Digital Preservation – Some Policy and Legal Issues

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Abstract

The technical problems of digital preservation are overshadowed by much larger problems involving organization, policy, and roles and responsibilities. This paper focuses on national libraries as archives since they are generally mandated by law to maintain deposit collections (legal deposit), somehow guaranteeing the long-term preservation of these materials. However, with the exponential growth of digital information, it is obvious that not everything can be preserved and that selection policies are necessary. Using metadata as a means of managing the process of preserving digital information is likewise important.

Keywords

Archives, Digital Preservation, Legal Deposit, National Libraries, Preservation Metadata, Selection Policies

ディジタル資料の保存について　－　方針と制度の観点から

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概要

ディジタル資料の保存における技術的な問題も広く認識されてはいるものの、保存のための組織および方針、役割、責任範囲といったより大きな問題の陰に隠れているように思われる。本研究では、文化的財産の保存を目的とし、法律に基づいて納本される出版物を収集蓄積する国立図書館を、長期に渡って資料の保存に責任を持つアーカイブとして位置付ける。近年のディジタル資料の爆発的な増加によって、全ての出版物を保存するということが困難であることが明らかになったのみならず、保存の対象とする資料を選定することが必要であることが明らかになってきた。一方、こうした背景の下、ディジタル資料の保存のためのメタデータを利用することも広く行われるようになってきた。

キーワード

アーカイブ，ディジタル資料の保存，法定の本，国立図書館，保存のためのメタデータ，資料選定方針

1. INTRODUCTION

In 1996, the Commission on Preservation and Access (CPA), which is now called the Council on Library and Information Resources (CLIR), and the Research Libraries Group (RLG) issued the final report of the Task Force on the Archiving of Digital Information with the alarming conclusion that there is, at present, no way to guarantee the preservation of digital information, and it is not simply a technical problem but a social one. Paul de Man, an American literary critic, is said to have remarked "Technology burns history, leaving no material residue" (Graham, 1995).

1.1 Technical strategies

Preservation of digital information is being looked at from at least three points of view: physical medium preservation, technology (i.e. hardware and software) preservation, and intellectual or content preservation. Digital information is fragile in ways that differ from traditional technologies, such as paper or microfilm (Hodge, 2000). The key technical approaches for keeping digital information alive over time were first outlined in the 1996 Task Force Report (Figure 1).

However, preserving bits is only a small part of the problem. This problem is overshadowed by much larger problems involving organization, policy, and roles and responsibilities. The International Council for Scientific and Technical Information (ICSTI) sponsored a study in March 1999 aimed at identifying emerging models and best practices for digital archiving, wherein technology was considered of secondary interest to the understanding of policy and practice.

1.2 Need for the right legal environment

A serious commitment to preserving digital information requires a legal environment that enables preservation. Increasingly restrictive intellectual property and licensing regimes will ensure that many materials never make it into library collections for preservation (Kuny, 1998). Current intellectual property laws inhibit an archive or library from preserving information in digital form, particularly since much of the digital information they acquire is licensed rather than owned. A study on copyright by the National Academy of Science (National Research Council, 2000) strongly recommended that intellectual property laws be changed to permit these institutions to legally preserve information in digital form.

1.3 Need for certain organizations to be responsible

Digital preservation also means that specific organizations must take responsibility for preservation by enacting new polices and creating the economic means to secure survival of this generation's knowledge into the future. While preservation and access are increasingly interwoven in the electronic environment, it would be helpful to separate them in this paper. The biggest challenge presently associated with digital archiving has to do with preservation. If digital information is not actively and repeatedly updated, the technology used to read and interpret it is likely to become obsolete. How do we ensure that materials in digital formats are preserved and remain readable when the technological environment is changing rapidly? Much has been written about this problem, and as the 1996 Task Force Report had confirmed there is no purely

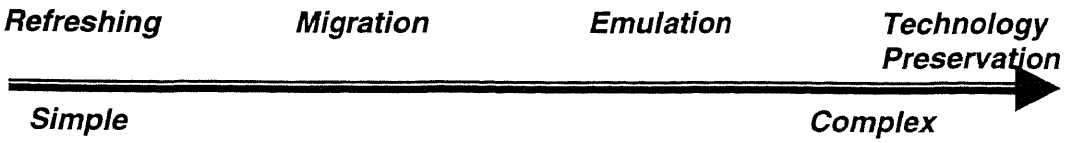

Figure 1: Proposed Technical Strategies for Digital Preservation

technical solution. The issue of archiving does not have to do fundamentally with technology, but rather it is about organizations and resources. A simple model of an archive environment is shown in Figure 2.

