

Digital Curation/Digital Archiving: A View from the National Archives of Australia

Adrian Cunningham

Abstract

This paper considers similarities and differences among the concepts of digital curation, digital archives, and digital libraries. It argues that, from a recordkeeping perspective, the phrase *digital archive* has been misused, even hijacked, and that this misuse obscures fundamental issues associated with the capture and long-term management of archival resources. The paper also argues that digital archiving requires active archival intervention across the entire records continuum, and that, as such, the Open Archival Information System (OAIS) reference model is deficient because it ignores the need for pre-ingest archival activity. The paper reviews the digital archiving experiences of the National Archives of Australia (NAA), in light of the key messages outlined in the first half of the paper placing those endeavors in the broader Australasian context. These experiences include the NAA's efforts to promote and facilitate improvements in government recordkeeping, the NAA's digital preservation project, and the wider challenges of implementing total "end-to-end" digital archiving in an institution already struggling to fund its more traditional activities. It identifies the major challenges that still require resolution, such as securing access to the various skills and capabilities required for digital curation, Australian style. The paper concludes with thoughts on the skills and capabilities needed to deliver total digital archiving outcomes.

Introduction

Harold Macmillan once described the life of a Foreign Secretary as being "forever poised between a cliché and an indiscretion." It is not my intention to add to the already vertiginous mountain of digital clichés and truisms, but

This is a revised version of a paper presented at the DigCurr2007 Conference, Chapel Hill, North Carolina, an international symposium on Digital Curation, 18–20 April 2007, as part of the project "Preserving Access to Our Digital Future: Building an International Digital Curation Curriculum," <http://ils.unc.edu/digcurr2007/>, accessed 15 May 2008. The paper was presented in a session titled "Views from National Libraries and Archives."

I cannot help but feel that much of this paper is a case of stating the obvious. It is perhaps indiscreet to argue that much of what should be obvious appears to have been overlooked among the millions of words written on this topic in recent years. The time has come to revisit the first principles of the archival endeavor.

First, however, a few words about the phrase *digital curation*. The term, which is now used by the Institute of Museum and Library Studies to describe one of its areas of priority funding,¹ appears to have originated in the United Kingdom, where there is now a Digital Curation Centre (DCC) in Glasgow. The DCC defines the phrase as “maintaining and adding value to a trusted body of digital information for current and future use.”² Instinctively I find the phrase inappropriate for a lot of what recordkeeping professionals do because it suggests antiquarian scholarship rather than modern information management. The phrase *data stewardship*, which is sometimes used as an alternative, is in many ways more attractive, though it too has some drawbacks. Nevertheless, the value of the phrase *digital curation* is that it attempts to unite into a coherent whole various threads of related professional endeavors spanning the entire life of digital information. Included within the definition of digital curation are the noble endeavors of digital preservation, digital librarianship,³ digital archiving, and data management.

Before taking you on an Australian journey, let me outline three key messages, with the aim of clarifying some of the confusion associated with the digital curation discourse.

Key Message 1

Just as archiving (the management of archives and records) is but one form of curation, so too is digital archiving just one form of digital curation. Yet the two terms are so often used interchangeably as to appear to be synonymous. They are not.

Digital curation of archival materials is not just about digital collection management. In fact, the curation of digital records is a sufficiently distinct curatorial activity as to warrant the use of a different term—*digital archiving*. In making this claim, I realize that I am swimming against a strong terminological tide. But as an archivist I am prepared to draw a line in the sand and say that I have had enough of our professional language being misappropriated, abused,

¹ The Institute of Museum and Library Services (IMLS) funded the project of which the conference was a part, <http://www.ims.gov/index.shtml>, accessed 15 May 2008.

² Digital Curation Centre, “What Is Digital Curation?,” <http://www.dcc.ac.uk/about/what/>, accessed 9 November 2007.

³ Defined for these purposes as involving selecting, acquiring, managing, preserving, and providing access to digital publications.

and twisted—a trend that began years ago when Information Technology professionals began talking about “archiving” back-up tapes and the like. Apparently “archiving” is now just a technological subroutine, not a rich and complex professional endeavor in its own right. Lest you feel I am being too precious and separatist about this, let me make it clear that I applaud the inclusive digital curation mission, and I believe absolutely that digital archivists should work within a broad collaborative cross-domain environment to share ideas and solve problems. But broad cross-domain collaboration does not serve us well if it means we ignore the vitally important differences between our various professional missions. This leads to my second key message.

Key Message 2

Digital archives are different from digital libraries and museums.

