

Digital archiving in the 21st century

Archives Domain discussion paper

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EXECUTIVE SUMMARY

In the 21st century the overwhelming majority of newly created information is digital. The digital collections of collecting institutions such as archives, libraries and museums consist of either digitised or 'born digital' content (see the definitions in Attachment 3, 'The business of archives'). The belief that digital objects can be managed with the same methodologies developed over the years for physical objects is misconstrued. While digital objects are easier to copy, transfer and re-package, they present new risks and challenges, and are not inherently easier to preserve, or give access to, over the long term.

Digital objects are difficult to preserve and manage over the long term. Users expect access to collection content to be delivered online and are inclined to ignore collections that are not available online in digital form. Without urgent coordinated action across the cultural collecting domain, Australian cultural content is at risk of either not surviving and/or being marginalised. Designing and implementing regimes for selecting, creating, acquiring, describing and delivering access to digital collections requires a complete reinvention of systems, approaches and practices in collecting institutions.

The challenges faced by all organisations with responsibility for managing digital collections, and the cultural community in particular, given they are responsible for some of the nation's largest digital collections, are described under 'Issues in common across the Domain'. How the Archives Domain has tackled these challenges is outlined in 'Australian archival approaches'.

Challenges and issues regarding the long-term viability of and access to digital collections are common to all collecting domains, but the Archives Domain has put particular emphasis on finding solutions to digital archiving and digital preservation. In doing so it has become a leader in the field of the long-term preservation of digital objects and is thus in a position to provide advice to the cultural domain at large.

The Archives Domain in Australia has considerable strengths and opportunities in the significant quantities of cultural content over which it has stewardship and in the solutions and strategies it has developed to meet the challenges of long-term digital preservation and archiving. Nevertheless, the Domain as a whole is not confident of its capacity to implement digital archiving solutions in a scalable and sustainable manner across the entire Domain. In addition, the Domain is uncertain that it can meet user expectations regarding the extent of its collections that are, or will be, available online in digital form. If the Archives Domain is to deal with these challenges and realise the opportunities with which it is presented, urgent coordinated action and advocacy are needed to address the following barriers:

- insufficient financial resources
- insufficient skilled staff
- low awareness among community and stakeholders of the importance and urgency of the challenges posed by digital collections.

The Archives Domain sees itself as a valuable contributor to the development of digital collection management and preservation solutions. It has, and is building up, valuable leading-edge expertise, which positions it as an active contributor to cross-domain collaborative digital collection endeavours.

The Archives Domain is therefore happy to lead the establishment of a cross-domain Australian Digital Archives Alliance (ADAA) within the Collections Council of Australia auspices.

Within this alliance the Archives Domain would be willing, available and positioned to deliver expert advice on digital archiving, digital preservation, digital appraisal, digital metadata schemas, accessibility to digital collections, and the policies, guidelines and practices needed to develop and implement digital archiving.

In addition, the Archives Domain considers that there is merit in exploring the establishment of a National Digital Heritage Fund to fund, in a strategic and co-ordinated way, digitisation and digital preservation initiatives across all cultural institutions in Australia. A study of the scope of the operations of the fund might be commissioned to report back to the Collections Council of Australia in 2007.

BACKGROUND

This paper was prepared for the Collections Council of Australia (CCA) Digital Collections Summit, held in Adelaide on 16 and 17 August 2006. It was written by the National Archives of Australia in partnership with the Council of Australasian Archives and Records Authorities (CAARA), and represents the views of the Archives Domain in Australia. It reflects discussion at a preliminary Mini-Summit on Digital Collections held by the Domain on 15 June 2006 (see Attachment 2 for the resolutions of that Mini-Summit). For a description of the Archives Domain and a discussion of the business of archives, see Attachment 4, 'The Archives Domain' and Attachment 5, 'The broader context'.

'Digital archiving in the 21st century' articulates the Australian Archives Domain's views on the issues associated with digital archiving, and the long-term preservation of, and access to digital collections. It examines the Archives Domain's:

- role in relation to digital archiving of digital collections
- views on important issues relating to digital collections
- forward strategies to ensure long-term viability of, and access to, valuable digital collections.

In setting out its position, the Archives Domain recognises that many organisations, businesses, government agencies, and private citizens will need digital archiving in order to maintain access to their records in the face of constantly changing information and communication technologies (ICT). Though it acknowledges the *prima facie* role of ICT in digital archiving, the Domain asserts that digital archiving is not solely a technical issue. It encompasses organisational, legal, cultural, social and financial dimensions.

A note on terminology

This paper has endeavoured to use terms that are common to and acceptable to all of the cultural collecting Domains. Definitions of key terms appear in appropriate places throughout the text of this paper.

Of particular note is the definition of 'digital archiving' which, for the purposes of this paper, is taken to include all of the processes associated with selecting, acquiring, describing, managing, preserving and providing access to digital collections. The choice of the phrase 'archiving' is deliberate in that it aims to reclaim and reinstate meaning to a word that has been co-opted and used in a narrow and distorted way by the information technology industry and profession.

DIGITAL HERITAGE IN AUSTRALIA

As well as the vast array of 'born digital' material being created, active digitisation programs are in place across the country converting materials of many formats into digital format (or digital surrogates) and so adding important material to the digital milieu. In fact, many of the digital objects being created from now on will only exist in digital form, with no paper or other analogue equivalents. These are the essential sources of evidence that help document and protect the rights and entitlements of citizens. More importantly, though, is the fact that a proportion of these digital objects will constitute our future history and heritage. They will provide insight into the workings of government, provide the accountability and evidentiary basis for decisions made by organisations, and they will record the scientific and creative endeavours of this country. Therefore, there is a great responsibility to identify, secure and ensure the survival of digital objects with heritage value.

The responsibility of maintaining, preserving and providing public access to our digital heritage lies primarily with archivists, record managers, librarians, gallery and museum curators, that is, with the members of the collections domain. Therefore, these public institutions need to cooperatively apply their skills and expertise to develop long-term digital archiving, digital preservation and access solutions. Happily, a number of institutions have taken up the challenges and taken proactive steps in addressing the practical implications of digital archiving and preservation.

However, cultural institutions alone cannot ensure the ongoing viability of our digital heritage. Governments, business partners and the wider public each have a role in assisting the cultural domain in its efforts to ensure the survival and accessibility of our digital heritage. They can assist the cultural domain in its endeavours by implementing the solutions offered, by supporting research and development, and by becoming partners in joint endeavours.

ARCHIVAL SERVICES

The Archives Domain offers the following services in relation to digital collections. It:

- ensures that digital records of lasting value are preserved so that they are accessible, retain their integrity and survive technological and organisational change over time (both mid-term and long-term)
- ensures that important digital records are identified through collection development policy criteria and/or an appraisal process, and managed appropriately
- provides access to and understanding of the archival resources of Australia
- advises on how digital records, from creation onwards, should be captured, managed and appropriately described so that they are retrievable.

In doing so, the wider society benefits by being assured that digital records:

- are preserved and protected
- are accessible over the long term
- hold governments and organisations accountable
- meet legal obligations relating to the records.

Creation of digital collections

Digital collections of archival interest can be produced by:

- government agencies
- non-government organisations
- religious organisations
- educational institutions
- cultural institutions
- people at home.

Digital objects of archival interest can be text, sound, images or a combination, and can come from a range of sources, including:

- websites
- records management systems
- email
- virtual reality models
- educational packages
- scientific datasets.

