

Towards a Canadian Digital Information Strategy:

A Review of Relevant International Initiatives

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Table of Contents

1. Introduction.....	1
2. International Digital Information Initiatives.....	3
2.1 Europe.....	3
2.2 United Kingdom.....	6
2.3 France.....	9
2.4 Netherlands.....	9
2.5 Germany.....	10
2.6 Scandinavia.....	11
2.7 Australia.....	11
2.8 New Zealand.....	13
2.9 United States.....	14
2.10 International Standards Development Activities.....	18
2.11 The Situation in Developing Countries.....	19
2.12 E-Government Initiatives.....	20
2.13 Relevant Journals.....	22
3. Analysis.....	23
3.1 Nature of the Initiatives.....	23
3.2 Governance and Strategic Direction.....	25
4. Conclusions and Recommendations.....	28
4.1 Conclusions.....	28
4.2 Recommendations.....	29
Appendix A: References.....	31

Towards a National Digital Information Strategy: A Review of Relevant International Initiatives

1. Introduction

This paper provides an overview of digital information initiatives and organizations underway around the world and describes the results of an assessment of the extent to which the scope, design, methodology, and outcomes of the initiatives could help inform the development of plans leading to a Canadian national digital information strategy. This paper complements another paper prepared for the Library and Archives Canada (LAC) entitled, “Toward a National Digital Information Strategy: Mapping the Current Situation in Canada”.

The information gathered for this study was based on the results of a previous informal survey of international activities, searches performed on the internet, and contacts with selected individuals in target countries. Considerable reliance was also placed on the personal knowledge of the consultant commissioned to undertake the study.

The survey was not intended to be a comprehensive or authoritative source of information on all digital information initiatives and organizations around the world. Rather, the information gathering exercise and the analysis of the results were directed to providing the background information required to support discussions concerning the development of a national digital information strategy. As a result, the focus of the study was on national initiatives (or initiatives at the regional or sector level) that:

- Have articulated a digital information strategy
- Have furnished an assessment of the feasibility of developing such a strategy.
- Constitute part of a ‘de facto’ strategy – for example, a new national organization or project whose focus is digital information.

Most of the initiatives in the survey are concerned with the management of ‘born digital’ information. Although major initiatives involving access to and dissemination of information as well as the digitization of information recorded on other-than-electronic media are included (by example only), the emphasis is on those initiatives that are addressing the use and preservation of information created in electronic form. The assumption was made that the greatest challenges being faced by national governments concern the management of information created electronically and for which its ongoing use and preservation in digital form are dependent upon technologies that will change over time. While generally accepted approaches are relatively in place for the conversion of analog information into digital form and for providing access to digital information, those for managing ‘born digital’ information are still emerging.

Similar to the scope defined for the survey of Canadian digital information initiatives it was determined that the international survey would focus on ‘**key initiatives**’ that involved digital information activities that were in some way related to the mandate of Library and Archives Canada. The criteria that were used to determine if an organization was ‘**key**’ were as follows:

- The degree of cultural/knowledge relevance of either the digital information being managed, or the component of the infrastructure supporting the management of digital information, or the nature and significance of the services or role supported by the organization.

- The perceived long-term value of the digital information being managed.
- The scope and potential impact of the initiative or the organization responsible for the initiative.
- The extent to which the initiative or organization fell within the scope of the role of the LAC.

The elements of information gathered for each initiative were as follows:

- Name of the major initiative.
- Brief description of its objectives, scope, method and current status.
- Level and source of funding (if the information was available).
- Lessons learned.

The next section of this report presents an overview of the key digital information initiatives identified through this study. The subsequent section describes the results of an analysis of the initiatives for the extent to which they can help inform the development of a Canadian national digital information strategy. The last section describes a number of conclusions and observations concerning the implications of the initiatives for the development of a Canadian national digital information strategy.

2. International Digital Information Initiatives

This section describes the findings of the international survey of digital information initiatives. It is based on reviews of existing sources (including an earlier informal survey of international activities undertaken by Library and Archives Canada), searches of the web, consultation with key contacts, and the personal knowledge of the consultant responsible for undertaking the study. The contributions of a leading international expert in digital information initiatives world-wide, Mr. Hans Hofman (National Archives of the Netherlands), were instrumental in mapping the international situation. Some existing sources were also consulted such as the survey undertaken by the Library and Archives Canada and the quarterly survey of digital preservation initiatives undertaken by the Digital Preservation Coalition and the National Library of Australia's 'Preserving Access to Digital Information' initiative. These and other sources are described in Appendix A.

2.1 Europe

The European Commission has sponsored numerous initiatives to promote access to and preservation of digital information across the European Union (EU). These initiatives are designed to promote cooperation and collaboration among EU members involved in the management of digital information. In its i2010 initiative, the Commission outlines three policy priorities.

- To create an open and competitive single market for information society and media services within the EU.
- To support technological convergence with “policy convergence”, the Commission will propose: an efficient spectrum management policy in Europe (2005); a modernization of the rules on audiovisual media services (end 2005); an updating of the regulatory framework for electronic communications (2006); a strategy for a secure information society (2006); and a comprehensive approach for effective and interoperable digital rights management (2006/2007).
- To increase EU investment in research on information and communication technologies (ICT) by 80%.

To close the gap between the information society “haves and have nots”, the Commission will propose: an Action Plan on e-Government for citizen-centred services (2006); three “quality of life” ICT flagship initiatives (technologies for an ageing society, intelligent vehicles that are smarter, safer and cleaner, and digital libraries making multimedia and multilingual European culture available to all (2007); and actions to overcome the geographic and social “digital divide”, culminating in a European Initiative on e-Inclusion (2008).

http://europa.eu.int/information_society/eeurope/i2010/index_en.htm

E-Europe

The e-Europe project has as its goal the establishment of a common digital platform that can reach across all EU members. To this end the EU requests its members to regularly complete digital policy profiles. France, Sweden, Denmark and the Netherlands have indicated that they have internal digital strategies (that are modified to each project) for the creation of national digital projects, primarily through their library and archives institutions.

http://europa.eu.int/information_society/eeurope/2005/index_en.htm

eContentplus Programme

The eContentplus Programme was approved in March, 2005 to make digital content in Europe more accessible, usable and exploitable. According to its web site, “the eContentplus programme will support the development of multi-lingual content for innovative, on-line services across the EU.” The 4-year programme (2005–08) will have a budget of €149 million to tackle organizational barriers and promote take up of leading-edge technical solutions to improve accessibility and usability of digital material in a multilingual environment. The Programme addresses specific market areas where development has been slow: geographic content (as a key constituent of public sector content), educational content, cultural, scientific and scholarly content. The Programme also supports EU-wide co-ordination of collections in libraries, museums and archives and the preservation of digital collections so as to ensure availability of cultural, scholarly and scientific assets for future use.

http://europa.eu.int/information_society/activities/econtentplus/index_en.htm

The Electronic Resource Preservation and Access Network (ERPANET)

ERPANET is another European Commission sponsored initiative which was successful in serving as a virtual clearinghouse and knowledge-base that focused on the preservation of cultural heritage and scientific digital objects. The dominant feature of ERPANET, which concluded in 2004, was the exchange of knowledge on state-of-the-art developments in digital preservation and the transfer of expertise among individuals and institutions. It also provided commentaries on recent publications, articles, etc., and case studies in organizations. In 2006 a new network will be established based on the experience gained through ERPANET. **Digital Preservation Europe** is intended to raise awareness, serve an advocacy role, promote the integration of research in Europe, and deliver tools and methods for, especially, audit and certification of digital preservation environments.

<http://www.erpanet.org>

Preservation and Access: Gateway for Resources and Information on Preservation (GRIP)

GRIP is a fully searchable database of information on preservation of the documentary heritage. It contains selected and annotated references to literature on preservation-related topics, links to websites, projects, organizations and discussion groups. GRIP presents a core of accessible and recent materials selected by experts and provides an introduction to a great many aspects of preservation. The database can be searched by category, keywords (descriptors) and free search. For searching by descriptor a thesaurus is used based on a part of the Art & Architecture Thesaurus (AAT) of the Getty Research Institute. Apart from a selection of introductory materials, the database contains a large amount of references to a number of specific topics. These have been collected from special publications and websites that are also accessible directly. As GRIP is an ongoing co-operation, maintained by experts within different fields, the database will be regularly updated with a selection of the latest references to preservation information resources.

<http://www.knaw.nl/ecpa/grip/>

The Conference of European National Librarians (CENL)

The CENL (<http://www.ddb.de/eng/wir/kooperation/cenl.htm>) is a foundation under Dutch law that aims to increase and reinforce the role of national libraries in Europe, in particular with respect to their responsibilities in maintaining the national cultural heritage and ensuring the

accessibility of knowledge in that field. The CENL is made up of the national librarians of all Member States of the Council of Europe. The conference currently comprises 41 members from 39 European countries (2002).