Just as archives are different from libraries and museums, so, too, should digital archives be different from digital libraries and museums. At this point, we need to remind ourselves why archives are different from libraries. It is worth quoting “The Archivists’ Mission” from the Australian Society of Archivists:

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.⁴

The nature of archival materials (records) is fundamentally different from the nature of library or museum collections. Records provide evidence of decisions and activities. They derive their meaning and value from a myriad of contextual relationships surrounding their creation and use—relationships that have to be documented and understood. This is the core business of archivists. Archivists document recordkeeping activity so that valuable records can be made available for future wider use in ways that ensure that their meaning and utility persist. Because records are created within systems that support and enable human activity (be they business systems or recordkeeping systems, however rudimentary in design), to understand records as evidence of human activity it is necessary to understand how their systems of creation and use operated. One way of understanding the work of archives, therefore, is to say that archives implement and manage systems for carrying recordkeeping systems forward across time and domains of use. The peculiar challenge of archiving is devising and implementing strategies for preserving the evidential meaning of records by capturing and preserving records in context. This is achieved

⁴ Australian Society of Archivists website, <http://www.archivists.org.au>, accessed 9 November 2007.

through complex, dynamic, interlocking, and finely engineered metadata regimes. Recordkeeping metadata is fundamentally different from and infinitely more complex than resource discovery metadata and preservation metadata. It is event-oriented metadata in an object-oriented world.⁵

Even though our predecessors did not use words such as *metadata* to describe their documentation systems, they nevertheless worked out these requirements some generations ago. They implemented impressive regimes for carrying nondigital archives and records forward through time in our archival programs. They understood that archives are different from libraries, not because we like to be exclusionist, but because of the fundamentally different challenges posed by the nature of the material that is the locus of our work. Yet, in the digital age we sometimes seem to have forgotten these fundamentals. Digital archives are at risk of being managed just like vanilla digital libraries, thus dumbing down the peculiar challenges and complexities of preserving *records*.⁶

Preserving individual digital objects in bulk is, these days, relatively easy. We can probably all agree that we have made enough progress with digital preservation in recent years. In fact, preserving decontextualized digital objects is easier by orders of magnitude than preserving the evidential and contextual meaning of digital records created within complex systems and work practices. What is not easy, and what we have not yet fully come to grips with, is developing and implementing comprehensive regimes for capturing and managing records as evidence in context from *before* the point of creation for as long as those records are required by their creators and by society at large. As long as we continue to regard digital libraries and digital archives as synonymous, we will continue to fail to address this challenge.⁷

Key Message 3

Digital archiving requires active archival intervention across the entire records continuum.

Digital archiving cannot just be end-of-life-cycle collection management. This brings us inevitably to the Open Archival Information System (OAIS)

⁵ David Wallace, "Archiving Metadata Forum: Report from the Recordkeeping Metadata Working Meeting, June 2000," *Archival Science* 1, no. 3 (2001): 253–69.

⁶ Council of Australasian Archives and Records Authorities, *Digital Archiving in the 21st Century: Archives Domain Discussion Paper* (Canberra: National Archives of Australia, 2006), available at <http://www.caara.org.au/Publications/DigitalArchiving21C.pdf>, accessed 8 November 2007.

⁷ It is acknowledged that the term *archive* is complex, contested, and unstable. In the words of Jacques Derrida, "Nothing is less reliable, less clear today than the word archive," *Archive Fever* (Chicago: University of Chicago Press, 1996), 90. Indeed, the advent of digital archives has only accentuated the unreliability of our terminology. All the more reason, therefore, for us to articulate and assert our meanings with clarity, while at the same time acknowledging the contested nature of the semantic and political terrain.

Reference Model.⁸ (See Figure 1.) Within its limitations, the OAIS model is a good model for managing digital libraries. The problem is that its limitations are not recognized. Instead, OAIS has been uncritically adopted by all digital curators as accommodating everything we ever need to know about digital curation. As the American journalist Walter Lippman once said, “When we all think alike, we are not thinking.”

The problem with the OAIS model is that it assumes, or at least most of its adherents assume, that submission information packages are out there and that they simply have to be found, described, and ingested into our digital repositories.⁹ Yet, our recent experiences with recordkeeping in modern organizations refute this assumption fairly comprehensively. What we know is that organizations, for all their gigabytes of data, have lost the ability to make and manage accurate, authentic, and meaningful records of their activities. If you ask most organizations nowadays what digital records they have, how they are managed, and for how long they need to be kept, you will probably be met with incomprehension. Not only are they probably unable to answer the question, more often than not, they will not even understand it. They might be able to tell you how much data they have, but they won’t know how many records they have, what these records are, and how important or trivial they might be. The relentless technological juggernaut has ridden right over the top of basic information management techniques and strategies. The OAIS model makes no attempt to

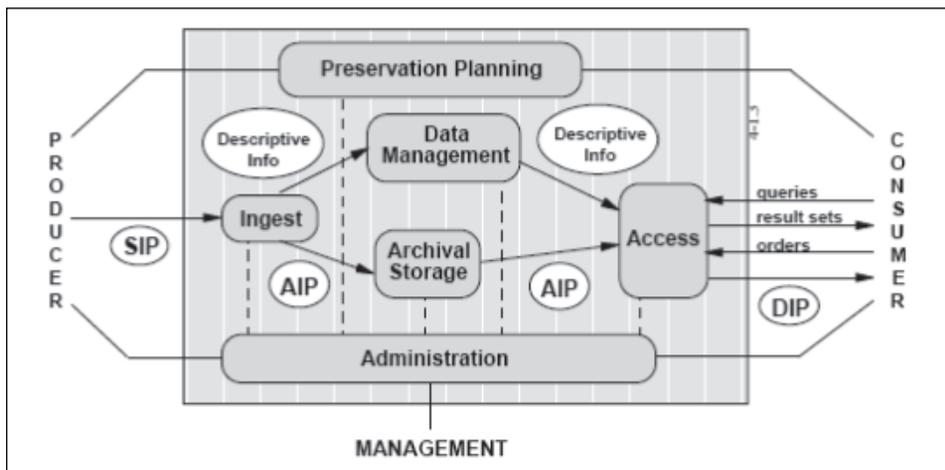


FIGURE 1. OAIS functional entities.