Archival organisations that support such digital collections include:

- government archives
- business archives
- educational archives
- personal archives.

Initiatives creating large collections of digital objects, and which impact on the Archives Domain, are:

- e-government initiatives resulting in large record collections in each jurisdiction
- e-heritage digital collections
- digitisation programs converting analogue material to digital
- personal digital collections being created by individuals and families
- digital learning packages being created by online learning initiatives and the education domain
- e-commerce transactions resulting in digital record collections
- the 'creative digital content' industry composed of private firms and individual creating online games, interactive TV, reusable educational material and so on.

ASPIRATIONS IN COMMON ACROSS THE DOMAIN

Regardless of the creating community or its digital products, there are common aspirations shared by all bodies responsible for managing digital collections over time.

The Archives Domain, though sharing these aspirations, puts a 'records' emphasis and interpretation on these aspirations (see definition in Attachment 3, 'The business of archives').

However, digital collections composed of 'records' are just one 'genre' of a large range of digital collections being created, that all share the following aspirations, which are that:

- important digital collections are captured, not lost
- born-digital objects are preserved in digital form to an agreed standard
- digital objects within the digital collections are managed so that they retain their context, integrity and authenticity over time
- digital objects are described and tagged so that they can be found and located within digital collections
- digital collections are preserved so that they survive technological changes and are available in the future
- digital collections can be accessed, interpreted and used in the future
- digital collections are contained within sustainable digital management and archival systems ensuring their appropriate management over time
- networks of shared trusted digital repositories are developed allowing access to a range of digital collections from a single gateway or single online access interface
- the tools, technologies, policies and practices that ensure the longevity and integrity of digital collections are developed and shared for the common good
- the resources and skills needed to maintain digital collections are available.

ISSUES IN COMMON ACROSS THE DOMAIN

Bearing in mind the national and international efforts already under way (see Attachment 3, 'The business of archives'), the Archives Domain has identified the following issues that remain in need of attention. They are issues common to the whole cultural community.

Issue 1 – Loss due to IT obsolescence

Though a major aspiration is that important digital collections last over time, digital objects and particularly digital records can easily be 'lost' and a 'digital black hole' covering several decades can easily eventuate. A key challenge of the digital age is to find ways of providing continuing access to digital objects that depend on outdated technology. Digital objects/records can be lost due to various types of IT obsolescence.

Physical storage media for digital records have been found to be unstable, fragile, prone to corruption and relatively short-lived. Thus most media requires frequent 'refreshing', ie copying onto new media. Also the standard media of the 1990s, the floppy disk, is mostly being superseded by CDs and DVDs, which are also on the way to becoming obsolete. Currently, whatever physical medium is selected to store digital objects, a migration schedule is necessary to ensure that the records on that medium are not lost.

Hardware needed to store and access digital records also becomes obsolete over time as newer, faster and larger capacity models come onto the market. Most new hardware has a usable life of only three to five years.

Software applications needed to access the digital objects are also quickly becoming obsolete. Software includes both the applications needed to make and read the record, and the operating system on which that software is run. Software upgrades and new releases are as frequent as the hardware and storage medium releases and pose an equal challenge.

Along with the need to convert, refresh or migrate digital objects, there is a need to keep audit trails of any transformations, to track the workflow and to identify any changes to the integrity or authenticity of the record. Without such audit checks, data could be lost.

Presently, no archive can cope with the variety of storage formats that may come into its custody. Hence a variety of solutions have been trialled and put in place by the Domain. The Domain acknowledges that for safe long-term preservation we cannot rely on present storage media options. Other management strategies need to come into play.

Issue 2 – Loss due to lack of capture and poor practice by creators

Loss can also occur as a result of poor practice at an organisational level. There is a perpetual risk that important digital objects or records are not captured – that they are left to sit on someone's hard drive, CD, DVD, or other storage media and not

captured into a larger organisational system. Even when digital objects are captured, they may not be captured into sustainable and appropriate management systems.

The Archives Domain has promoted the 'capture at creation' and 'good recordkeeping message' to alleviate this concern, and has published guidelines to help implement best practice.

The Domain remains concerned that poor digital recordkeeping may result in loss of records and possible loss of record authenticity, hence resulting in the loss of the evidentiary value of a digital collection. Furthermore, unless digital records are captured and managed in appropriate and adequate management systems, digital archiving will become unnecessarily difficult.

The guidelines the Domain has produced regarding the capture and management of digital records are applicable to digital objects generally and so can be used, with slight modifications, to suit clients in other cultural domains.

Issue 3 – Digital authenticity and integrity

It is a common requirement that digital objects retain their authenticity and integrity over time, for both historical as well as for accountability and evidentiary reasons. This is often backed up by legislative requirements, particularly so in the Archives Domain.

To ensure integrity, and to prove the authenticity of digital objects within a collection over time, the essential characteristics of that object or record need to be captured and preserved. In this way, the context in which the digital object was created and used is captured along with the content.

Digital collections also need to be kept safe from unauthorised access, alteration or deletion. Data security, data integrity and audit requirements are all required components of maintaining accountability and integrity.

Issue 4 – Volume of digital collections

The Archives Domain anticipates that it will be dealing with, potentially, petabytes of digital data in the near future (a petabyte is two orders of magnitude larger than a gigabyte). The cultural community as a whole will similarly be dealing with petabytes of digital data in the near future and so the issue of volume is a common one.

In particular, there will be a need to:

- sort the chaff from the wheat, ie to use evaluation and appraisal tools to determine what's worth keeping
- ensure that objects can be quickly retrieved from within large and distributed digital collections, ie to employ a metadata management framework.

The Archives Domain is used to dealing with large volumes of physical material and has strategies and robust systems in place that allow it to cope with such volumes (ie its appraisal methodologies, metadata schemas, and intellectual control mechanisms). In 2005, the ten major archival institutions collectively held almost 550 kilometres of records in their custody, equivalent to more than 68 million items (see

CAARA statistics and methodology for determining item numbers at www.caara.org.au).

The Archives Domain is now transferring that expertise to managing large volumes of digital objects. For example, the National Archives of Australia now has more than 500,000 items – close to 15 million images – available online. Other jurisdictions are building up similar volumes of digital collections.

The expertise archivists have developed in dealing with large volumes of physical records stands them in good stead for dealing with the volume of digital records expected over the next few years.

Issue 5 – Evaluation/appraisal methodologies

Not all digital objects need to be kept for long periods of time, let alone permanently. The ability to guide decisions on what to keep and what not to keep, through the appraisal process, has been a core function of the Archives Domain and it has methodologies and guidelines in place on how to embark on an appraisal process.

Appraisal

The process of evaluating business activities to determine which records need to be captured and how long the records need to be kept to meet business needs, the requirements of organisational accountability, and community expectations.

To cope with large volumes of digital objects, excellent metadata frameworks and management systems need to be in place, to enable the retrieval of digital records/objects from amongst large digital collections within acceptable time frames.

Institutions, and archival institutions in particular, need to have intellectual and physical systems designed, and in place, well before they can effectively take into custody large-scale digital object/record transfers. It is better for organisations to be prepared in advance, rather than try to re-engineer themselves having already created or assumed custody of large digital collections.

Issue 6 – A digital archives framework

There is more to ensuring the longevity of a digital collection than just preserving the digital objects within it. Ensuring the long-term viability of digital collections is what the Archives Domain means by the term ‘digital archiving’.