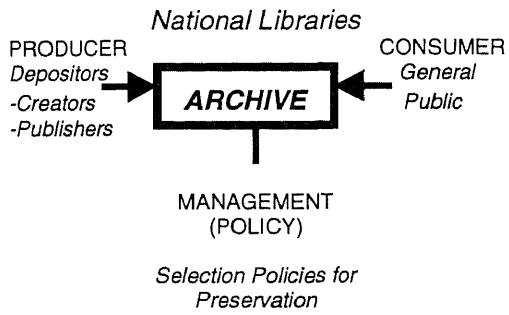

Figure 2: Archive Environment – A Simple Model

1.4 Need of having selection policies

A selection policy for the purpose of preservation is essential. "In the network environment, any individual can be a publisher and the networked publishing process does not always provide the initial screening and selection at the manuscript stage on which libraries have traditionally relied on in the print environment" (National Library of Canada, 2000). Much of the literature discusses institutional policies and guidelines on how to select materials for digitization to create digital surrogates for preservation and broader access. Several collection development policies also exist dealing on how to select "physical format" digital publications, i.e., those publications issued on media such as floppy disk and CD-ROM. However, written policies for selecting online publications available only on the Internet are not very common. Guidelines hardly exist for these networked digital materials that are also called web documents, Internet publications or online materials (PADI subject gateway). Stakeholders realized though that it is simply not practical to accept all potential data without some selection because there is simply too much data available. A higher degree of selectivity is therefore necessary for online publications than is the case with print. Generally, the policy must be based on users' likely needs and demands, and also must be able to:

1) Attempt to predict data sets which are endangered;
2) Identify strategically important data sets;
3) Fill gaps (e.g. missing parts of a series, out-of-print materials);
4) Build specialist collections;
5) Widen holdings.

1.5 Need for metadata

There is also the need for documentation. Documentation (in this case, metadata) is best produced by depositors, but they need persuasion, help, and guidance to encourage them to produce and deposit it. The format/s in which documentation is kept need to be considered; appropriate format and media are important for ease of use and of delivery. Furthermore, the preservation of documentation is also critical, as data without its documentation is worthless. Consequently, documentation becomes a resource in its own right, and thus its preservation becomes a critical requirement. At this point in time, extensive metadata is our best way of minimizing the risks of a digital object becoming inaccessible. Properly used, metadata can:

1) Identify the name of the work, who created it, who reformatted it, and other descriptive information;
2) Provide unique identification and links to organizations, files, or databases which have more extensive descriptive metadata about this work (this is particularly important in the event that the digital file and its metadata become separated);
3) Explain the technical environment needed to view the work, including applications and version numbers needed, decompression schemes, other files that need to be linked to it, etc.

Preservation metadata, therefore, may be used to store all this technical information that supports preservation decisions and actions. In contrast to descriptive metadata schemas (e.g. MARC, Dublin Core), which are used in the discovery and identification of

digital objects, preservation metadata largely falls into the category of administrative metadata, assisting in the management of information.

The Open Archival Information System (OAIS) Reference Model has been utilized by many initiatives developing preservation metadata sets. It provides a useful reference point to ensure all relevant information required for preservation has been included. National libraries included in this study were selected based on this common feature. All are using the OAIS model as their framework in developing their own preservation metadata sets.