In December, 2005, the CENL approved the Luxembourg Resolution on digitization of European Cultural Heritage which endorsed the creation of the European Library (http://libraries.theeuropeanlibrary.org/aboutus_en.html). The Library's web service is a portal which offers access to the combined resources (books, magazines, journals - both digital and non-digital) of the 45 national libraries of Europe. It offers free searching and delivers digital objects - some free, some priced.

Preservation Towards Storage and Access: Standardized practices for audio-visual content in Europe (PRESTOSPACE)

The objective of PRESTOSPACE is to provide technical solutions and integrated systems for digital preservation of all types of audiovisual collections. The project intends to provide tangible results in the domain of preservation, restoration, storage and archive management, content description, delivery and access.

<http://www.prestospace.org/index.en.html>

Ministerial NETWORK for Valorizing Activities in Digitization (Minerva)

The aim of MINERVA, which concluded in July 2005, was to create a network of Member States' Ministries to discuss, correlate and harmonize activities carried out in the digitization of cultural and scientific content, for creating an agreed European common platform, and for developing recommendations and guidelines about digitization, metadata, long-term accessibility and preservation. <http://www.minervaeurope.org/>. On November 15, 2005, a new action plan was announced to promote access to the digital cultural heritage of Europe. The plan is called "Dynamic Action Plan for the EU Co-ordination of Digitization of Cultural and Scientific Content" (<http://www.minervaeurope.org/publications/dap/dap.pdf>).

Building Resources for Integrated Cultural Knowledge Services (BRICKS)

The objective of BRICKS is to develop an integrated system of next generation digital libraries, a comprehensive term covering "digital museums", "digital archives" and other kinds of so-called digital memory systems. The initiative foresees the creation of a networked system of services, encompassing globally available collections of digital multimedia documents and a comprehensive repository for the European Digital Memory based on cultural heritage. The BRICKS multidisciplinary partnership brings together museums, leading-edge technological and cultural organizations, research centres, governmental cultural heritage institutions and small-medium enterprises with specific skills.

<http://www.brickscmmunity.org/prj>

Network of Excellence for Digital Libraries (DELOS)

The aim of DELOS (<http://www.delos.info/>) is to provide a forum in which an international research agenda for future research activities in the digital libraries domain can be developed and continuously updated. The Network will constitute a reference point for stimulating the exchange of experiences and know-how and for building and maintaining close contacts with relevant application communities. It will make test beds available, facilitate their interoperability, and provide mechanisms for the evaluation of models, techniques, and approaches, and the exchange

of open-source software components. It will also contribute to the definition of relevant standards. A dense network of links with the international DL research community will be created. The activities of the Network will be organized under Forums and will be open to the European DL research world and the relevant application communities (electronic publishing, libraries, cultural heritage, archives, etc.). The Preservation Cluster of DELOS will focus on those designed to initiate collaborative interaction between institutions and individuals, focus and enable digital preservation, and deliver tangible results by bringing together fragmented research results in different laboratories. (<http://www.dpc.delos.info/cluster/index.php>)

In 2006 two new European Commission-sponsored research projects, PLANETS (Preservation and Longterm Access NETWORK Services) and CASPAR, will get underway. Each is to be undertaken over a period of four years. The aim of the PLANETS project is to integrate research on digital preservation in Europe and ‘to develop systems and tools which will support the accessibility and use of digital cultural and scientific resources, specifically through the development of novel concepts, techniques and tools to preserve the availability of digital resources over time.’

The objectives of CASPAR (Cultural, Artistic and Scientific knowledge for Preservation, Access and Retrieval) are: 1) to build a pioneering preservation environment, based on the full use of the OAIS Reference Model and incorporating the latest developments in knowledge technologies; 2) to demonstrate its ability to handle the preservation of the digital resources of multiple user communities; 3) to advance the current state of the art in digital preservation; and 4) to support the development of technological solutions supporting systems and services for the preservation of digital resources. A focus will be the establishment of three different test beds to address the preservation of various types of digital objects.

2.2 The United Kingdom

The key organizations leading major digital information initiatives include the British Library (BL), the Joint Information Systems Committee (JISC), the Digital Preservation Coalition (DPC), the Digital Curation Center (DCC), and The National Archives (TNA).

The **British Library (BL)** is collaborating with other British government departments to develop a national e-infrastructure. One component of this infrastructure will be the **National Digital Library** (<http://www.bl.uk/about/strategy.html>), a purpose-built ‘trusted’ digital repository for all electronic publications and digitized items. Other relevant initiatives sponsored by the BL are as follows:

- The **Digital Preservation Policy** was written in 2002 to set out a statement of goals, a set of principles and a strategic approach to the preservation of digital information. It gives special emphasis to the need for collaboration.
<http://www.bl.uk/about/collectioncare/bldppolicy1102.pdf>
- The **Digital Preservation Strategy Framework** is a corporate level document based on the Preservation Management of Digital Materials Handbook. It charts the ‘required actions’ and ‘implementation’ strategies for the BL’s digital preservation framework.
<http://www.bl.uk/about/collectioncare/hbookframework.html>

- The BL together with the JISC and the DPC created the “**Preservation Management of Digital Materials Handbook**”. The handbook was released in 2002 as an instrument both to secure the preservation of digital resources in the UK and to be shared at the international level.
<http://www.dpconline.org/graphics/handbook/index.html>

The **Joint Information Systems Committee (JISC)** www.jisc.ac.uk/index.cfm?name=home supports further and higher education by providing strategic guidance, advice and opportunities to use Information and Communications Technology (ICT) to support teaching, learning, research and administration. JISC is funded by all the UK post-16 and higher education funding councils. Significant current JISC initiatives that are relevant to this study are as follows:

- The **SHERPA** project (**Securing a Hybrid Environment for Research Preservation and Access**) has been set up to encourage change in the scholarly communication process by creating open-access institutional "e-print" repositories for the dissemination of research findings.¹
<http://www.sherpa.ac.uk/>
- **DAAT (Digital Asset Assessment Tool)** that libraries, archives, museums and research centres can use to “identify the preservation needs of their digital holdings.”
<http://ahds.ac.uk/about/projects/daat/>
- **PRESERV (PReservation Eprint SERVICES)** to develop an ingestion system for digital publications by adapting the Eprints software. The project involves Southampton and Oxford universities, the National Archives, and the British Library.
<http://preserv.eprints.org/about.shtml>
- **Supporting Institutional Records Management** to help institutions implement institutional records management programs that will meet the requirements of the Freedom of Information Act (2000) and conform to established good practice for the management of records and digital content throughout their lifecycle. This project is being undertaken with the support of The National Archives.
www.jisc.ac.uk/index.cfm?name=programme_supporting_irm

On March 2, 2006, JISC announced the development of a new access management system for connecting students and staff of UK educational institutions to the on-line resources subscribed to by UK educational institutions. Benefits of the new system will include: easier access to online resources for users, enhanced opportunities for collaboration, and facilitation of national e-strategies.

http://www.jisc.ac.uk/index.cfm?name=news_shibboleth

The National Archives (TNA), www.pro.gov.uk/recordsmanagement/erecords/default.htm, has dedicated itself to supporting the requirement by government ministries to have the capability to store and retrieve their records electronically by 2004 (as set out in the “Modernizing Government” White Paper). The TNA has produced functional requirements for an electronic records management system, and has since been assessing systems against those requirements. There are also comprehensive “Guidelines on the Management,

¹ SHERPA and Institutional Repositories / Bill Hubbard, from Serials 16 (3), 2003
<http://eprints.nottingham.ac.uk/archive/00000095/01/sherpa&instrep.pdf>

Appraisal and Preservation of Electronic Records”, and a route map and milestones to enable departments to meet the 2004 target. The TNA has also produced a range of toolkits for departments relating to each individual milestone (including an upcoming guide on the management of electronic records in transaction-based systems). Other key initiatives include the following:

- **PRONOM** is the UK National Archives’ online source for information about file formats and software products. It provides impartial and definitive technical information about the file formats used to store electronic records, and the software products that are required to create, render, or migrate these formats.
www.records.pro.gov.uk/pronom
- **The UK Central Government Web Archive** is a selective collection of UK Government websites, archived from August 2003, which has been developed by The National Archives using the services of the US-based Internet Archive.
www.pro.gov.uk/webarchive/default.htm
- **The National Digital Archive of Datasets (NDAD)** preserves and provides online access to archived digital data and documents from UK central government departments.
www.ndad.ulcc.ac.uk

Other key UK-based digital information initiatives include the following:

- **The Digital Preservation Coalition (DPC)** was established in 2001 to foster joint action to address the challenges of securing the preservation of digital resources in the UK and to work with others internationally to build a global knowledge base by producing, providing, and disseminating information on current research and practice and building expertise amongst its members to accelerate their learning and generally widen the pool of professionals skilled in digital preservation. The members include the British Library, the National Library of Scotland and a Consortium of University Libraries.
<http://www.dpconline.org/graphics/index.html>
- The **Digital Curation Centre (DCC)** provides a national focus for research into curation issues and promotes expertise and good practice, both national and international, for the management of all research outputs in digital format. It is led by the University of Edinburgh and supported by the University of Glasgow (HATII and Information Services) and other partners such as the United Kingdom Office for Library Networking (UKOLN) and the Council for the Central Laboratory of the Research Councils (CCLRC). It is meant to support any institutions involved in managing digital resources. Some of its activities include organizing seminars and workshops, publishing the Digital Curation Manual with chapters on relevant topics in digital curation, providing a helpdesk and advisory service, developing tools and test beds, and providing audit and certification services. The third DCC progress report to JISC was published in January, 2006 (<http://www.dcc.ac.uk/about/>).
www.dcc.ac.uk
- **Creative Archiving at Michigan & Leeds: Emulating the Old on the New (Camoleon)** was a joint project between the University of Michigan and Leeds University. The project,

which ran from 1999 to 2003 and was funded in part by JISC, explored issues associated with the use of emulation techniques in supporting the preservation of digital information. <http://www.si.umich.edu/CAMILEON/about/aboutcam.html>

- **CURL Exemplars in Digital Archives (CEDARS)** was based on funding awarded to the Consortium of University Research Libraries (CURL) to address strategic, methodological and practical issues and provide guidance in best practices for digital preservation. <http://www.leeds.ac.uk/cedars/>

In the area of digital preservation, the **Technical Advisory Service for Images (TASI)** funded by JISC manages a growing compendium of advice and guidance in the area of digital representation. <http://www.tasi.ac.uk/>. Reference should also be made to “**The NINCH Guide to Good Practice in the Digital Representation and Management of Cultural Heritage Materials**” sponsored by the The Humanities Advanced Technology and Information Institute (HATII), University of Glasgow, and the National Initiative for a Networked Cultural Heritage (NINCH), 2002. (<http://www.ninch.org/guide.pdf>).

2.3 France

Gallica Digital Library

The key nationally based digital information initiative in France is the Gallica Digital Library Charter sponsored by the Bibliothèque nationale de France (BnF). Launched in 1997, Gallica can be accessed from anywhere in the world over the Internet. It is a digital library focusing on the wealth of printed materials, manuscripts, and audiovisual collections already available in the BnF. Gallica is an encyclopedic digital library constructed from existing library collections. Digitization of collections started in 1992 and includes materials in the national library and in associated library collections. There has been a strong focus on digitizing public-domain print collections although a large program for digitizing video has recently started.”² http://www.bnf.fr/pages/zNavigat/frame/version_anglaise.htm?ancre=english.htm

2.4 The Netherlands

National Archives of the Netherlands, Digital Longevity (Digitale Duurzaamheid)

As the ‘national memory’, the Nationaal Archief of the Netherlands manages not only the archives of central government but also the archives of individuals deemed to be of national importance. The Nationaal Archief is responsible for managing and maintaining accessibility to the information produced by government organizations. In addition, the Nationaal Archief also advises on the archiving and preservation of such information. The **Digitale Duurzaamheid – Digital Longevity** – department functions as a knowledge centre for the management and preservation of digital information. It collects information relating to digital longevity in the digital knowledge bank of this website, and informs and advises government organizations on the issues surrounding digital longevity through its publications, presentations, and events.

² Neal Beagrie, “National Digital Preservation Initiatives: An Overview”, Council on Library and Information Resources and Library of Congress, April, 2003

Furthermore, the department carries out experimental research to identify the most suitable methods for preserving different types of digital information over the long term.

<http://www.digitaleduurzaamheid.nl/index.cfm?paginakeuze=286&categorie=6>

e-Depot of the Koninklijke Bibliotheek

Over the last 5 to 10 years, the national library of the Netherlands (KB) has invested a great deal of time and resources into studying, designing, and implementing digital collection and archiving projects. One example is the e-Depot initiative which is an automated system for the ingestion, description, management and long-term storage of electronic publications (though for the most part it is actually more of a storage system than an active preservation system). Released in December of 2002, the e-Depot is a product of collaboration between the KB and IBM.

http://www.kb.nl/hrd/dd/dd_onderzoek/reports/3-preservation.pdf

Permanent Access to the Records of Science

The EU Conference “Permanent Access to the Records of Science” organized by the National Library of the Netherlands (the KB) and the Netherlands EU Presidency in November 2004 brought together a group of high level stakeholders who agreed that a *Task Force on Permanent Access* should be established to formulate a Strategic Action Program for Europe. A high priority item in this Action Program was to develop a research and development program that would be carried out as part of the 7th Framework Program of the EU.

<http://tfpa.kb.nl/Proposal%20Research%20and%20Development.doc>

2.5 Germany

NESTOR

The objective of Network of Expertise in Long-term Storage of Digital Resources (NESTOR) is to create a network of expertise in the long-term storage of digital resources for Germany. As the perspective of current and future archive users is central to the project, the emphasis of the initiative is more on long-term accessibility rather than the preservation of digital resources. The project features the following: a web-based information forum on long-term archiving and long-term accessibility of digital resources in Germany, a platform for information and communication, criteria for trusted digital repositories, recommendations for certification procedures of digital repositories, recommendations for collecting guidelines and selection criteria of digital resources to be archived, and guidelines and policies for the long-term preservation of digital resources.

<http://www.langzeitarchivierung.de/index.php?newlang=eng>

DOMEA

In November 1999, the German Federal Government Co-ordination and Advisory Agency for IT in the Federal Administration (KBSt) published its concept of the Paperless Office (DOMEA concept). Since that time, it has become established as a quasi-standard for electronic records management. Federal, Länder and local governments as well as product manufacturers have used the potential of this concept as a basic illustration of public administration’s requirements for electronic records management.

<http://www.kbst.bund.de/-,413/DOMEA-Konzept.htm>

2.6 Scandinavia

All of the Scandinavian countries are involved in some aspect of digital information and national archives and national libraries tend to be at the forefront. Prominent examples of digital information initiatives underway in Scandinavia are as follows:

Swedish Royal Library: Kulturarw3

Since 1996, the Swedish Royal Library's Kulturarw3 project has been harvesting Swedish websites. Their approach has often been cited as an example of a 'whole domain' or 'comprehensive collection' and is based on the approach taken by the Internet Archive in the US. To date, the Royal Library has done 12 sweeps of Swedish content on the internet.

<http://www.kb.se/kw3/ENG/Default.aspx>

Danish State Archives: Electronic Records - strategies and requirements

A conversion strategy has been developed at the Danish State Archives for the long-term preservation of IT filing systems. The electronic archival materials which are submitted to the State Archives are required to be stored by ministries in a way that enables data conversion to formats suitable for continuous conversion without significant data loss.

www.sa.dk/sa/omarkiverne/english/earchives.htm

Danish Royal Library: Digital Policies Framework

The review of existing policies and the development of a Strategic Plan led to the establishment of the "Hybrid Library" initiative. Danish legislation on archiving web pages now allows the Royal Library to harvest published documents without problems of copyright. The national library and national archives are collaborating on this initiative.

<http://www.kb.dk/index-en.htm>

National Archives of Norway: NOARK

Noark-4 is a specification of functional requirements for electronic recordkeeping systems used in public administration (in Norway). The specification lists requirements with regard to information content, data structure and functionality. In some cases there are requirements with regard to the user but this is mainly left to the individual system developers or vendors to decide. The specification does not contain requirements with regard to the how the data structure is to be implemented, or how systems are to be designed.

<http://www.riksarkivet.no/english/electronic.html>

2.7 Australia

Digital information strategies in Australia are generally led by the National Library and the National Archives³. Although both institutions have had a long history of working together in the area of digital information (beginning in 1993 with the Preserving Access to Digital Information (PADI) Working Group and continuing to this day through initiatives such as "Managing Digital

³ Similar to other developed countries higher level e-government strategies are in place such as the Australian e-government strategy which is being updated for release in 2006.

Information Resources”), each supports its own approach to the establishment of strategic plans and directions.