Digital archiving

Digital archiving covers the identification, appraisal, description and tagging, storage, preservation, management and retrieval of digital records, including all of the policies, guidelines and systems associated with those processes, so that the logical and physical integrity of the records is securely maintained over time.

Digital archiving covers the spectrum of laws, policies, procedures and methodologies required to address the ‘whole of life’ issues of a digital object or record. Digital archiving subsumes within it the critical function of digital preservation. Though this approach to digital archiving is particularly pertinent to

the Archives Domain, as their digital collections are primarily made up of 'born digital' records, the digital archiving approach is one that has valuable application across many domains and the tools and skills developed can be shared with, and used by, other domains as appropriate.

Issue 7 – Intellectual control and description frameworks

Intellectual control and description schemas and frameworks include appropriate metadata models and standards that ensure:

- resource discovery
- intellectual control and description
- administrative control
- preservation control.

A number of such metadata schemas are already in use across the cultural domain. Others are Domain-specific. As we operate more collaboratively in an online environment, and make our collections available via the internet through distributed databases, the issue of interoperability comes to the fore – we need to either match or map metadata to enable metadata harvesting and federated searching.

Issue 8 – Sustainable preservation solutions

From the Archives Domain's point of view, digital preservation relies on good digital recordkeeping. Good recordkeeping and archival systems provide access to complete, reliable and authentic records into the future. In other words, the Domain takes a 'whole of life' approach to digital preservation. This emphasis may be less relevant where an organisation is creating a collection via a digitisation program, but the concept of 'capture at creation' would be a worthwhile emphasis of any preservation solution, whether the records are born digital or digital surrogates.

Of particular concern to the Archives Domain is the ability of small to medium-sized archival programs to implement sustainable digital preservation solutions. At the moment digital preservation is seen as a prohibitively expensive activity and as such the exclusive preserve of the large government archives. There is an urgent need to develop simple and scalable digital preservation tools and strategies that can be deployed in all archival settings. The innovations developed in the larger institutions need to be repackaged in 'lite' form with supporting training programs so that they can spread across the entire Domain.

Issue 9 – Access and delivery

Australia's cultural institutions are responsible not only for accumulating and maintaining their individually unique collections, but also for increasing public access to these collections. A critical issue, therefore, is that appropriate accessibility infrastructure is in place. Present and future generations need:

- the ability to readily access and interpret digital collections over time
- user-friendly online interfaces to digital collections

- access management and delivery systems to support the quick and seamless retrieval and delivery of digital objects
- controlled access mechanisms, for privacy, security or copyright reasons.

Issue 10 – Visibility of digital collections

At present, cultural digital collections are generally made visible on individual organisation's websites, and either accessed there directly, or through cultural gateways or portals. Visibility of collections and their objects, via internet search providers, is dependant on the index ranking given to an organisation's website by that provider.

A companion issue is the need to increase the public's awareness of the many cultural Domain digital collections available to them. An ongoing proactive marketing strategy is required to increase the public's awareness of the range and utility of digital collections.

Issue 11 – Sustainable management systems

Intellectual and physical management systems that are employed to store, manage, retrieve and deliver digital objects should, ideally, be based on open standards to ensure sustainability of the systems over time. Open standards exist for format types, for operating systems, disk drives and so on. If proprietary systems are used, digital objects could be lost or rendered uninterpretable over time.

The Archives Domain is advocating that digital archiving solutions be based on open standards such as the Open Archival Information System (OAIS) Reference Model ('Blue Book' digital preservation framework – ISO 14721: 2003).

Issue 12 – Shared and trusted digital repository networks

The Australian Partnership for Sustainable Repositories (APSR) projects (<http://www.apsr.edu.au/>) are developing sustainable repository frameworks, interoperability capabilities, metadata harvesting mechanisms, standards development, and so on.

Another group focusing on the requirements of trusted digital repositories is MAGDIR – Working Group on Management of Australian Government Digital Information Resources, which includes in its agenda:

- repository functions and processes
- the organisational structure and governance requirements needed to support sustainable trusted digital repositories
- technology requirements and sustainable system infrastructures and strategies
- usability of information by designated target communities.

The Archives Domain supports the development of networks of shared and trusted digital repositories to provide 'single point' access to a range of digital collections hosted by cultural and other organisations in Australia.

There are, however, many different approaches that research institutions and cultural organisations can take. The Archives Domain focuses on a digital archive, as opposed to a trusted repository. Central to a digital archive is a robust and sustainable preservation functionality, which assures the longevity and integrity of the record.

Issue 13 – Skilled staff

Digital archiving is a relatively new ‘archival function’ and for that reason there are few people at present who have the particular combination of skills required for the job (ie a combination of traditional archival and recordkeeping skills, as well as acute awareness of the role technology plays in digital object management, ICT experience, and skills in system stewardship).

There is an urgent need for training in all areas associated with the creation, capture, management, preservation and accessibility to digital collections. Having inadequate numbers of trained and skilled staff can seriously hinder the development of the digital archiving agendas.

There is also a need to embed into any skills development and training programs the conceptual difference between digital archiving and digital preservation so as to avert any misconception that ‘digital preservation’ is the total solution. Training programs need to explain the need for, and role of, ‘digital archiving’. People need to understand that digital preservation is a vital subcomponent of digital archiving and that preservation on its own – without the policies and systems of digital archiving – will not deliver a long-term solution.

Issue 14 – Adequate resourcing

Resources are required for research and development into the following aspects of digital archiving:

- framework design
- implementation
- application of descriptive and intellectual control metadata to large volumes of digital objects
- digital preservation
- appropriate access and delivery mechanisms.

Additional costs are associated with the initial development and implementation of digital archiving solutions, but possibly also with their sustainable maintenance. The extent of resourcing needed for this may be Domain specific and will depend on the:

- quantity of digital objects/records that require preservation
- range and complexity of formats and content
- extent of control needed over the digital objects
- standard of access that is required
- degree of standardisation among the objects in a collection.

Government and other funding bodies have not, as yet, understood the consequences of not adequately funding the research and development needed to achieve sustainable digital archiving solutions. There is obviously a great need to make funding or sponsoring organisations aware of the range of issues involved in digital archiving and of the critical nature of having effective solutions in place.

Though a number of substantial, one-off allocations have been made for digitisation programs, most organisations need to fund their digital records research and development, and prototyping of digital archiving solutions, from present internal funds. This is not sustainable, given the time critical nature of the problem.

Issue 15 – Copyright, intellectual property and fair use

The Copyright Amendment (Digital Agenda) Act 2000 has updated copyright law for the digital environment. The introduction of this law has led to a heightened awareness of the possibility of copyright infringement as well as an awareness of the administrative cost associated with negotiating and securing copyright licences for digitised and born digital objects. The aim of the legislation is to ensure that cultural institutions:

can access, and promote access to, copyright material in the online environment on reasonable terms, including having regard to the benefits of public access to the material and the provision of adequate remuneration to creators and investors

Copyright Amendment (Digital Agenda) Act 2000 (Cth), s. 3

An issue is still the extent to which copyright reforms are applied ‘in situ’ and the extent to which they promote or impede cultural institutions’ ability to use digital technologies to achieve their public interest missions. Further changes to copyright law are on the way. A draft exposure Bill on reforms to federal copyright law is presently being prepared by the Attorney-General’s Department, with the aim of making the copyright law fairer for consumers.

Another issue facing the cultural community is licensing arrangements for copyright and the increasing demand for commercial content development.