The work being undertaken by the Research Libraries Group (RLG) and OCLC is complementary to this study and that keeping watch on the developments of this Working Group would be beneficial. In the CURL/JISC/ RLG/OCLC – sponsored Digital Preservation Conference held last 2000 December in the U.K., Brian Lavoie of OCLC described the work of the joint OCLC/RLG Working Group on Metadata for Digital Preservation (RLG DigiNews, December 2000). He mentioned that this metadata effort is using a consensus-building approach to identify a comprehensive metadata framework to support a broad range of digital preservation activities. In the same conference, Lavoie described a white paper written to launch the work. The white paper, to be made publicly available in 2001, describes the current thinking and practice on the use of metadata to support digital preservation. Also highlighting the OAIS reference model as a common starting point, the paper reviews existing metadata element sets from projects and institutions, which were guided by the OAIS model during their work: CEDARS, the National Library of Australia, and NEDLIB. The method and objectives adopted by the OCLC/RLG Working Group methodology are, incidentally, very much similar to those of this research.

2. THE ROLE OF NATIONAL LIBRARIES

One of the main responsibilities of national libraries is to assemble comprehensive collections of the published outputs of their nations, record and organize them for use, and preserve them for posterity. National libraries have been able to develop their print collections through legal deposit, a statutory provision which places a legal requirement on producers of publications to

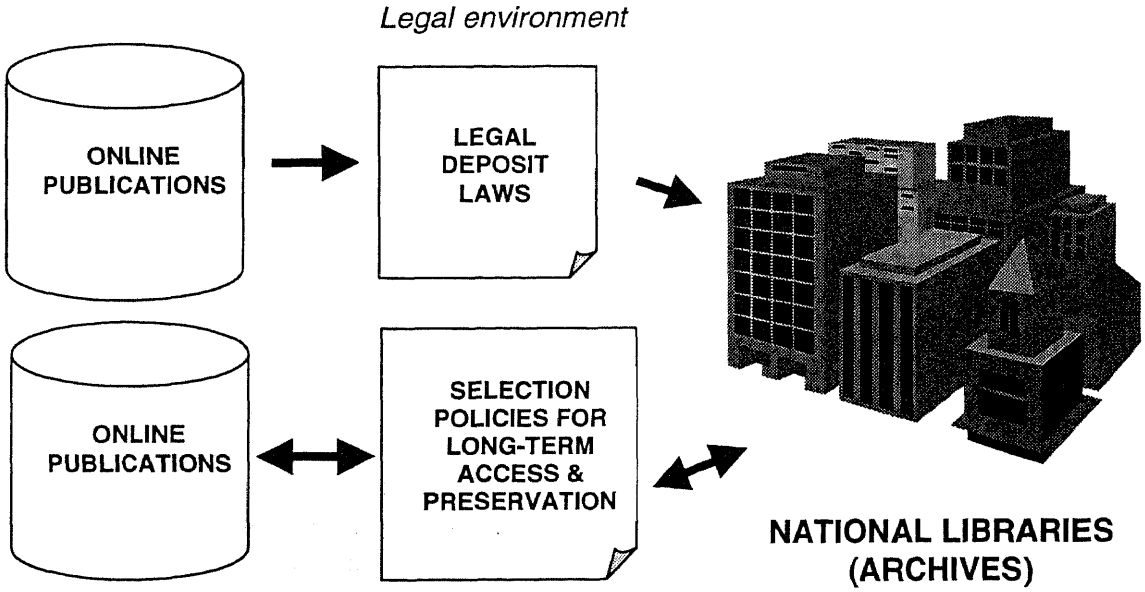

Figure 3: Key Concepts and Relationships

deposit their works in designated institutions. Legal deposit in most countries has traditionally applied to print publications. As other techniques have developed for the production and delivery of publications, and as the number of publications produced in other formats has increased, some countries have put in place revised legal deposit legislation to take account of the newer publishing media. In France, where legal deposit has its origins, there has been a progressive evolution of legislation, the twentieth century having seen the most significant changes. The most recent changes, which came about in 1992, allow for more or less all types of publication to be deposited. The same is true in the U.S. where the copyright law has traditionally been modified to require deposit of new formats as they develop.

