playable with additional application	Partly playable	Unplayable
Win 7 (32)	48%	10%	8%	35%
Win 7 (64)	38%	12%	8%	42%
Win XP	65%	6%	13%	15%
Win 2000	59%	5%	11%	25%
Win 95	45%	7%	5%	43%

Major issues encountered during testing are as follows.

-Some documents were installed successfully but failed to run properly. In one case, installation completed properly, but the start menu never appeared.

-Some documents required specific playback applications other than those normally packaged with Windows computers, or specific plug-ins for a specific application.

-Some documents required a specific framework for installation and execution. In one case, Microsoft .NET Framework 1.1 was required.

-Some documents were compatible with only one version of Windows. (Primarily, Windows 7 (64 bit))

-Some documents were not installed due to missing files or information.

5. CONCLUSION

We found that Windows XP was compatible with more documents than any other version of Windows. We assume that this is related to the fact that Windows XP was intended to be compatible with both MS-DOS-based Windows 9x and Windows NT-based products.

We also found significant incompatibility between 32-bit and 64-bit versions of Windows. We found many documents that would either not install or not run properly on the 64-bit version of Windows 7.

Before conducting this research, we assumed that the newer documentation would have greater accessibility and usability. The results of this research, however, demonstrate that this is not entirely true. In fact, the older test documents, which were created on Windows 3.1, had a higher level of compatibility than newer documentation. We speculate that, since this documentation was published in the early days of physical media, it does not have the more complex programmes or strict copy protection used for documentation that was published in the later years.

Still, this study was conducted on a relatively small number of test documents, and these results could change significantly if conducted with a different set of test documents.

Apart from issues with the different versions of Windows, there were other factors that resulted in errors during installation or running of these documents. Some documents need specific applications to install or operate properly, such as Acrobat Reader, Quicktime, or Shockwave. During this research, there were several cases in which the necessary applications were not supplied with the original materials. Therefore, these materials could neither be installed nor executed.

There was also some documentation that required serial numbers, passwords or product keys for installation or activation. The problem here is that such information is frequently not readily accessible. For instance, in one case, the necessary information was stored on floppy disks, which are now obsolete. Since the service terminals are not equipped with 3.5” floppy disk drives, it was difficult to extract the necessary information.

The result of this research suggests that, in order to maintain a proper playback environment, it is essential to preserve not just the actual documents but all passwords, product codes, application software, and other items needed for installation and execution of the digital documentation.

We also investigated availability of the same content online or in alternative media, and found that little of it was readily obtainable.

6. REFERENCES

[1] *The Long-term accessibility of packaged digital publications (NDL Research Report No.6)* http://www.ndl.go.jp/en/aboutus/dlib/preservation/research_report2006.html (retrieved on 2015/6/5)