Issue 16 – Organisational re-engineering

The traditions of stewardship and best practice that cultural organisations have used in a print or analogue-based environment are not fully adequate in a digital environment. Many processes, workflows and management approaches have had to be re-examined and often re-engineered. There is a need to establish new best practices as well as new organisational structures that best meet the requirements of digital archiving and digital preservation.

Issue 17 – Digitisation standards

Cultural organisations have and are continuing to invest considerable effort into digitisation programs and many are using or have set quality standards to ensure consistency of approach, the ability to exchange, deliver products and to ensure at the start of a digitisation project that the best strategies are adopted to ensure long-term viability of image files. Digitisation guidelines prepared thus far often cover the

technical, metadata and administrative components associated with digitisation.

Examples of guidelines include:

- UK National Preservation Office, 'Guidelines for digital preservation', www.rlg.org/preserv/joint/chapman.html
- National Library of Australia, 'Guidelines on digital capture and image creation', www.nla.gov.au/digital/capture.html
- National Library of New Zealand, 'Digitisation guidelines for creating digital still images', www.natlib.govt.nz/files/nldraftdign.pdf
- The UK National Preservation Office, 'Guidelines for digital images', www.rlg.org/preserv/joint/ayris.html
- OCLC Registry of Digital Masters' minimum benchmark digitisation and access standards
- Digital Library Federation, 'Benchmark for faithful digital reproductions of monographs and serials', www.diglib.org/collections.htm

Given the range of digitisation guidelines and standards, it may be appropriate for the cultural domain to work towards an agreed set of digitisation standards.

AUSTRALIAN ARCHIVAL APPROACHES

The Australasian Archives Domain is continuously working to progress the digital agenda, set best practice standards, and mitigate issues of concern. Major contributions and enablers developed or in development are described below.

Capture at creation

Early on in its digital endeavours, the Archives Domain recognised the importance of capturing digital records, at creation, into well-designed recordkeeping systems. Conversely, the Domain recognises the profoundly detrimental impact of lack of capture at creation on digital recordkeeping and digital archiving.

Decisions relating to recordkeeping and preservation of a digital record should ideally be made before creation, at the point of designing the recordkeeping system. This brings the decision-making about the significance and lifetime of the records 'forward' in time. With the advent of born digital records it is no longer feasible to wait until records are old and no longer required by their creators before considering which records should be preserved in cultural collections. Any collecting institution that adopts this 'end of lifecycle' approach will almost certainly find that the right records were either not created and captured in the first place, or are in no fit state to be transferred for long-term preservation and access.

From the Archives Domain's perspective, significant records must be recognised at or before the time of creation, so that decisions of management, preservation, integrity and authenticity are made as early as possible. The Archives Domain has therefore advocated in its digital recordkeeping advice that organisations set general rules to cover the early capture of digital record types such as email, word processing documents, and spreadsheets. It also advocates for appropriate capture procedures for non-standard digital record types such as specialised databases.

This fundamental principle of 'capture at creation' applies equally to all domains dealing with digital collections, and can be incorporated into any digital collection strategy.

Digital recordkeeping

Good digital archiving depends on good digital recordkeeping. The Domain's preservation approaches rest on this dictum. Therefore the Archives Domain has put enormous effort into developing digital recordkeeping policies, guidelines and practices to aid good digital recordkeeping. The websites of all the major Australian archives institutions list the digital recordkeeping products they have developed (see Table 1). These products can equally be used by client groups outside of the Archives Domain or can be modified by them to meet their particular needs.

As recordkeeping is a core function of the Archives Domain, it has been a natural leader in developing digital recordkeeping solutions, and this expertise can be applied to 'digital object-keeping'.

Table 1 – General and digital recordkeeping products of Australian archives

National Archives of Australia	www.naa.gov.au/recordkeeping
State Records New South Wales	www.records.nsw.gov.au/recordkeeping
Queensland State Archives	www.archives.qld.gov.au/government/recordsmgmt.asp
State Records of South Australia	www.archives.sa.gov.au/management
Archives Office of Tasmania	www.archives.tas.gov.au/government
Public Record Office Victoria	www.prov.vic.gov.au/records
State Records Office of Western Australia	www.sro.wa.gov.au/dri/drimain.asp
ACT Territory Records Office	www.territoryrecords.act.gov.au/recordsadvice
Northern Territory Archives Service	www.nt.gov.au/dcis/nta/recordkeeping

The digital recordkeeping strategies referenced in Table 1 were developed in direct response to the issues of common concern raised earlier in this paper, ie the fact that increasing numbers of records are ‘born digital’, the need for early capture of records, the need to apply appraisal decisions regarding the retention of digital records ‘at creation’, and the need to have effective preservation strategies incorporated within a digital archiving framework.

In addition, the Archives Domain is continuously producing new policies and guidelines relevant to digital recordkeeping and archiving, adding to the wealth of knowledge collectively accumulating on digital collection management.

Records management systems

The Archives Domain has also been advising industry on recordkeeping and archiving issues in vendor development of records management systems (RMS) and electronic document and records management systems (EDRMS). This is to ensure that the latest standards and policies of the Archives Domain are incorporated into the design of such systems, both at the initial design stage or at the point of system upgrades. Incorporating archival principles and practices into the functional capabilities of the EDRMS allows record creators to make on-the-spot decisions about the life span, and future accessibility of a digital record as they are creating the records.

New appraisal approaches

The Archives Domain has investigated how best to apply appraisal to digital collections and has developed specific appraisal methodologies and disposal authorities for digital records. This expertise is unique to the Archives Domain and could well be applied usefully across other cultural domains.

Standards development

The Archives Domain has been instrumental in the development of national and international standards aimed at setting best practice for digital recordkeeping and

digital archiving. The following are a selection of standards the Domain has either developed or helped develop:

Table 2: Standards available

ISO 23081 Part 1	Recordkeeping Metadata Standard
AS ISO 15489 – 2002	Records Management Standard
ASXXX (Int.) – 2006	Recordkeeping Compliance Standard
AS 5044	AGLS Metadata Element Standard
AS 5090	Work Process Analysis for Recordkeeping
ISO 19005-1:2005	Document Management – Electronic document file format for long term preservation – Part 1, Use of PDF, portable document format
ISO 26300	Open Document Format
ISO TR18492:2005	Long Term Preservation of Electronic Document-based Information
ISO 14721:2003	OAIS Blue Book – Reference Model for an Open Archival Information System.

The OAIS (Open Archival Information System) model is an important standard that provides a common framework/design schema for describing and comparing architectures and operations of digital archives. The OAIS model was developed by the Consultative Committee on Space Data and is now an international standard. It defines the following functional requirements of a digital archive system:

- ingest function
- archival storage function
- data management function
- administrative function
- access function
- interoperability between archival systems/system integration.

The OAIS model has been adopted as the underpinning framework by the Domain in its development of digital archive models.

Metadata

The metadata standards outlined in Table 2 were developed to enable the unique identification, description, management, discovery and preservation of digital records.

In addition, the Archives Domain has developed innovative solutions for associating the content of a preserved object with its metadata.

Metadata can reside in a variety of places in a system – either in the digital object that forms the basis of the record, or elsewhere in the system with links/associations back to the digital object that forms the basis of the record. Conceptually though, the metadata is an integral part of the record, and the boundaries of a record are not limited to the boundaries of a single digital object within a system, but a record can be a digital object together with a variety of linked metadata elements/values.