The **National Library of Australia (NLA)**, <http://www.nla.gov.au/>, currently supports a number of initiatives designed to help position itself to address the challenges of preserving the published documentary history of the country. These include the following:

Digital Preservation Policy (2003) that describes the directions the Library intends to take in preserving its own electronic collections (both born digital and digitized) and in collaborating with others to enable the preservation of electronic information resources. <http://www.nla.gov.au/policy/digitisation.html>

The **Preserving Access to Digital Information (PADI)** initiative which has as its objectives: to facilitate the development of strategies and guidelines for the preservation of access to digital information; to develop and maintain a web site for information and promotion purposes; to actively identify and promote relevant activities; and to provide a forum for cross-sector cooperation on activities promoting the preservation of access to digital information. <http://www.nla.gov.au/padi>

The **Preserving and Accessing Networked Documentary Resources of Australia (PANDORA)** initiative which is a national network of distributed archives where each of the National and State libraries work under an agreed set of principles and actions to gather the titles for which they accept responsibility into either the PANDORA Archive (supported by the National Library) or an archive maintained within their own institution. The publications are selected, described and processed by the participating libraries, but all material is stored on a server in the National Library and managed through the PANDORA Digital Archiving System (PANDAS). In essence, PANDORA is the name of the collection and the user interface, while PANDAS is the working architecture behind it. Pandora collects both websites and discrete publications. As of 2005, the collection includes about 8235 titles and 16736 instances. <http://www.pandora.nla.gov.au/index.html>

The **National Archives of Australia (NAA)**, <http://www.naa.gov.au/>, launched the e-permanence program in 2003 to bring a focus to its efforts to preserve both current and archival electronic records. It complements and is supported by the tools and guides that have been issued under, ‘Designing and Implementing Record Keeping Systems’ (DIRKS) initiative (<http://www.naa.gov.au/recordkeeping/dirks/summary.html>) which is designed to enhance the management of records under the control of Australian Commonwealth ministries. The National Archives has developed a preservation approach for archival digital records (i.e. those sentenced as ‘retain as national archives’) based on converting or ‘normalizing’ digital records into archival data formats for long-term storage and access. The basic conceptual approach of the project is described in a National Archives Green Paper, “An Approach to the Preservation of Digital Records” (www.naa.gov.au/recordkeeping/er/digital_preservation/summary.html). The Archives’ approach to the long-term preservation of digital records is also expected to be useful for preserving digital records in agency custody. In order to guide departments and agencies, the NAA released, “Digital Recordkeeping: Guidelines for Creating, Managing and Preserving Digital Records” (<http://www.naa.gov.au/recordkeeping/er/guidelines.html>). This site sets out the National Archives’ policy on the status and management of Australian Government websites and other online resources as Commonwealth records. It will assist agencies to establish internal

mechanisms for creating, managing and retaining web-based records, for as long as those records have value (http://www.naa.gov.au/recordkeeping/er/web_records/intro.html).

The Australasian Digital Recordkeeping Initiative (ADRI) is an undertaking of the [Council of Australasian Archives and Records Authorities](#), the peak body of government archives and records institutions in Australia and New Zealand. The primary objective of ADRI is to pool the resources and expertise of national, state and territory public records institutions in Australia and New Zealand to find better ways to ensure that digital records are preserved and made accessible for the future. <http://www.adri.gov.au/content.asp?cID=14>

The AGLS Metadata Standard is a set of 19 descriptive elements which government departments and agencies can use to improve the visibility and accessibility of their services and information over the Internet. It has been mandated for use by Commonwealth Government agencies (see “[Better Services, Better Government: The Federal Government's e-Government Strategy](#)”). The AGLS standard is based upon the leading international online resource discovery metadata standard, the [Dublin Core standard](#) ([Australian mirror site](#)). The AGLS standard was developed in late 1997/early 1998 in response to Recommendation 6 in the report of the Information Management Steering Committee, “[The Management of Government Information as a National Strategic Resource](#)”. While the National Archives is the lead agency for AGLS development and deployment, the initiative is a cooperative venture between the [Australian Government Information Management Office](#) (AGIMO) and the [Online Council](#) Officials. AGLS was published as Australian Standard AS 5044 by Standards Australia in December 2002. http://www.naa.gov.au/recordkeeping/gov_online/agls/summary.html

The Clever Metadata Project, Monash University

The objective of this project is to develop a proof of concept prototype to demonstrate how standards-compliant metadata can be created once in particular application environments then used many times for multiple purposes across business applications and in different environments. The prototype will be implemented in a test-bed site to provide a model for best practice. Development of the prototype and its implementation model will also require the prototyping of model metatools, including a mini-metadata registry. <http://www.sims.monash.edu.au/research/rcrg/research/crm/background.html>

2.8 New Zealand

Similar to Australia, digital information strategies have tended to be led by Archives New Zealand and the National Library of New Zealand. The stimulus for the development of strategies by both of these organizations, however, was the release of the draft government-wide draft **Digital Strategy** (<http://www.digitalstrategy.govt.nz/>) in November 2004. In addition to setting strategic direction for the introduction of ICT's to support greater connectivity, economic growth and enhanced government services, the strategy focuses on the role of digital information as an economic tool for advancing New Zealand culture and education. The vision includes the promotion of information literacy at all stages of education and in all forms of training.

It is within this context of promoting education and training that the New Zealand government recently gave the **New Zealand National Library** \$24 million in new money to establish a “trusted digital repository” to collect and preserve digital objects over the long-term. This led to the development of the National Library's own “**digital information strategy**” which has as its objectives:

- To provide enhanced access to digital information for New Zealanders, e.g. online databases, electronic journals, especially New Zealand content
- To collect digital resources, especially those relating to New Zealand and New Zealanders
- To ensure the long-term storage and preservation of New Zealand's online heritage
- To provide enhanced access to the Library's collections through digitization

<http://www.natlib.govt.nz/en/whatsnew/4digitalstrategy.html>

Archives New Zealand has forged its own strategy called, “**Continuum – Create and Maintain**” (currently under review) which has been designed to provide tools and services to government agencies to enable them to meet best practice record keeping standards. It assists agencies in developing their own records management programs to fulfill business and accountability requirements, and promotes good records management so that the most significant records of government are preserved for current and future generations. It is also designed to promote strong, cooperative and mutually beneficial partnerships between Archives New Zealand and government agencies.

<http://www.archives.govt.nz/continuum>

In February, 2006, Archives New Zealand launched a new web site called Digital Recordkeeping which is designed to serve as a focal point for electronic records issues ranging from access to preservation.

<http://www.archives.govt.nz/continuum/digitalrecordkeeping.php>

2.9 United States

National Digital Information Infrastructure and Preservation Program (Library of Congress)

The Library of Congress is leading a collaborative project called the **National Digital Information Infrastructure and Preservation Program** (NDIIPP). It is based on an original appropriation from Congress of \$100 million US. Today the program has up to \$175 million in funding which includes \$75 million US federal matched by \$75 million US from non-federal sources. The Program seeks to provide a national focus on important policy, standards and technical components necessary to preserve digital content. Investments in modeling and testing various options and technical solutions will take place over several years, resulting in recommendations to the U.S. Congress about the most viable and sustainable options for long-term preservation. The NDIIPP sets policy for the collection, preservation, and access to digital objects, as well as plans “the technological infrastructure required by the Library of Congress.”

The initiative is a collaborative venture involving multiple organizations ranging from the National Archives and Records Administration to the White House Office of Science and Technology Policy. Eleven research projects designed to support the long-term management of digital information were announced under the program in May, 2005. Eight cooperative agreements were also launched and a Study Group was established to “conduct a reexamination of the exceptions and limitations applicable to libraries and archives under the Copyright Act, specifically in light of the changes wrought by digital media.” In another initiative, U.S. states and territories have been invited to form collaborative arrangements and develop strategies for the preservation of significant state and local government information in digital form.

Workshops will be sponsored to help states identify their needs and priorities for digital preservation and a toolkit will be made available to each state to enable this analysis. Finally, the

NDIIPP has partnered with the National Science Foundation to invest \$3 million US in advanced digital preservation research.

<http://www.digitalpreservation.gov/index.php?nav=3&subnav=1>

Electronic Records Archives Program (National Archives and Records Administration)

The multi-million dollar 7 year Electronic Records Archives Program of the National Archives and Records Administration (NARA) has selected Lockheed-Martin as the company that will lead the development of a comprehensive persistent digital archives program. The project, which is expected to deliver its first deliverables in 2007, is expected to have a far ranging impact on digital archives development in other US archives and beyond. NARA is also leading other related initiatives in partnership with the San Diego Supercomputing Lab.

<http://www.archives.gov/era/>

Preservation, Reliability, Interoperability, Security, Metadata (PRISM)

This project is a four-year collaborative effort between the CUL and the Cornell's Computer Science Department to investigate and develop policies and mechanisms needed for information integrity in the context of component-based digital library architecture. The key research areas include long term survivability of digital information, reliability of information resources and services, interoperability, and security (the [privacy rights](#) of users of information and the [intellectual property](#) rights of content creators), and metadata that makes it possible to ensure information integrity in digital libraries. At the heart of this project is translating the traditional preservation strategies to the digital realm in order to support the development of digital preservation tools and mechanisms. Project Prism addresses preservation issues involved in a variety of digital formats.