2.1 Reasons for legal deposit legislations

Although there are many possible reasons for establishing legal deposit legislation, e.g. to support the collection of national statistics on publishing, to provide materials for exchange purposes, to protect intellectual property rights, it is assumed that the main purposes of legal deposit are to create an archive of national publications and an authoritative national bibliographic record. Virtually all existing legal deposit legislation enables those two essential activities to take place. It is just as appropriate that they should apply to the electronic publishing environment as they do to the print or paper environment, which in reality is easier said than done. Legal deposit of dynamic electronic material, such as on-line databases and publications only available through the Internet, is raising serious copyright problems as well as authentication and preservation issues (Lariviere, 2000).

3. LEGAL DEPOSIT OF ONLINE PUBLICATIONS: A CURSORY SURVEY

Legal deposit is established either through an Act dedicated to it, or through a Copyright Act and sometimes through the Act of a national repository. Traditionally, legal deposit regulations apply to publications of the country itself. Where the publications of other countries are collected, these can only be collected as imports or as re-published material. In the case of electronic publications, the origins of a publication are difficult to define and for this reason, it will be necessary to consider what should be collected and how. Off-line publications such as CD-ROMs are similar to print in this regard, but online publications are more complex and may involve several countries as sites for production and distribution. Legislation may be required to specify in this case how the national boundary is to be applied.

3.1 Copyright issues

There are several major problems related to legal deposit of online publications vis-à-vis copyright. The first is related to the deposit process itself. The legal deposit of electronic publications necessitates the reproduction of protected works. Exceptions are the off-line carriers, where deposit procedures are quite similar to those for print material, and the cases where publishers/producers of digital documents "deposit" their documents themselves by sending them through the network at the national legal deposit institution, e.g., the CORDS project of the Library of Congress (CORDS stands for Copyright Office Electronic Registration, Recordation & Deposit System). Since digital material might have to be collected through downloading from the master copy on a server, the process raises the issue of permission to reproduce a protected work. Again, national copyright legislation or legal deposit legislation should provide legislative permission to reproduce documents for legal deposit purpose.

The second issue deals with access. Considering that it is widely recognized, at both the national and international levels, that a copyright owner has an exclusive right to communicate a protected work to the public and that most electronic publications need to

be "communicated to the public" in order to be seen and read, the deposit copy of such electronic publications might require a specific exception allowing access to the clientele of the national legal deposit institution.

Another legal issue is the question of ownership. The law should clearly state that the collection is an integral part of the country's cultural heritage and that the sole owner is the national institution responsible for maintaining and preserving it. A good example of such a clear statement of ownership is contained in Canada's National Library Act. However, it should be made clear to both the national legal deposit institution and the publishers that ownership of the collection does not mean ownership of intellectual property rights. A related property issue is the right of the depository to dispose of certain categories of material under certain conditions, e.g. the resource has limited enduring value or potential for re-use. The legislation should include a commitment by the depository that all possible and reasonable efforts will be made to permanently keep all materials deposited, but the legislation should also include a right of disposal.

Finally, a legal issue that is important to consider when preparing legal deposit legislation is the possible conflict with other laws. The two best examples of such a problematic situation relate to pornographic material and hate literature. Even if most countries have laws forbidding the publication, production, distribution, circulation and possession of such material, any such material should be subject to legal deposit. Since both pornographic and hate material may be found on carriers subject to legal deposit (books, periodicals, videos, etc.) and is also extensively available in electronic format, it is worth considering the issue. One of the basic elements of this discussion is the fact that the issue deals with the values of society, which vary from one country to another. One of the objectives of a national legal deposit scheme is to build up a comprehensive collection of published material for preservation and research purposes, and not allowing such material to be deposited might jeopardize the historical and sociological value of the national collection as the prevailing standards of tolerance evolve. From a strictly legal point of view, unless the legal deposit legislation clearly states that such material is not subject to legal deposit, it should be deposited. But after it has been deposited, the depository will have to comply with its jurisdiction's legal requirements with respect to access to material deposited.