One approach has been the 'encapsulated object approach', where the preserved record and all of its preserved metadata elements/values are bundled together into a single object (with the administrative and resource discovery metadata associated with that object being kept separately elsewhere in the archival system). This concept has been successfully utilised as a digital preservation solution in a major Australian archives organisation. Another successful approach that has been implemented is to preserve the object and its metadata as separate objects with persistent linkages connecting the two elements (in this case the administrative and resource discovery metadata are also kept separately elsewhere in the system). Both approaches have proven to be successful models for preserving the long-term viability, interpretability and accessibility of valuable records.

Digital archiving

The concept of digital archiving is a solution that the Domain advocates, as the concept incorporates all the required digital recordkeeping, archiving and preservation processes required to ensure the authenticity and longevity of digital records. In advocating this concept, and in building 'digital archiving solutions', the Domain wishes to avert the misconception that 'digital preservation' is all that is required to ensure the long-term viability and accessibility of digital collections over time. Digital preservation is crucial for the longevity of digital records but it needs to be applied within a digital archiving framework.

The Domain is active in developing a range of digital archive models, generic workflows and business cases for use by archives organisations, or other organisations within the cultural Domain, to further their digital cause. Technical architectures, system specifications, tool kits and case studies are under development. Pilot implementations and evaluations of repository models have been undertaken and the Domain is active in publishing its findings relating to these digital developments for public consumption.

Skills identification and training

The Archives Domain is active in identifying present and future skills required for digital archiving as well as are identifying the 'skills gap' within the profession at present.

Individual initiatives are underway to develop capability frameworks and training programs aimed at increasing the digital skills base within the profession. The Domain's aspiration is that there will be adequate numbers of archivists and records managers, skilled and trained in digital archiving, who are *au fait* with the digital environment and capable of leading the Domain into the future.

Online access to digital collections

The Archives Domain is undertaking digitisation programs and making significant digital collections available to the public online. Most of the digital collections offered by the Archives Domain at present are the result of digitisation programs, as few archives organisations are yet in a position to make 'born digital' records publicly available through an online interface. The Public Record Office of Victoria with its digital archives, is a notable exception.

A search of the major archives organisational websites highlights the range of digital collections now available. Some are of particular interest as they are collections where the original record material has been augmented and repackaged into digital training resources such as the National Archives of Australia's [Vrroom](#) site.

Many archival institutions now provide online interfaces to their collections databases and, in some cases, to a selection of digital renderings/surrogates of their holdings. A number of topic-specific portals have been developed to provide one-stop search access to information about distributed archival holdings. Examples of these include:

- [Register of Australian Archives and Manuscripts](#)
- [Directory of Archives in Australia](#)
- [Australian Trade Union Archives Gateway](#)
- [Australia's Prime Ministers](#)
- [Guide to Australian Business Records](#)
- [Bright Sparcs: Archives of Australian Science and Technology](#)
- [Guide to Australian Literary Manuscripts](#)
- [Australian Women's Archives Register](#)

In addition, a number of archival institutions contribute to portals such as the National Library of Australia's [Picture Australia](#). Recently, in the context of discussions about the development of a National Online Archival Network (NOAN), the Archives Domain has decided to pursue the development of the NOAN through cooperation with federal government-funded [Collections Australia Network](#).

Marketing

Allied with the development of digital recordkeeping solutions is the continuous need to communicate the value of good digital recordkeeping practices to clients, until such practices become entrenched, and to remind them that responsible stewardship is a component of good recordkeeping.

The Archives Domain is active in marketing its products and services through a variety of means including seminars, presentations, publications, brochures and advices, via the media, through sponsorships and fellowships, through networking and collaboration, and through websites.

There is also a need to develop cross-Domain marketing strategies to promote the expertise archivists can bring to the digital agenda. International project managers working on the digital agenda regularly contact us to learn from our experiences and endeavours in digital archiving and are acknowledging the value of the initiatives being undertaken in Australia.

Digital signatures and authentication

The uptake of ICT has created new challenges in relation to providing proof of identity and guaranteeing confidentiality in online transactions. Ensuring authenticity, privacy and confidentiality is of particular importance to business and

all governments as many of the e-Government initiatives now only permit online transactions and communications between themselves and their clients. Early e-Government initiatives were outlined in *Better Services, Better Government: The Federal Government's E-government strategy (2002)* and more recently reinforced with *Responsive Government – A new Service Agenda (2006)*. These guidelines and publications relating to e-Government initiatives can be found on the [Australian Government Information Management Office \(AGIMO\)](#) website. Other jurisdictions have also tackled this issue and can be followed through on state government websites.

The Archives Domain has worked with government to develop whole-of-government guidelines on authentication, an example being the [Australian Government e-Authentication Framework \(AGAF\)](#).

As well as working with governments on broad guidelines, the Domain has addressed authentication and encryption matters that relate more directly to digital recordkeeping. The National Archives of Australia has developed the [Recordkeeping and Online Security Processes: Guidelines for Managing Commonwealth Records Created or Received Using Authentication and Encryption](#).

These guidelines provide advice on the recordkeeping implications of using online security processes, such as authentication and encryption, and give strategies for ensuring that legislative, business and community requirements for records are met. The guidelines also introduce the technology available to support online security processes.

Advice in the above guidelines pertains to all digital object transactions requiring authentication and security, so are not only relevant to digital records. In other words, the work of the Archives Domain has a broader relevance for the whole cultural domain.

Preservation

Preservation involves the processes and operations involved in ensuring the technical and intellectual survival of authentic records through time.

Preservation

Preservation encompasses environmental control, security, creation, storage, handling, and disaster planning for records in all formats, including digital records.

Standards Australia, AS ISO 15489, Part 1, Clause 3.14.

The Australian Archives Domain has been an international leader in digital preservation since the 1990s. Digital preservation solutions have been implemented in two major Archives and through the collaborative work of the [Australasian Digital Recordkeeping Initiative](#). These solutions are discussed in detail in Attachment 1.

STRATEGIES FOR THE FUTURE

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted a 'Charter on the Preservation of the Digital Heritage' at its 32nd session of the General Conference of UNESCO, 17th October 2003.

The Charter proclaimed 'truisms' about the inherent vulnerability of global digital heritage and set out strategic actions required to mitigate threats to the survival of such heritage. The Charter focused on public policy and advocacy issues and aimed to give direction to UNESCO members in developing their own national strategies or charters.

The Charter, in précis, said:

- many digital collections have lasting value and significance, and therefore constitute a heritage that should be protected and preserved for current and future generations
- the purpose of preserving the digital heritage is to ensure that it remains accessible to the public
- digital collections are at risk of being lost due to a number of factors, including technological change
- there is an urgent need for action; unless prevailing threats are addressed, the loss of the digital heritage will be rapid and inevitable
- continuity of the digital heritage is fundamental. To preserve digital heritage, measures will need to be taken throughout the digital object's life cycle, from creation to access
- measures need to be taken to develop appropriate policies, practices and systems
- selection principles need to be established and applied
- appropriate legal and institutional frameworks are needed
- the digital heritage needs to be preserved and made accessible
- roles and responsibilities within organisations and cross-cultural Domains are needed
- partnerships and cooperation is required.

The Charter is as relevant today as it was in 2003. Many organisations have taken up the challenge, and many have substantially progressed the digital agenda as proclaimed by the Charter. However, we are still in the fledgling stage of implementing solutions. A lot of experimentation is required before the 'digital archiving industry' matures.