<http://www.library.cornell.edu/iris/research/prism/index.html>

Global Digital Format Registry (GDFR)

The Global Digital Format Registry (GDFR) at Harvard University will provide sustainable distributed services to store, discover, and deliver representation information about digital formats. The format of a digital object must be known in order to interpret the information content of that object properly. Without knowledge of its format, a digital object is merely a collection of undifferentiated bits. Format registries fall directly into the scope of the digital preservation research agenda identified in the NSF/Library of Congress workshop report, *It's About Time*, playing a key role in enabling and supporting technical architectures and tools "to acquire archival data, prepare data for long-term storage, and manage data over several generations of technology."

<http://hul.harvard.edu/gdfr/about.html>

RLG-NARA Audit Checklist for Certifying Digital Repositories

This draft report is the first guide for determining whether a digital repository can be certified as a trusted location for digital collections. Developed by a task force of experts assembled by RLG and National Archives and Records Administration (NARA), the draft is available for public comment (for which comments were requested for January, 2006). The document benefits those who work in or are responsible for digital repositories and who want to be certified against its requirements, as well as for those who execute the audit and certification process.

http://www.rlg.org/en/page.php?Page_ID=20769

Digital Library Federation

The Digital Library Federation (DLF) is a consortium of libraries and related agencies that are pioneering in the use of electronic-information technologies to extend their collections and services. Through its members, the DLF provides leadership for libraries broadly by: identifying standards and "best practices" for digital collections and network access; coordinating leading-edge research-and-development in libraries' use of electronic-information technology; and, helping start projects and services that libraries need but cannot develop individually. The DLF operates under the administration umbrella of the Council of Library and Information Resources. <http://www.diglib.org/dlfhomepage.htm>

The International Children's Digital Library (ICDL)

The International Children's Digital Library (ICDL) is a research project funded primarily by the National Science Foundation (NSF), the Institute for Museum and Library Services (IMLS), and Microsoft Research to create a digital library of outstanding children's books from all over the world. The mission of the ICDL is to select, collect, digitize, and organize children's material in their original languages and to create appropriate technologies for access and use by children 3-13 years old. <http://www.icdlbooks.org/about/index.html>

Digital Library Project, University of Michigan

The purpose of the University of Michigan Digital Library (UMDL) is to define and incrementally develop interfaces and infrastructures for users and providers such that intellectual work (finding, creating, and disseminating knowledge) is embedded in a persistent, structured context even though the underlying networked system is evolving. The infrastructure should support extensible ontologies (meta descriptions of collections and services) for allowing components in the digital library to self-organize, dynamically teaming to form structures and services that users need. Principles from economics are being used to efficiently allocate resources and provide incentives for continual improvement to networked goods and services. This approach should enable third parties to join or use UMDL technologies to define and manipulate agents, facilities, and ontologies so that the web of resources grows in an orderly but decentralized way. <http://www.si.umich.edu/UMDL/>

Indiana University Electronic Records Project

The IU Electronic Records Project, which is ongoing, was designed to implement and test the "Functional Requirements for Evidence in Recordkeeping" model developed by David Bearman, Richard Cox, and the project personnel associated with the University of Pittsburgh Electronic Records Project. To achieve these goals, IU project personnel designed four distinct stages of development for the project. Stage 1: Application: Develop a methodology for applying the "Functional Requirements for Evidence in Recordkeeping" to IU information systems. Stage 2: Evaluation: Review and evaluate IU information systems in terms of the "Functional Requirements for Evidence in Recordkeeping" and the "Metadata Specifications Derived from the Functional Requirements" developed at the University of Pittsburgh. Stage 3: Recommendation: Develop and submit a set of recommendations designed to improve the performance of the system as a recordkeeping system. Stage 4: Revision: Critique and, if necessary, recommend revisions or additions to the "Functional Requirements for Evidence in Recordkeeping" and the "Metadata Specifications." And, more broadly, critique the methodology

developed in the IU project, including its use of the Pittsburgh models, in terms of effectiveness, cost, user acceptance, and skills required to implement.

<http://www.libraries.iub.edu/index.php?pageId=3313>

University of Virginia: The Fedora™ Project

The Fedora project was funded by the Andrew W. Mellon Foundation to build an open-source digital object repository management system based on the Flexible Extensible Digital Object and Repository Architecture (Fedora). The new system demonstrates how distributed digital library architecture can be deployed using web-based technologies, including XML and Web services. Jointly developed by the University of Virginia and Cornell University, the system completely implements the Fedora architecture that was originally conceived of at Cornell. Fedora is a general-purpose digital object repository system that can be used in whole or part to support a variety of use cases including: institutional repositories, digital libraries, content management, digital asset management, scholarly publishing, and digital preservation.

<http://www.fedora.info/>

New York State Archives, “Models for Action: Developing Practical Approaches to Electronic Records”

The Models for Action project, undertaken through the late 1990’s and ongoing seeks to find practical solutions to electronic recordkeeping in networked computing environments. The project incorporates principles from business process analysis, information systems development, electronic records management and archival preservation in order to find solutions that address recordkeeping at all stages of the records life cycle and -- more importantly -- within the context of the business process which the records support.

http://www.ctg.albany.edu/publications/guides/digital_preservation_partnerships

Minnesota State Archives , Trustworthy Information Systems Project

With the support of the National Historical Publications and Records Commission (NHPRC), the sponsorship of the Information Policy Council (IPC) and in collaboration with select state agency partners and the Data Issues Group for Information Technology (DIG-IT), the State Archives Department of the Minnesota Historical Society developed and tested a set of criteria to establish the trustworthiness of information systems. The Trustworthy Information Systems (TIS) Project produced this Handbook, which details the TIS criteria set and a methodology to evaluate government information systems for trustworthiness.

<http://www.mnhs.org/preserve/records/tis/tis.html>

State Archives of Michigan: Preserving the Electronic Records Stored in a Records Management Application (PERM)

The State Archives of Michigan and the San Diego Supercomputer Center (SDSC) wanted to develop and test a model for preserving the records in Michigan's Records Management Application (RMA) environment. While the RMA is capable of storing and providing access to electronic records, it cannot ensure that they remain accessible as software becomes obsolete. A final report describes the results of the project: <http://www.sdsc.edu/PERM/>

Illinois State Library Digital Imaging Program

The success of a project is generally in proportion to the time spent in planning the project. Digital imaging projects are complex, time-consuming, and costly. To help avoid

some of the pitfalls the Library has issued some recommendations and resources for planning a digital imaging project.

http://www.cyberdriveillinois.com/departments/library/who_we_are/bestpractices.html

2.10 International Standards Development Activities

Standards initiatives are underway in many developed countries through the auspices of national standards groups. However, significant standards initiatives at the international level, especially through the International Organization for Standardization (ISO) and its various standards bodies such as TC46/SC11, are setting the stage for global approaches to the management and preservation of digital information. The Open Archival Information System

(<http://public.ccsds.org/publications/archive/650x0b1.pdf>), which has been approved as an ISO standard (ISO 14721:2003), offers a reference model for addressing digital preservation from a range of perspectives (i.e. management to technical). The ISO records management standard (ISO 15489:2001), offers a model framework for the management of records in all forms including digital

(<http://www.iso.ch/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=31908&ICS1=1&ICS2=140&ICS3=20>). Recently a standard for metadata for records has been published (ISO-23081-1:2006) that explains the principles for records management metadata

(<http://www.iso.ch/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=40832&ICS1=1&ICS2=140&ICS3=20>). Currently, work is underway in TC46/SC11 to address functional requirements for long term preservation of digital records and for work process analysis in support of records management.

Other standards such as XML and metadata standards associated with the Dublin Core, developed by open standard organizations such as W3C (World Wide Web Consortium - www.w3c.org), and de facto industrial standards such as PDF (from Adobe Inc.) offer the underlying technical capability that will enable a standards-based approach to be adopted to digital information preservation. In late 2005 a subset of PDF was transformed into an international ISO standard PDF/A (ISO 19005-1:2005)

(<http://www.iso.ch/iso/en/CombinedQueryResult.CombinedQueryResult?queryString=PDF%2FA>). These and related standards such as those developed in individual sectors (e.g. the international pharmaceutical industry) or for distinct media (e.g. MPG3, JPEG, etc.) are being built upon the growing suite of standards that are responding to the global pressure for greater inter-connectivity across both space and time.