3.2 Current status of legal deposit in several countries

Irrespective of the arguments and issues brought forward and all the expected technological problems, as a matter of principle, all electronic publications, both offline and online, should be subject to legal deposit (Lariviere, 2000). Already countries such as Canada, Denmark, Finland, France, Germany, Italy, Japan, and Norway have included provisions in their legal deposit laws to include electronic publications. Most of them, however, are limiting legislation to offline materials, but some countries such as the Netherlands and Finland are including online publications.

Some countries have specifically excluded online publications from any new legislation. The Legal Deposit Act of 1993 in Sweden covers offline electronic documents and certain other non-print media such as microforms but not online publications. A Bill submitted to Parliament in 1995 recommends that not only online databases, but also software such as operating systems, compilers and text-processing programs, be excluded. The French legal deposit legislation of 1992 applies to offline but not to online electronic materials. However, it does apply to databases, software and expert systems and specifies rules of deposit for each category. The Library of Congress receives CD-ROMs on a more or less comprehensive basis through legal deposit. However, it currently

lacks clear authority to collect online publications.

Some countries include non-print publications within their legislation but their coverage is highly selective. In Italy, the existing law of 1939 (revised in 1945) covers print material and videos produced as integral parts of books. In Spain, the existing law of 1971 covers books, periodicals, sound recordings and cinematographic productions; plans for new legislation recommend much wider coverage and will include computer programs, databases, expert systems and other artificial intelligence products. Current legislation in Germany includes offline electronic publications and excludes online publications. It also excludes film works, filmed records, audio-visual displays, and individual photographs.

In Asia, it is only the National Diet Library (NDL) of Japan that made effort to amend its Library Law to make the new legal deposit system include packaged (i.e. CD-ROMs, DVDs and other electronic publications which fixate information in physical media) electronic publications from 2000. However, networked electronic publications are excluded from the time being but those which are considered necessary or beneficial would be collected selectively by contract (NDL Newsletter 112). Other Asian national libraries like Malaysia, China, Indonesia, Korea, Nepal, the Philippines, Taiwan, Thailand, and Vietnam have non-print/audio-visual materials as part of their collection and legal deposit legislation. However, it is not clear whether the law requires the deposit of non-print materials.

The Working Group of the Conference of Directors of National Libraries (CDNL) recommends to include rather than to exclude items if there is any doubt what should be included. It also advises against making a distinction between online and offline forms of electronic publications and suggests both forms be included in countries where there is the possibility of a rapid move towards online publications. It is then up to the national repository to determine which items are required for the national collection.

4. SELECTION POLICIES FOR PRESERVATION: A SUMMARY

If we consider a national deposit library as a library of "last resort" for publications which otherwise may disappear, and as a place where the "published cultural memory" of a nation is kept together and is recorded, the principles of selection and acquisition of material are the same whether we talk about conventional or electronic formats. As a matter of principle and policy, all publications, whether conventional or electronic should at least be considered for acquisition in a deposit collection. In practice, selectivity is forced upon libraries by constraints in resources, storage space, handling capacity, and funding. It has been said that the selection of electronic publications should be limited to those that can be acquired, handled and stored locally by the library. However, in a digital environment one could equally well argue that giving access to publications that reside elsewhere also fulfills one of the major purposes of any library, namely to make information available to its users (although it is not a deposit function).

Dynamic documents, i.e. frequently updated documents or those that change continually over time, pose an acquisition problem that we do not face with conventional texts. Although one would argue for selective acquisition that is frequent enough to preserve all information contained in such a publication during its lifetime, prohibitive costs may well compel a much greater selectivity aimed at only acquiring representative samples (National Library of Sweden's Kulturarw3 Project).

In the 1998 survey of RLG's members conducted by Margaret Hedstrom and Sheon Montgomery of the University of Michigan's School of Information, few institutions reported having policies or even codified practices for preserving "born-digital" and "converted-to-digital", i.e. digitized, materials.