Increasingly apparent since the adoption of the Charter by UNESCO is the need for, and value of, collaboration across the cultural domain, and cooperative sharing of developmental results. The digital agenda comprises many issues common to all

bodies with digital collections. The strengths and expertise of individual domains within the cultural group are valuable, and we must take advantage of them.

Cooperation also brings economies of scale. Digital archiving is not cheap, and we do not have the luxury of time to allow each domain to develop the levels of expertise required, when others have already established them within the collective group. We cannot afford to 'reinvent the wheel'. So collaborative work is the way of the future, but collaborative work where established expertise within the cultural domain is acknowledged and used, not re-invented.

To further the collaborative work in a concrete manner, the Archives Domain proposes a formal alliance across a broad sweep of interest groups that have a stake in digital archiving. The proposed Australian Digital Archiving Alliance (ADAA) would focus on digital preservation for heritage collections and educational and scientific domains (including e-research infrastructure), and would seek solutions for all types of digital objects (including records). Its membership would embrace representatives from any organisation with an interest in digital preservation and curation. This would include private and public institutions, private individuals, universities etc. In terms of the cultural domain it would include all archives, libraries, museums, galleries and other collecting institutions. Its main roles would be advocacy and awareness-raising.

Another issue is that now, more so than when the Charter came out, there is a great need for collaborative development of strong business cases outlining the research and development needed to further the digital archiving agenda. Strong funding submissions need to be drawn up, bolstered by effective lobbying and marketing strategies so that the cultural domain as a whole, and individual bodies and projects within it, get adequately funded.

It is not so much the technical issues, or even the organisational re-engineering changes required, that are inhibiting progress at the moment. Rather, it is the lack of funding, the lack of government awareness of the ramifications of inaction, and the lack of proactive action being taken by the cultural community itself. We have not been a 'force to be reckoned with'. It is time we became such a force.

CONCLUSIONS

It is critically important that digital objects within digital collections retain their authenticity, accessibility and 'understandability' over time, through effective digital archiving and preservation.

Effective management of digital collections is a challenging business. More than any other part of the cultural domain, the Archives Domain has worked develop, implement and evaluate solutions, especially in the areas of digital appraisal, digital preservation and accessibility to digital collections. The Archives Domain's approaches to digital recordkeeping and digital archiving, its metadata models, its policies, practices and procedures – these can all be deployed across domains facing the challenges of digital collection management.

The Archives Domain sees itself as a valuable contributor to the development of digital collection management and preservation solutions. It has, and is building up, valuable leading-edge expertise that position it as a natural leader in, and active contributor to, collaborative digital collection endeavours across the cultural domain.

The Archives Domain is also happy to lead the establishment of an Australian Digital Archives Alliance (ADAA) within the auspices of the Collections Council of Australia. As part of this alliance the Archives Domain would be willing, available and positioned to deliver expert advice on digital archiving, digital preservation, digital appraisal, digital metadata schemas, accessibility to digital collections, and the policies, guidelines and practices needed to develop and implement digital archiving.

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PRESERVATION CASE STUDIES

A variety of preservation solutions, focusing on the following options, have been explored:

- emulation
- migration
- normalisation.

The Australian Archives Domain has been leading internationally in this field for ten years or more. Two successful case studies have tested and implemented the normalisation approach.

National Archives digital preservation approach

The National Archives has developed an innovative approach to meet the challenge of digital preservation. It is now operating as a prototype and has been recognised nationally and internationally as a sustainable, scalable and innovative answer to the complexities of digital preservation and access.

Under the National Archives' prototype, digital records are converted into a small number of open file formats to guarantee unimpeded access to their contents in the future. The open formats are based on standards, have full specifications that are publicly documented, and are interoperable with a range of software applications.

The National Archives has avoided using proprietary (ie closed format) software because the owners of such software tend to keep some or all of their specifications secret and their software is needed to access all aspects of a format. They also hold patents and may ask for royalty payments where their format is implemented.

The National Archives has developed software tools to convert data into open formats, as well as tools to export original formats and access converted data in the way it was originally presented. The use of open format software will allow others to build tools capable of presenting or repurposing data preserved by the National Archives.

The National Archives' digital preservation approach has three layers:

1. The process for accepting and preserving digital records.
2. The environment and infrastructure, using (where possible) open format hardware and systems.
3. The National Archives' digital preservation and management software – the preservation software platform.

The digital preservation process has also been separated into three distinct phases:

1. *Quarantine* – records are checked for viruses and their manifests (similar to consignment lists) are checked against accompanying agency metadata.

2. *Preservation* – records are preserved (normalised, or converted, into open formats) using the software application, Xena (XML Electronic Normalising of Archives)
3. *Storage* – records are deposited for long-term storage in a digital repository.

Each phase operates in a physically isolated network that is customised to its particular needs. Records travel through each isolated phase of the process until they are eventually stored in the digital repository.

To keep abreast of changes in information technology and the dynamic nature of digital recordkeeping, the National Archives is undertaking ongoing research and development. It will focus on the following areas:

- *Process.* The digital preservation process must evolve in line with changes in the Archives' own business processes and developments in digital records creation, management and preservation.
- *Infrastructure.* Regardless of what the Archives does to minimise changes required in infrastructure, the prototype itself will, over time, become obsolete and require change. In part this will be driven by the Archives' need to scale its operations in line with the storage capacity required to maintain all significant and archivally valuable digital records created by government agencies.
- *Software.* The preservation software must not only evolve to meet changes in the process and infrastructure but also keep up with changes in the digital recordkeeping environment. Currently, the Archives converts (normalises) office documents, emails, images and some other files into open file formats, but there are many more digital formats, and more will evolve in the future, that will have to be normalised and preserved. Xena's 'plugin' architecture enables the software to be readily enhanced to meet this challenge.

While its digital preservation approach is already in operation as a prototype, the National Archives continues to plan and prepare for a future when the expected volume of records will require a more sophisticated system to handle a significantly larger operation.

Public Record Office Victoria

The Public Record Office of Victoria (PROV) approach to digital preservation is soundly based on the dictum that good digital recordkeeping is the bedrock of good digital preservation, and it developed the VERS (Victorian Electronic Records Strategy) as a prerequisite to its digital archiving efforts. The VERS strategy included the development of PROS 99/007, the Management of Electronic Records standard and the design, development and implementation of the VERS@DOI system, the world's first digital recordkeeping system that was VERS-compliant. The VERS Centre of Excellence, set up to support agency adoption of VERS as well as to design, develop and implement the PROV digital archive, complements the VERS strategy.

With the increasing uptake of VERS throughout the Victorian government, it is expected that an increasing number of VERS-compliant digital records (VEOs –

Victorian electronic objects) will be produced. As agencies finish using the VEOs in their day-to-day work, records of permanent value will be transferred to PROV as part of agency's records disposal program. PROV will then receive transfers into their digital archive.

The PROV digital archive manages, preserves and enables online access to VEOs of the Victorian Government. The access component to the PROV digital archive provides user access to the physical collection at PROV. For physical records, 'access' refers to the ability to search or browse the descriptive metadata about records, and to order records for viewing in a reading room. For digital records, 'access' also covers the ability to search or browse descriptive metadata and other metadata about VEOs, as well as rendering copies of VEOs to the user's desktop.

The PROV digital archive also includes a digital repository facility. The digital repository is a storage system that houses digital objects, specifically born-digital records (which might have been created as word processing documents, spreadsheets, emails, databases, websites etc) and digitised copies of physical records in the form of VEOs. A primary repository is maintained at PROV and an off-site secondary repository provides backup and disaster recovery capabilities.