Examples of key international standards organizations are as follows:

ISO (International Organization for Standardization) is a global network that identifies what International Standards are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input and delivers them to be implemented worldwide. ISO – a non-governmental organization – is a federation of the national standards bodies of 149 countries, one per country, from all regions of the world, including developed, developing and transitional economies. Each ISO member is the principal standards organization in its country. The members propose the new standards, participate in their development and provide support in collaboration with ISO Central Secretariat for the 3 000 technical groups that actually develop the standards. ISO members appoint national delegations to standards committees. In all, there are some

50,000 experts contributing annually to the work of the Organization. When their work is published as an ISO International Standard, it may be adopted as a national standard by the ISO members and translated.

www.iso.ch

An example of the work of ISO can be found in **Joint Technical Committee 1/SC32/WG2** which is currently responsible for developing and maintaining standards that facilitate specifications and management of metadata. The goal is to enhance the understanding and sharing of data, information and processes to support, for example, interoperability, electronic commerce and component-based development.

<http://metadata-standards.org/metadata-stds/>

Organization for the Advancement of Structured Information Standards (OASIS) is a not-for-profit, international consortium that drives the development, convergence, and adoption of e-business standards. The consortium produces more Web services standards than any other organization along with standards for security, e-business, and standardization efforts in the public sector and for application-specific markets. Founded in 1993, OASIS has more than 5,000 participants representing over 600 organizations and individual members in 100 countries.

<http://www.oasis-open.org/home/index.php>

2.11 The Situation in Developing Countries

Developed countries are not the only countries moving into the digital age. Nearly every country in the world regardless of its economic status is introducing information and communications technologies (ICT's) that are changing the way in which information is being created, accessed, and preserved. The challenge in developing countries has been to build the capacity not only to carry out the transition to a digital environment but to do so in the face of often collapsed records systems, the absence of qualified information specialists, and the lack of resources to ensure that whatever is in place can be sustained through time. Organizations such as the International Records Management Trust (<http://www.irmt.org/>) have been providing records management support to developing countries for over fifteen years. In recent years the Trust has been providing guides and assessment tools directed to the management of digital records thus facilitating the means by which governments in developing countries can make the migration from paper-based to digital environments. Other initiatives such as the World Summit on the Information Society (<http://www.worldsummit2003.de/en/nav/14.htm>) and the work of the Digital Opportunity Task Force (<http://www.dotforce.org/>), sponsored through the G-8, offer forums for bringing forward issues related to the implications for developing countries of migrating to a digital environment.

The Development Gateway puts the Internet to work for developing countries by providing innovative internet solutions for effective aid and e-government – increasing access to critical information, building local capacity and bringing partners together for positive change. Specifically it works with “governments, international donors and private local and global organizations to focus on areas where internet processes can deliver high impact results, such as public procurement, aid fund management, aid coordination, and the rapid exchange of lessons and best practices.” The Development Gateway was initiated by the World Bank and became an independent foundation in 2001. Its donors and sponsors include governments, international

institutions and private entities. Approximately 40 employees work with hundreds of partners around the world, including direct activities in 60 countries.

<http://topics.developmentgateway.org/egovernment>

2.12 E-Government Initiatives

This section is designed to illustrate the kinds of e-government sites that are established or being established around the world. The intent is to demonstrate that regardless of the status of a given country as developed, developing, or country in transition, government on-line initiatives tend to adhere to the same principles (service orientation, transparency, etc.), follow the same direction (e.g. common look and feel, respect for the handling of personal information, etc.), and respond to the need to build an underlying high-quality infrastructure for the creation, organization, use and handling of digital information.

Australia

The www.australia.gov.au website provides an interface between Australian citizens and their government. It links to information and services on over 700 Australian Government websites as well as selected state and territory resources. Australia.gov.au also searches over five million government web pages. Australia.gov.au is a gateway to information but is not a publishing tool itself. Most material indexed by this site is created and stored externally to the site and is, therefore, the responsibility of the authoring department or agency.

<http://www.australia.gov.au/>

www.gov.au is an Australian whole-of-government single point of access (portal). In its current release, the site provides links to the ten entry points for Australian, State, Territory and Local governments. The site will be further developed to allow full search and retrieval capabilities across all levels of government and all government sites. This will be achieved through the implementation of the [GOVERNET](#) architecture, an initiative of the Online Council of Ministers.

<http://www.gov.au>

Canada

The Canada Site is the 'home page' for the Government of Canada. It enables access to information and services supported by all federal government departments. The site reflects the three categories of users who typically access federal government information and services: individuals, businesses and non Canadians. In 2005, Service Canada was created to enhance the delivery of services to Canadians. Service Canada will integrate services from a number of federal departments to form a single service delivery network. Over the next three years, Service Canada will continue to enhance and introduce more services with the goal of continuous improvement in service delivery and client satisfaction.

http://www.gc.ca/main_e.html

European Commission

The web site for the European Commission was established and continuously enhanced to provide access to information and services for Europeans and non-Europeans alike. It is based on the EU's "[Lisbon Goal](#)" of becoming the world's most dynamic and competitive economy by 2010.

http://europa.eu.int/information_society/index_en.htm

Hong Kong

This website presents the Government of Hong Kong's e-government initiatives and encourages the exploitation of information managed by government bureaus and departments. Increased attention is being paid to supporting one stop access to information and services. As mentioned in the 2004 Digital 21 Strategy, the focus of the e-government program in the years ahead is to focus more sharply on service quality and effectiveness, for creating value for customers and Government. The Government also intends to rationalize different channels of service delivery to better serve the needs of different customer segments and improve cost-effectiveness.

<http://www.info.gov.hk/eindex.htm>

Malaysia

The 'MyGovernment' Portal of the Government of Malaysia provides numerous channels enabling citizens to secure programs and services from the Government.

<http://www.gov.my/MYGOV/BI/Directory/Citizen/>

New Zealand

This site is a resource for people in New Zealand who need up-to-date, easily accessible and authoritative e-government information & resources to assist them to achieve their agency's e-government goals. The site contains information on the E-government Strategy, the history of the program, and the ongoing work program. There is an Archive section that contains superseded documents or older, less relevant material.

<http://www.e.govt.nz/>

Tanzania

The Tanzania Development Gateway is an Internet portal that provides and promotes on-line networking, sharing, exchange and dissemination of knowledge, ideas and information on development matters.

<http://www.tanzaniagateway.org/>

United Kingdom

Directgov is the Government's flagship digital service, delivered through the Directgov website and digital television. Directgov offers the widest range of government information and services online. Users browse by audience groups such as 'Disabled people and carers' and 'Parents' or by topics including 'Employment', 'Learning' and 'Motoring and transport'. Alternatively, they can access definitive government directories or use the search engine. The site contains extensive content for motorists, parents, disabled people and carers together with broader information for other clearly identified customer groups such as Britons abroad and the over-50s. This will be expanded over time to include content for other groups including householders, jobseekers and adult learners. As well as government departments, the site links through to relevant third parties which can offer additional trusted advice and support.

<http://www.direct.gov.uk/Homepage/fs/en>

United States

FirstGov.gov, the official U.S. gateway to all government information, is the catalyst for a growing electronic government. Ongoing work on the site transcends the traditional boundaries of government and is based on the vision of connecting the world to all U.S. government information and services.

<http://www.firstgov.gov/>

2.13 Relevant Journals

RLG Diginews

RLG DigiNews is a bimonthly Web-based newsletter produced by the Research Libraries Group and intended to: focus on issues of particular interest and value to managers of digital initiatives with a preservation component or rationale; provide filtered guidance and pointers to relevant projects to improve awareness of evolving practices in image conversion and digital archiving; announce publications (in any form) that will help RLG staff attain a deeper understanding of digital issues.

<http://www.rlg.org/preserv/diginews>

Journal of Digital Information

JoDI is supported by the British Computer Society and Oxford University Press. JoDI published its first papers in April 1997, when it was one of very few electronic-only journals. It continues as an electronic-only journal dedicated to the publication of peer reviewed papers on the management, preservation, and use of digital information..

<http://jodi.ecs.soton.ac.uk/>

D-Lib Forum and D-Lib Magazine

The D-Lib Forum supports the community of researchers and developers working to create and apply the technologies leading to the global digital library. Its goal is to support and facilitate collaborative activities, information exchange, and communications of this community.

<http://www.dlib.org/>

DigiCULT.Info

DigiCULT.Info is a quarterly electronic journal presenting current news, articles, interviews, opinions, and issues related to cultural heritage and the information society. Its aim is to bring developing projects and initiatives to a wider audience, to demonstrate the use of technologies and standards, and to provide greater access to the expertise and experiences of fellow cultural heritage professionals.

<http://www.digicult.info/pages/index.php>

3. Analysis

The decision to focus on initiatives that were related to the mandate and interests of the LAC (i.e. to preserve and make available Canada’s documentary heritage and to provide support to those involved in its preservation and promotion) shaped the nature of the findings as well as the nature of the analysis. As indicated in the report on the Canadian survey of digital information initiatives, “it appears that the concern of greatest significance is that of managing digital information through time”. In that same report it was proposed that the development of a national digital information strategy should focus on issues pertaining to the ability of organizations to preserve the authenticity, accessibility, and understandability of digital information over time.