Many institutions are actively working to store and maintain access to their digital holdings, whether or not practice is documented or an institutional policy exists. As the RLG survey documents, creating digital preservation policies is a difficult task. The lack of good models for digital preservation, together with uncertainty about the most appropriate methods and approaches, appear to be major obstacles to developing effective policies and practices.

4.1 Two approaches

Looking also at some web preservation projects among national libraries, two main approaches could be detected. The comprehensive one is represented by the Swedish Kulturarw3 Project, and the Finnish EVA Project. The scope is to collect everything published on the Internet. These projects are collecting millions of documents. Both projects have as their aim the creation and testing of methods and tools for collecting, registration of, and archiving of electronic publications distributed on the Internet, and investigation of conditions for long-term preservation. As with other projects with limited resources, the National Library of Sweden is not collecting as much as it would like. For example, they have only collected examples of electronic newspapers but no publications which are protected by passwords or other hindrances (e-mail, November 2000). Less priority is given to conferences, e.g. usenet groups and discussion groups based on Listserv (which the Norwegian National Library and Brewster Kahle's Internet Archive both collect), ftp archives which are public, and databases. Project EVA of the National Library of Finland, likewise, has as one of its objectives to enhance criteria for selecting electronic documents. Selecting publications first requires some well-defined criteria of what to collect, and deciding if a publication should be archived as such or only its contents while its external appearance may change during conversions.

The selective approach is represented by the PANDORA Project of the National Library of Australia and EPPP (Electronic Publications Pilot Project) of the National Library of Canada, the policies of which are analyzed in this study. Their scope is to collect important publications that can be made accessible at once. They are only collecting thousands of documents. An argument for being selective is that one should not spend limited resources for preserving lots of trash. However, admittedly, doing intelligent selection is difficult and researchers in the future will criticize the way choices are being made now. Computer storage is getting cheaper and cheaper, while the cost of personnel is not.

5. SUMMARY

(1) The first objective of this study aimed to look at the advantages of having selection policies rather than aiming for comprehensiveness citing issues on costs, access provisions, and copyright and Intellectual Property Rights (IPR). The selective approach is represented by the PANDORA Project of the National Library of Australia and the Electronic Publications Pilot Project (EPPP) of the National Library of Canada. Factors that contribute to the benefits of being selective are: (a) the large amount of material of low research value, and (b) the labor-intensive nature of managing online publications with limited staff. Primary focus has been to select only those online publications of national, cultural, or research significance to which long-term access and preservation should ideally be ensured. Decisions are made on the frequency of capture desirable for each title. Most of the time, the publication pattern and stability of the site are additional factors that affect the decision.

(2) Elements contained in general selection guidelines include decisions regarding the following:

- Content
- Multiple versions
- Authority and research value
- Topical issues
- Parameter definitions, e.g. only internal links are archived.

(3) Adapting traditional collection levels for print-based materials to the digital realm can be the most cost-effective means of ensuring appropriate management and continued access to the most important digital resources. Assigning collection levels to digital materials can indicate what preservation decision and action are given to the resource. These levels which have been consolidated from three initiatives i.e., the Berkeley Digital Library SunSITE Project, the Arts and Humanities Data Services, and the National Library of Canada, are now summarized as follows:

Collection Levels & Definitions

- Archived

Material is hosted in the library, and the library intends to keep the intellectual content of the material available on a permanent basis.

- Served

Material is hosted in the library, but the library has not yet made a commitment to keeping it available permanently.

- Mirrored

Material residing elsewhere is hosted in the library, and the library makes no commitment to archiving it.

- Brokered

Material residing elsewhere, but the library has negotiated access to it with a collaborating agency & includes metadata and links for the resource in its catalog.

- Linked

Material residing elsewhere, and the library points to it at that location.

- Finding Aids

Finding aids & metadata held by the library to facilitate discovery and searching of material.

- De-accessioned

Accessioned resources that have not been retained after review.