The digital archive has been operational for record transfers and online access since August 2005.

Digital preservation case studies at the collective level

Australasian Digital Recordkeeping Initiative

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 resources and expertise to find better ways of ensuring that digital records are preserved and are accessible in the future. Every national, state and territory public records institutions in Australia and New Zealand joined to form this initiative. They agreed to collaborate on the development, articulation and implementation of a common set of strategies enabling the making, keeping and using of the digital records of governments.

ADRI focuses attention on the importance of archival institutions and government agencies working together to preserve digital records. The initiative promotes a united Australasian approach to digital public recordkeeping across all jurisdictions and provides a space for communication and information sharing among members. The collaboration ensures the best strategic use of limited collective resources and maximises the impact of the agreed approach to the challenge of digital records.

The collaboration builds on and acknowledges many years of Australasian collaboration in the development of concepts, tools, standards and strategies for good recordkeeping. The initiative's approach aims to add value to existing jurisdiction-specific initiatives. An outline of the ADRI projects underway can be read on the website, www.adri.gov.au.

RESOLUTIONS OF AN ARCHIVES DOMAIN MINI-SUMMIT ON DIGITAL COLLECTIONS

1. Australian culture and cultural content is *at risk*.
 - Users expect online access. If we cannot deliver this as an integral part of the national digital information infrastructure we run the risk of our cultural content being marginalised.
 - Without urgent attention born-digital Australian cultural content is likely to be lost.
2. Archives in Australia are confident that they know the challenges, risks and *solutions* for long-term digital archiving and are willing to offer leadership in this area, eg:
 - digital preservation
 - dealing with bulk
 - digital recordkeeping and archiving, frameworks, standards etc.
3. Archives in Australia are not confident that they have the capacity to *implement* the solutions in a scalable and sustainable way across the whole Archives Domain (small and large archives, government and non-government) because of:
 - lack of resources
 - lack of skills
 - lack of awareness.
4. Archives in Australia have significant quantities of content in all formats. But most of this content is not available online because of:
 - lack of digitisation
 - lack of metadata and supporting information online
 - lack of money.
5. There is an urgent need for coordinated action and advocacy across various Domains, including:
 - information and communications technology industry and professions
 - education domain
 - the cultural collections Domains (archives, libraries, museums, galleries).

THE BUSINESS OF ARCHIVES

The archivist's mission, as articulated by the Australian Society of Archivists, is that:

Archivists ensure that records which have value as authentic evidence of administrative, corporate, cultural and intellectual activity are made, kept and used. The work of archivists is vital for ensuring organisational efficiency and accountability and for supporting understandings of Australian life through the management and retention of its personal, corporate and social memory.

Records are therefore our business. Importantly, these days, digital records are our business.

Records

Records are information created or received and maintained as evidence and information by an organization or person in pursuance of legal obligations or in the transaction of business of the conduct of affairs.

Australian Standard, Records Management AS ISO 15489

Our business upholds the primacy of the record, including the digital record. It acknowledges that a record is an integral and organic component of the business of the creating organisation. It affirms that the records of an organisation are the bedrock of its business.

Records have continuing value, which can span a few weeks to a few centuries. They can have the greatest of global significance, for example a peace treaty, or be of a most personal nature, such as a love letter. All records, including digital records, 'record' the thoughts, discussions, decisions and actions of the business or the organisation, whether that organisation is a family or the United Nations.

Our business is to manage these records. Our business is also to archive the records that have long-term significance and need to be kept for extended periods of time for either their business accountability or heritage reasons. If created as digital records, then digital archiving is required to ensure ongoing and meaningful access to those records for as long as they are required for the legitimate purpose they serve.

Our business makes the distinction between 'born-digital' records that are created and used in an ICT environment versus 'digital surrogate' records, ie digital records created by digitisation of selected materials.

Born digital

Relating to a document/record or object that was created and exists in a digital form.

Digitisation

Converting objects or records to electronic format usually through digital imaging or electronic recordkeeping.

Archives institutions, like other cultural collecting organisations, have major digitisation programs. Over the next few years, however, the Archives Domain will find that most of its new acquisitions will be mainly 'born digital'. Hence the Domain is developing solutions that address the preservation and long-term access to valuable digital objects irrespective of the means by which they were created.

The Archives Domain is not the only domain with a vital interest in the long-term management, preservation of, and access to digital collections. However, the Archives Domain has a *prima facie* role in this area as digital archiving is one of its core functions, and one in which it is building up a high level of expertise. Archiving of 'born-digital' and 'digital surrogate' records is becoming the Domain's forte and it is proactively making valuable contributions, at a national and international level, to the ongoing resolution of digital collection issues via digital archiving. The Archives Domain draws a distinction between digital archiving and digital preservation: both are inextricably combined, however digital archiving covers the broad framework required to ensure long-term viability of digital collections, whereas digital preservation is a critical component within the digital archiving framework.

Digital archiving

Digital archiving covers the identification, appraisal, description and tagging, storage, preservation, management and retrieval of digital records, including all of the policies, guidelines and systems associated with those processes, so that the logical and physical integrity of the records is securely maintained over time.

Digital preservation

Digital preservation is an essential and necessary component of digital archiving ensuring longevity of a digital object, but though essential, if applied in isolation from digital archiving, cannot ensure the long-term accessibility and comprehension of the digital records that have been preserved.

THE ARCHIVES DOMAIN

The Archives Domain comprises a wide range of organisations, professional bodies and interest groups as well as bodies set up to advance particular issues.

The Domain includes archives of government, business, education and medicine. Many archival programs are 'in-house' archives – that is, they manage the records of the organisation or government of which they are a part. Such archival programs do not collect records, rather they identify which records of their parent organisation should be made and kept. Examples of in-house archives include the various government archives in each jurisdiction, the archives of large private corporations such as BHP Billiton and the archives of schools, hospitals and churches.

Other archival programs are 'collecting archives', in that they actively collect records by other entities, either individuals or organisations. Examples of collecting archives include the manuscript collections in the various state libraries and the archives of the University of Melbourne and the Noel Butlin Archives Centre at the Australian National University, both of which specialise in collecting the records of businesses and trade unions. Very many archival programs in Australia are staffed only by a single archivist, and often this archivist is only employed part-time.

In addition, the Domain includes industry and professional bodies including:

- **Council of Australian Archives and Records Authorities (CAARA)**, www.caara.org.au. CAARA is the peak body of government archives and records institutions in Australia and New Zealand.
- **Australian Society of Archivists (ASA)**, www.archivists.org.au. ASA is the peak professional body for archivists in Australia. It was formed in 1975 in response to the growing number of archivists in Australia and to the increasing demand for archival skills. An elected Council administers the Society on a national basis. Branches and special interest groups are active in the states and territories.
- **The Australasian Digital Recordkeeping Initiative (ADRI)**, www.adri.gov.au. The primary objective of ADRI is to pool resources and expertise to find better ways to ensure that digital records are preserved and made accessible for the future. ADRI focuses attention on the importance of archival institutions and government agencies working together to preserve digital records. The Australasian Digital Recordkeeping Initiative (ADRI) is an undertaking of CAARA.

Close working relationships are maintained with the Records Management Association of Australasia (RMAA), www.rmaa.com.au, the peak industry body of Australian record managers, whose mission is:

To enable records management professionals to develop and utilise their skills and experience to leverage the value of records as corporate assets and as evidence of business activities.