Within this context, the analysis of international initiatives focused on two themes:

- **The nature of the initiatives:** In what ways can the issues being addressed and the methods being employed by the initiative(s) being undertaken in other countries help to inform the development of a Canadian national digital information strategy?
- **Governance and strategic direction:** Are there aspects of the way in which the initiatives are governed and how they are strategically positioned that can help to inform the way in which the development of a Canadian national digital information strategy should be positioned?

The analysis that follows was based on a review of the descriptions of the individual initiatives, the opinions of several key contacts, and the personal knowledge of the author.

3.1 Nature of the Initiatives

Most of the initiatives underway around the world are focused on research and the development of standards and guides in addition to encouraging and supporting networking and the exchange of information. Considerable attention is being paid to the complex issues associated with the preservation of digital information or, more accurately, the preservation of the accessibility of digital information through time. This field of research and development is relatively new and highly complex which is why the research is multi-faceted—from analyzing the requirements for digital longevity, to exploring the role of metadata, to identifying effective tactics for migrating digital information through changing technologies, and to understanding the implications of using digitization techniques to migrate from paper to digital information.

This complexity has served as a catalyst to the growing recognition that research cannot be restricted to one discipline such as records management and archives or library science, etc. Multi-disciplinary approaches that draw on the principles, understandings and strengths of each of the participating disciplines are required. A number of the networks that have been established in recent years reflect this recognition. In several cases, for instance, the knowledge of records managers and archivists of the attributes of authenticity and what it means to build and preserve relationships among digital objects and the business processes that generated them is being combined with the knowledge of librarians of how complex collections of digital objects can be accessed (i.e. sometimes referred to as ‘content discovery’).

This inter-disciplinary approach has also spawned inter-disciplinary approaches to the development of standards such as the Open Archival Information System Standard (OAIS - ISO

14721:2003), XML and, increasingly, international metadata standards. Over time it is expected that these will pave the way for cross-discipline, global approaches to building inter-connectivity across time as well as space.

On the other hand, while collaboration across professional disciplines is becoming more common, some of the initiatives underway are based on discipline-specific approaches. Archives and records management initiatives are focusing on the long term preservation of archival records and current records of long term value while initiatives sponsored by libraries tend to focus on the preservation of digital publications and other related digital objects as well as the means by which such objects can be accessed. Each is applying its own distinct sets of concepts, principles and even tools and techniques. These discipline-specific approaches are having an impact on the nature and focus of individual initiatives. In some of the digital initiatives described in this report concern has focused on preserving the ability of the digital object to serve as evidence of an action or transaction. In other initiatives the concern has focused on preserving the object as a commodity that can be bought and sold on the marketplace. In others it is the role of the object as a ‘published’ source of knowledge that can be made available widely through time.

As cross-disciplinary approaches emerge so too are increasing numbers of inter-sector partnerships. In Europe, for instance, major software vendors such as Microsoft and IBM as well as management consulting firms are joining academic and government partnerships based on the recognition that important new markets are emerging that are concerned about the need to manage the authenticity and reliability of digital information through time.

The combination of cross-disciplinary, inter-sector, and discipline-specific initiatives and the diverse array of drivers that have served as catalysts to their establishment is presenting a complex landscape that needs to be understood when contemplating how any one initiative might help inform the nature and direction of the initiatives established under a national strategy.

It is also important to understand that the landscape itself is proceeding through an evolutionary path that is still in its infancy. For instance, up until recently, and with few exceptions (e.g. NARA, UK), there were relatively few substantial implementations of comprehensive digital preservation programs. This is changing, however, as new projects such as PLANETS, CASPAR, and the Digital Curation Centre are established to focus on tools development and the sharing of services for maintaining digital objects over time. In addition to furthering the understanding of digital preservation concepts and issues, they will also be bringing abstract concepts and standards such as OAIS a step further into reality.

At the same time, however, recognition is also growing that no single ‘cookbook’ will be applicable to all digital information management situations. The field of digital preservation is much larger and more complex than might have been envisioned just a few years ago. Complex digital objects are being generated as the result of just about every human endeavour and they are being generated in multiple types and in multiple, often diverse technology environments that are not only rapidly changing they are also rapidly growing in complexity. Nearly every sector in a given society must deal not only with the complexity involved in managing and preserving these objects but it must do so in a way that aligns with the expectations and requirements of the sector itself and its stakeholders. As a result, in spite of the emergence of common frameworks (e.g. OAIS) and methods (e.g. emulation, migration) as well as technical standards (e.g. XML) and even solutions based on clusters of organizations focusing on common requirements, no single implementation strategy (i.e. the ‘cookbook’) is expected to emerge. This observation is important to consider. The development of a Canadian digital information strategy will need to

account for the complexity described above and, in setting strategic direction, be prepared to support (and indeed nurture) what will likely emerge as a complex ever-changing network of seemingly diverse initiatives and implementation scenarios.

Finally it is important to consider the broader information management dimensions within which these initiatives are situated. The issue of preserving the accessibility of digital information through time cannot be addressed in isolation from the larger management frameworks within which digital information is being created, used and preserved. While the Open Archival Information System Model (OAIS) provides a coherent view of the different (albeit technical) components/processes needed for preservation over time even it must be situated within the larger management frameworks of the organizations that are responsible for the digital information. In a number of the initiatives, this broader 'business' context, either conceptually or in reality, could not be defined easily. While the absence of such a business context may be understandable in initiatives supported in the academic sector where research into theoretical constructs is the norm, its absence in other government supported initiatives can lead to the development of digital preservation strategies that are independent of (and in isolation to) the strategic directions being set for information management generally and, most importantly, for the business of the organization itself. In developing a national digital information strategy that is relevant to the organizations it is supporting, steps will need to be taken to ensure that the initiatives established under the strategy are integrated into or linked with broader national strategic directions and priorities as well as the strategic business directions and priorities of the organizations benefiting from their results.

In summary, the world of digital information is still in its infancy. The emphasis of most of the initiatives underway in other countries has been on research and development. Major implementations (especially standards-based) are only just beginning to emerge. This evolutionary path and the current stage of maturity of the 'field' of digital information are important to understand in shaping the process for developing a national digital information strategy. Such a strategy can either be a catalyst for building a quantum and accelerated leap into the next stage of the evolutionary path or it can serve as a guide to help smooth the way for a more steady progression. Regardless, the decision should be based on a clear understanding of the evolutionary path.

3.2 Governance and strategic direction

There was no evidence of any of the countries surveyed having developed a national digital information strategy. National institutions such as a national library or a national archives may have developed strategies but these tend to be specific to the mandates of the individual institutions. Aside from the Government of New Zealand (where even here the emphasis was on e-learning, connectivity, etc. rather than a focus on the management and preservation of information), none of the national governments surveyed appeared to have developed a comprehensive national digital information strategy that would embrace the interests of multiple groups and organizations directed to a set of discipline and sector independent national goals.

This is not to say that a national strategy is neither feasible nor warranted. It is simply to say that it has not been undertaken by any of the countries surveyed and as such it is not possible to gain an understanding of the lessons that have been learned from such an exercise. That being said, however, there is much that can be learned from the initiatives described in this report and how these have been positioned in terms of the drivers that caused them to be established in the first place and the way in which they have been governed. Even in the absence of an all-embracing

national strategy, the context within which these initiatives are being managed can offer important clues and tips that can benefit the Canadian development effort.

Based on a review of the findings of the study the following observations were made:

- There is no single driver that led to the establishment of the initiatives described in this report. While cultural/heritage drivers (i.e. preserving digital information that can contribute to the enhanced knowledge of society) lie at the heart of many of the initiatives the establishment of other initiatives was stimulated by drivers that touched only tangentially on cultural and heritage interests and concerns. Some were derived from strategic plans for e-government. For example, the digital strategy for New Zealand focused on e-learning which in turn triggered the development by the National Library of a strategic plan for digital information. Some were derived from strategic ‘accountability’ concerns. And still others were driven by cost and efficiency concerns. In the UK, for instance, the White paper, “Modernizing Government” (1998) and the “Transforming Government” policy (2004) issued by the Cabinet Office (which included the statement that “all newly created public records must be electronically stored and retrieved by 2004” were spurred by the need to achieve cost savings and improved efficiency in government operations. This coupled with the Freedom of Information legislation and the growing concern about the long term preservation of digital information were catalysts for the establishment of a host of national digital information initiatives led by the Joint Information Systems Committee (JISC).
- Although the initiatives described in this report may have been subject to different drivers, most of the initiatives appear to be supported by government organizations and universities (e.g. Glasgow, UBC, UCLA, Monash) and especially cultural organizations such as the Research Libraries Group (RLG).
- In each of the countries surveyed, and while multiple organizations may have been active players, it appears that the national libraries and national archives play a very significant role; this role extends from governance, to research, to implementation, to advocacy, etc.
- However, with several exceptions the roles of key organizations remain poorly coordinated. For instance, the governance of some initiatives may be dominated entirely by a library (e.g. Library of Congress through the NDIIPP) while in other cases it may be the archives (e.g. NARA through the ERA) that is taking a lead role. Each will bring its own discipline-specific approaches, tools and techniques to the task thus placing at risk the prospect of developing comprehensive and holistic frameworks for digital information preservation.
- Cooperation and cross-disciplinary approaches are being reflected in several of the international networks that have been established in recent years. This has arisen out of the recognition that digital information issues pertaining to long term accessibility touch all disciplines and all types of organization regardless of where they are located around the world. The issues being the same suggests that the solutions should be the same or at least consistent in design and be based upon the same infrastructure. These factors are driving greater cooperation and a greater willingness to share knowledge and experience and to work together on the achievement of common goals building on the strengths each brings to the table. In this respect lessons can be learned from several European examples where considerable effort has been made in a number of inter-disciplinary and inter-sector partnerships to establish mutual research goals and objectives