(4) Most projects dealing with digital preservation recognized at an early stage that metadata is important. The OAIS Taxonomy of Information Object Classes, the information requirements identified for preservation used by several of these projects, was based on the concepts first described in the 1996 Task Force Report as those features that determine information integrity : content, fixity, reference, provenance, and context. Accordingly, the OAIS Taxonomy divides Preservation Description Information (PDI) into Reference Information, Context Information, Provenance Information, and Fixity Information. After comparing the three OAIS-based Preservation Metadata sets, the common preservation metadata elements which can be considered essential to ensure long-term preservation, are the following:

Preservation Description Information

a) Reference Information
   - Persistent Identifier

b) Context Information
   - Relation

c) Provenance Information
   - History of origin
   - Custody history
   - Change history
   - Original technical environments
   - Reason for preservation

d) Fixity Information
   - Authentication indicator

Content Information

a) Representation Information
   - Structure information
   (specific hardware requirements)
   - Semantic information
   (platform, operating system)

6. CONCLUSIONS

(1) Long-term preservation should be undertaken by long-term institutions with stable financing that lasts for hundreds of years. Giving the task to national libraries, thereby widening its responsibility for traditional publications to include digital publications, based on rewriting the legal deposit law, seems to be a good solution for many countries Collection and preservation are best done at one institution with good resources, while indexing and selection might be done in cooperation with other institutions.

(2) There is a relationship between preservation and access in both the traditional and digital environments. Institutions, like national libraries, that are charged with preserving traditional paper-based materials invest heavily in the physical infrastructure which will allow people to access the material they need both now and in the future. Similarly, there is a need to ensure that selected digital materials will also continue to be accessible when they are needed.

(3) An increasing dependence on both digitally produced and accessed information means that there is a rapidly growing body of digital material for which there are legal, ethical, economic and/or cultural imperatives to retain, at least for a defined period of time and, in some cases, forever. If active steps are not taken to protect these digital materials, they will inevitably become inaccessible within a relatively brief timeframe.

(4) Selection for collection building and preservation is mainly human-driven and involves the decision-making process for including or excluding electronic material from the deposit collection. The decision-making process is based on national deposit policies, regulations, and agreements made with publishers and other providers. The selection process is therefore highly dependent of local conditions.

(5) The OAIS Reference Model is applicable to any archive. It is specifically applicable to organizations with a responsibility to make information available for the long term such as national libraries. By applying the OAIS Model, deposit libraries can benefit from the advantages of international standardization. By using a common reference model, a common terminology and a common conceptual framework, it is much easier to share ideas and exchange experiences.

(6) In the library domain, discussion has tended to focus on so-called "item-level" metadata (i.e. descriptions of individual books, articles, etc.) The new environment has new requirements. The "information broker" needs to have access to various types of metadata to support its operation. It is recognized that metadata required for long-term digital preservation is complicated by the levels of "granularity" that can occur within a single digital object or collection of objects. Metadata may be assigned at the level of a complete digital collection, a single digital object, or even, in the case of complex digital material, at the individual file level. In part, the granularity of the metadata will be determined by the digital object itself and the level of description necessary to ensure preservation, but it will also be influenced by collection management policies in place at the archive. In addition, the granularity of the metadata may be influenced by concerns about rights management of some more complex digital objects, for example, where different parties own different components of the content and/or systems. How an archive chooses to assign metadata, and at what level of granularity, are not decisions imposed by a metadata specification. A preservation metadata specification should allow for description at any level but ultimately the decision resides with the archive. For example, both the British Library and NEDLIB, where work is focused on the deposit library situation, have chosen, for justifiable practical reasons, to assign metadata to materials as they have been

delivered to the library (e.g. as produced by the publisher).

(7) The description of collections will become increasingly important in the context of networked library services. A strong view is emerging that libraries need to complement item-based description with description at a higher level. This will complement current work in the archives community and that descriptions at this shared level of granularity will facilitate cross-domain working. Hence, while the value of collection-level description is recognized, there is no standardized way of doing it. UKOLN has developed a preliminary approach in describing the JISC Current Collections, and it has prepared a report that examines collection description in library, archive, and museum domains. This area would be worth looking into further.