THE BROADER CONTEXT

A number of significant digitally-oriented projects are in progress nationally and internationally, in both archives and allied information communities. All seek sustainable solutions for the ongoing management, preservation and access to digital collections. All seek to realise the common aspirations held for digital collections.

The Archives Domain, along with other domains in Australia with responsibility for digital collections, is actively contributing to, or monitoring, these developments so as to progress the digital agenda and take advantage of any gains made. The following three examples highlight work in progress globally:

The Digital Preservation Coalition (UK), whose mission is:

... to secure the preservation of digital resources in the UK and to work with others internationally to secure our global digital memory and knowledge base.

The Coalition aims to promote digital preservation, secure funding, foster collaboration and forge strategic alliances, produce, provide and disseminate information and promote and develop services, technology, standards and training.

The National Digital Information Infrastructure and Preservation Program (USA) who have a National Digital Strategy Advisory Board and their mission is:

Develop a national strategy to collect, archive and preserve the burgeoning amounts of digital content, especially materials that are created only in digital formats, for current and future generations.

Provide a national focus on important policy, standards and technical components necessary to preserve digital content. Investments in modelling and testing various options and technical solutions over several years, resulting in recommendations to the US Congress about the most viable and sustainable options for long-term preservation.

Expand the network of preservation partners to include state libraries and archives, and state and local governments.

Partnership projects focus on tools development, online government information, geospatial information online, public television programs, and social science data.

NESTOR: Network of Expertise in Long-Term Storage of Digital Resources (Germany). Their mission is:

Create a network of expertise in digital preservation for Germany.

The NESTOR project includes a web-based information forum, recommendations for certification procedures of digital repositories, recommendations for collecting guidelines and selection criteria for digital resources to be archived, and guidelines for the long-term preservation of digital resources. The long-term goal is a permanent distributed infrastructure for long-term preservation and long-term accessibility of digital resources in Germany.

An Australian Government initiative convened by the National Library of Australia is **MAGDIR – Working Group on Management of Australian Government Digital Information Resources**. The objective of MAGDIR is that:

Australian Government information resources in digital form are controlled, managed and preserved so as to permit their ongoing and reliable use by government and the community for as long as needed.

This group aims to increase the shared understanding of possibilities for taking effective action, clarifying responsibilities, providing greater access to existing expertise, possible access to increased expertise and more effective infrastructures.

The other major players and projects are listed in Table 1 below. The Table highlights the scope and variety of issues associated with ongoing digital collection management.

Table 1 – Digital projects under way in the Archives Domain

Australian projects	
E-Government:	<p>Online and Communications Ministerial Council</p> <p>The e-Government agenda projects and information management projects of:</p> <p style="padding-left: 40px;">AGIMO, The Australian Government Information Management Office</p> <p style="padding-left: 40px;">IMSC, The Information Management Strategy Committee</p> <p style="padding-left: 40px;">GOVDEX Registry of XML schemas</p> <p style="padding-left: 40px;">Multimedia Victoria</p> <p style="padding-left: 40px;">AGLS Metadata Standard</p>
Digital recordkeeping	<p>Australasian Digital Recordkeeping Initiative – a common Australasian approach to managing born-digital public records</p> <p>Standards Australia and ISO committees and standards, such as ISO 15489 (Records Management)</p> <p>Recordkeeping audits conducted by auditors-general in various jurisdictions – eg the Australian National Audit Office</p> <p>International Council of Archives Generic Software requirements project for records management (drawing on exposure drafts of National Archives of Australia, <i>Functional Specifications for Electronic Document and Records Management Systems Software</i> and <i>Business Information Systems Software</i> and <i>Archives New Zealand Electronic Recordkeeping Systems Standard</i>)</p>
Digital preservation	<p>The Public Record Office Victoria digital archiving and digital preservation program outlined in VERS – Victorian Electronic Records Strategy;</p> <p>The National Archives of Australia approaches to digital archiving and digital preservation outlined in the Archives’ digital preservation program</p> <p>National Library of Australia Working Group on Managing Australian Government Digital Information Resources (includes AGIMO, Australian Bureau of Statistics and Geosciences Australia – focuses on preservation and access, but not limited just to ‘records’)</p> <p>PADI – National Library of Australia’s website on preserving access to digital information</p> <p>PANDORA – National Library of Australia’s collection of significant Australian web publications</p> <p>Department of Education Science and Training research infrastructure funding initiatives, including the Australian Partnership for Sustainable Digital Repositories (ANU, Sydney Uni, etc) and ‘Clever Network’ funding; International Internet Preservation Consortium</p>

Heritage collections domains	Collections Council of Australia/Cultural Ministers Council – across jurisdictions and domains (libraries, archives, museums, galleries) – August summit meeting and moves to develop a national digital collections strategy
Digital content industry	DoCITA Digital Content Industry Action Agenda – Department of Communications Information Technology and the Arts Digital Content Industry Action Agenda currently excludes heritage industries, so we need a strategy for promoting Australian cultural heritage content online within an industry development framework
International projects	
United Kingdom	UK Digital Preservation Coalition; PRONOM file formats registry; National Digital Archive of Datasets; Digital Curation Centre; UK Web Archiving Consortium; CEDARS Digital Preservation Project (UK university libraries), www.leeds.ac.uk/cedars/colman/metadata/metadataspec.html
Europe	European Union projects such as ERPANET (Electronic Resource Preservation and Access Network) FEDORA – open source digital object repository system PREMIS preservation metadata working group of the RLG and OCLC, www.oclc.org/research/projects/pmwg NESTOR. Network of Expertise in Long-Term Storage of Digital Resources (Germany) www.langzeitarchivierung.de
USA	W3C Semantic Web OAIS (Open Archival Information System) Reference Model ‘Blue Book’ digital preservation framework – ISO 14721:2003 NARA’s Electronic Records Archives (ERA) initiative US National Digital Information Infrastructure and Preservation Program (led by the Library of Congress) OASIS – Organisation for the Advancement of Structured Information Standards Research Libraries Group/NARA digital repositories audit checklist NISO Framework for Building Good Digital Collections PREMIS preservation metadata working group of the RLG and OCLC Washington State Digital Archives Global Digital Format Registry (Harvard University)
China	Digital archives in Qingdao and Shenzen
Canada	Canadian National Digital Information Strategy and Canadian content online commitment InterPARES International Digital Preservation Research Project led by University of British Columbia, Canada
New Zealand	New Zealand National Digital Heritage Archive National Digital Forum

Synergies between projects and domain communities

Though at first glance many of the projects appear disparate, and cover a great array of subjects, certain synergies can be drawn. These synergies confirm the commonality of concerns and issues associated with digital collections, and highlight the common gains that can be made through cooperative work within the cultural domain, on these issues.

The broad areas being addressed and from which synergies across domains can be gained include:

- the open archives repository and institutional repository movement
- the use of open source software applications for repository development
- appropriate search capabilities addressing accessibility and retrieval issues
- metadata requirements for intellectual control, resource discovery, administration, preservation and so on
- metadata harvesting and metadata-based federated search models
- information interoperability architectures allowing for data capture and transfer amongst distributed databases holding digital collections
- sustainability issues of format, content, metadata, language, technical architectures

and importantly

- digital archiving containing within it digital preservation models
- digitisation guidelines and standards
- storage and delivery mechanisms
- tools for access
- visibility of digital collections.