- Aside from informal interaction among individuals participating in specific initiatives (or because of overlaps in representation), there was little evidence of substantial cooperation among or across the initiatives nor was there evidence that within a country steps were being taken to create a strategic framework within which individual initiatives could be better positioned and related to one another.
- Partnerships involving diverse organizations are emerging not only within individual countries but also across national boundaries. International partnerships such as ERPANET and new inter-disciplinary and inter-sector projects such as PLANETS were established based on the recognition that the issues and the solutions as well as the overall way forward for the management of digital information transcends national boundaries. These partnerships suggest that if national strategies are to be developed they will need to account for and indeed be prepared to nurture complex multi-disciplinary partnerships within the country and ultimately multi-national partnerships that reach around the world.
- As the strategies begin to coalesce nationally and internationally and as a greater degree of coherence is introduced there will be a need to realign existing initiatives to a strategic direction that reflects inter-disciplinary and inter-sector approaches and interests. This alignment process will need to be thought out and designed carefully as a new Canadian national digital information strategy is developed.
- Finally, as expressed in a number of forums, the developed world should not be moving forward on national strategies, especially in the field of digital information, without taking into account its role in providing support to developing countries.

4. Conclusions and Recommendations

This section draws on the results of the analysis described in the previous section and offers some conclusions regarding the extent to which international digital information initiatives can help to inform the development of a Canadian digital information strategy. The section is divided into two parts. The first part addresses key conclusions that follow from an analysis of the initiatives described earlier. The second part describes a set of recommendations on how the work underway to develop a Canadian digital information strategy should be positioned to both benefit from and contribute to initiatives underway at the international level.

4.1 Conclusions

The results of the analysis suggest that Canada has much to learn from developments at the international level. From the general review that was undertaken of the international landscape and the findings of the analysis of the information that was gathered, the following conclusions emerged:

- Although none of the countries surveyed had developed a comprehensive national digital information strategy this does not suggest that Canada should step back from developing its own. At the very least, the exercise to develop such a strategy should focus attention on the need to foster closer cooperation among those responsible for existing initiatives and ensure that future initiatives are rooted in a strategic context. It would also promote the establishment of Canadian initiatives that would complement those in other countries and accelerate Canada's efforts to position itself on the world stage. In many respects Canada is like the EU in the sense that it has an opportunity to set a multi-disciplinary, multi-sectoral approach that should be capable of satisfying the diverse interests of the regions and yet offer a unified national perspective. Given the complexity, however, it also suggests that Canada should move forward in a cautious, systematic manner based on the time required to establish complex inter-sector partnerships and the capacity of the country to absorb change.
- It is important to be precise about the identification of the drivers for a national digital information strategy. Based on experiences in other countries it is likely that the drivers will range from cultural/heritage interests, to e-government requirements, to scientific research and development, to concerns about accountability and transparency. These drivers will shape the direction of the national strategy. Ideally, the strategy should be designed such that it responds to multiple drivers to ensure that the value of the results of the initiatives established under the strategy can be maximized to the fullest extent possible.
- In some areas, funding for digital information initiatives has grown substantially over the past number of years. Often it is the nature of the drivers that have led to the sponsorship. In some cases, such as the National Library of New Zealand's Digital Information Strategy, the drivers were promoting a knowledge-based society and e-learning. In other cases the drivers may have been more directly related to e-government strategies or as the result of scandals leading to greater concerns about accountability and transparency. In the European Union (EU), one of the drivers was related to the EU's objective to promote member cooperation and multi-cultural/multi-national unity. Regardless, the nature and profile of the driver will often dictate the degree and level of funding.

- Judging from the role that cultural and heritage drivers played in the establishment of initiatives in other countries and if the strategic focus of the proposed Canadian strategy is to be on ‘documentary heritage’⁴ (which assumes the concepts of intellectual capital, societal knowledge, etc.), then it should be expected that cultural/heritage organizations such as LAC may be asked to assume a significant leadership role.
- However, cultural/heritage organizations such as the LAC cannot address digital information issues on their own. Some of the more successful initiatives underway in other countries were based on strong partnerships involving organizations representing different sectors and different perspectives on the issues. In fact, there are a number of examples of partnerships that did not require the cultural institution such as the national library or the national archives to assume the leadership role. Other highly significant organizations such as the Joint Information Systems Committee in the UK should be kept in mind as cultural and heritage organizations position themselves to assume a leadership role.
- The multi-sector and multi-national representation on existing networks established at the international level is a reflection of the global nature of the issues concerning the ongoing preservation of the accessibility of digital information. Canada has much to gain from participation in these networks (e.g. NESTOR/DPC/DELOS/DPE)
- As mentioned in the analysis section, initiatives at the international level are diverse with little if any coordination. This reflects the reality of the digital information landscape, the diverse drivers, and the diverse organizations participating in the initiatives. As a result, any effort to build a comprehensive national digital information strategy will need to account for the wide range of diverse initiatives that exist across the country. Decisions will need to be made about the extent to which a national strategy should drive the alignment of existing initiatives and the design and direction of new ones.
- In establishing a national digital information strategy Canada will be setting a precedent. Others around the world will be examining this initiative very closely in the hopes of being able to emulate it in their own countries. Canada should be mindful of the outside scrutiny the initiative will generate and be prepared to account for and respond to it as it moves forward.

5.2 Recommendations

The recommendations described below are intended to help support the development of plans leading to a national strategy. They should be read in concert with the recommendations described in, “Toward a National Digital Information Strategy: Mapping the Current Situation in Canada” available from Library and Archives Canada.

<http://www.collectionscanada.ca/cdis/index-e.html>

- Those involved in the consultation sessions should be provided with a copy of this report.
- Reports on the results of the thematic meetings and the summit should be provided to key international players.

⁴ see, “Toward a National Digital Information Strategy: Mapping the Current Situation in Canada”, available from Library and Archives Canada

- Representatives from leading international initiatives should be invited to review the results of the thematic meetings; their input would help ensure that Canadian initiatives under the digital information strategy could both contribute to and benefit from international knowledge and experience.
- The perspective of developing countries should be represented at sessions to ensure that the work underway to develop a Canadian digital information strategy can be shaped in a way that supports developing country requirements; to this end it might be useful to include a representative from CIDA.
- Key international players should be invited to participate in the initiatives established under the Canadian digital information strategy.
- As steps are undertaken to enhance the awareness of various Canadian communities about the development of the Canadian digital information strategy information about related international initiatives should also be included.
- An assessment should be undertaken of the extent to which international digital information initiatives could support the **implementation** of the planned Canadian digital information strategy and vice versa; the results of the assessment should be used to guide decisions concerning the participation of Canada in existing international networks and in establish partnerships with relevant international players.
- Information about the progress being made on the development of a Canadian digital information strategy should be published in leading international digital information journals such as D-Lib, etc.
- An assessment of the relevance of international initiatives underway in sectors other than those covered in this survey (e.g. the science domain) should be undertaken in tandem with any similar assessments undertaken in the Canadian context. This will facilitate the determination of the extent to which they can help inform the development of a Canadian digital information strategy that is comprehensive, all-embracing, and in line with global trends.

In moving forward on the development of a national digital information strategy, Canada will be joining the growing international community of those who are involved in addressing the complex and substantial issues associated with the management and preservation of digital information through time. Decisions concerning the objectives, scope and approach to be taken in developing such a strategy will be examined closely by those who themselves are struggling with positioning their digital information initiatives effectively within their own countries. As expressed in the Conclusions, such expected scrutiny suggests that Canada should be prepared not only to make the results of its own initiatives available to the world but to become active participants in the development of global solutions to what is quickly becoming recognized as a global challenge.

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