7. BIBLIOGRAPHY

1) Beagrie, Neil and D. Greenstein. *Managing digital collections: AHDS policies, standards and practices.* Consultation draft, December 1998.
2) Beagrie, Neil and Maggie Jones. *Preservation management of digital materials.* Pre-publication draft, October 2000.
3) Besser, Howard. *Digital longevity*, 1999. http://www/gseis.ucla.edu/howard/Papers/sfs-longevity.html
4) CEDARS Project. http://www/curl.ac.uk/projects/cedars.html
5) Conference of Directors of National Libraries. *The legal deposit of electronic publications: report of a CDNL Working Group.* Paris: UNESCO, 1996.
6) Consultative Committee for Space Data Systems (CCSDS), CCSDS 650.0-R-1, May 1999. *Reference Model for an Open Archival Information System (OAIS) Draft Recommendation for Space Data System Standards.* http://www.ccsds.org/RP9905/RP9905.html, October 1999.
7) Day, Michael. "*Extending metadata for digital preservation*". Ariadne, No. 9, May 1997.
8) Day, Michael. *Metadata for preservation.* CEDARS project document AIW01. Bath: UKOLN, 1998.
9) *Digital Library SunSITE Collection and Preservation Policy.* <http://sunsite.berkeley.edu/Admin/archived.html>, 1996.
10) Graham, Peter. "*Requirements for the digital research library*". College and Research Libraries, Vol. 56 No. 4, July 1995.
11) Hodge, Gail. *Best practices for digital archiving: an information life cycle approach.* D-Lib Magazine, January 2000.
12) Hodge, Gail. *Digital archiving: Bringing stakeholders and issues together – a report on the ICSTI/ICSU Press Workshop on Digital Archiving.* ICSTI Forum, No. 33, March 2000.
13) Kuny, Terry. "*The Digital Dark Ages? Challenges in the preservation of electronic information*"" International Preservation News, No.17, May 1998.
14) Lariviere, Jules. *Guidelines for legal deposit legislation: a revised, enlarged and updated edition of the 1981 publication* by Dr. Jean Lunn, IFLA Committee on Cataloging. Paris: UNESCO, 2000.
15) Mannerheim, Johan. *The WWW and our digital heritage – the new preservation tasks of the library community.* Paper presented at the 66th IFLA Council and General Conference, Jerusalem, Israel, August 2000. http://www.ifla.org/IV/ifla66/papers/158-157e.htm
16) National Diet Library. *Legal deposit system.* http://www.ndl.go.jp/e/toukan/nouhon_towa.html
17) National Library of Australia. *Guidelines for the Selection of Online Australian Publications Intended for Preservation.* 1999.

http://www.nla.gov.au/scoap/guidelines.html
18) National Library of Australia. *Preservation Metadata for Digital Collections*. 1999. http://www.nla.gov.au/preserve/pmeta.html.
19) National Library of Canada. *Electronic Publications Pilot Project (EPPP): Final Report*. June 1996.
20) National Library of Canada. *Networked Electronic Publications Policy and Guidelines*. October 1998.
21) PADI (Preserving Access to Digital Information) subject gateway http://www.nla.gov.au/padi/
22) *Preserving Digital Information: Report of the Task Force on Archiving of Digital Information, Commission on Preservation and Access and The Research Libraries Group, Inc.*, May 1996, http://www.rlg.org/ArchTF/
23) Project PRISM. http://prism.cornell.edu/overview.htm
24) *RLG Working Group on Preservation Issues of Metadata. Final report.* Mountain View, California: Research Libraries Group, May 1998.
25) Russell, Kelly. *Cedars Document ABS01: Debate and discussion at the Cedars Project Advisory Board Meeting*, May 1999.
26) Stenvall, Jani. *Metadata for preservation of electronic publications*. Helsinki University Library, October 2000 (Translated from Finnish).
27) Stenvall, Jani. *Using Dublin Core as preservation metadata*. Helsinki University Library, October 2000 (Translated from Finnish).
28) Stone, A. and Day, M. *Cedars preservation metadata elements*. Cedars project document AIW02, 1999. http://users.ox.ac.uk/~cedars/Papers/AIW02.html