⁸ Consultative Committee for Space Data Systems, Reference Model for an Open Archival Information System (OAIS) Blue Book, 2002, available at <http://public.ccsds.org/publications/archive/650x0b1.pdf>, accessed 8 November 2007. Also ISO 14721: 2003.

⁹ For the purposes of this paper, *digital repositories* are defined as managed storage facilities for digital information objects.

address what is probably the biggest single challenge facing digital archivists: How do we find (or indeed ensure the creation of) reliable records that can serve as evidence of decisions and activities among the mountains of what are often dynamic, anarchic, and unmanaged data that organizations and individuals accumulate? If digital archiving is to succeed, it must include intervention in the creation and management of digital information, not just take submission information packages as a given and go from there. This intervention needs to speak the language of business to address people, process, and technology issues in the quest for flexible evidence capturing solutions that can be an organic part of the business process. In short, ignoring the front end of records creation is a recipe for submission information packages that are not worth ingesting. We will have lovely digital repositories containing nothing of any real meaning or value. We will have failed in our mission to document the important things that happen in society and in public administration.

So, with these three key messages in mind, how has the National Archives of Australia faced the digital archiving challenge?

Improving Government Recordkeeping

In some ways, the mid-1990s were no different from today. Then, as now, people were inclined to view the digital archiving challenge as being purely a matter of devising workable approaches to digital preservation. What *was* different then was that they felt completely overwhelmed by the digital preservation challenge. Understandably, people regarded the challenge purely in terms of the technicalities of digital preservation, because those were the “in your face” issues. Archival programs worldwide spent every dollar they could spare on researching digital preservation. In the face of this widespread alarm, the National Archives of Australia took the seemingly odd step of largely ignoring digital preservation, at least for a few years.

This was not just willful perversity; there was method to our madness. First, we looked at our available resources and decided that researching or experimenting with digital preservation was likely to be a bottomless pit. Better to let other people explore solutions and conduct experiments, so that we could learn from their experiences. More importantly, we felt that we needed to become much more actively engaged in influencing recordmaking and recordkeeping in government agencies. Despite the absence of a strong legislative mandate or additional funding, we effectively took on a new function—that of being a recordkeeping standards setter and expert advisor. We considered this the more critical issue to address with our limited resources. Until agencies had regimes in place for making and keeping good digital records, we felt there was no point in investing effort to develop a digital preservation program. It was a case of setting priorities and dealing with first things first.

This decision placed major strains on the organization. Taking on a whole new function is never easy. Staff needed to embrace nontraditional concepts, strategies, and modes of operation. We recognized that sitting within our comfort zone behind the walls of the repository doing business as usual was the fast route to oblivion. In 1994, we upset many of our professional and agency colleagues by announcing a distributed custody policy for electronic records.¹⁰ In effect, we were admitting that we were unable to manage electronic records in archival custody, so there was no point in agencies transferring such records to us—if indeed they had any to transfer. We decided that it was better for the records to stay in the custody of the agency that had the business need for and the technical expertise to manage them in the first place. While this may have looked as though we were renegeing on our archival responsibilities, it at least reflected an honest assessment of our capabilities at the time. The distributed custody policy gave us the time and the space to reinvent ourselves as record-keeping standards setters and advisors.

The first fruits of this work came in 1996 when Standards Australia published the world's first national standard for records management, AS 4390.¹¹ This standard, which was the result of a truly national collaborative effort, provided the basis for the later ISO standard, ISO 15489.¹² As an aspirational “best practice” standard, rather than a reflection of any current practices, AS 4390 gave us the high-level blueprint for what we needed to implement across the entire Australian government.

But before we could attempt to change the entire government, we had to change ourselves. Most of our staff members were completely unfamiliar with records continuum thinking that AS 4390 embodied. In 1998, we contracted with Monash University, the spiritual home of records continuum theory,¹³ to deliver a year-long training course in modern recordkeeping theory

¹⁰ Stephen Ellis and Steve Stuckey, “Australian Archives’ Approach to Preserving Long-Term Access to the Commonwealth’s Electronic Records,” in *Playing for Keeps: The Proceedings of an Electronic Records Management Conference hosted by the Australian Archives, Canberra, Australia, 8–10 November 1994*, ed. Stephen Yorke (Canberra: Australian Archives, 1995), 113–32.

¹¹ Standards Australia, *AS 4390-1996 Records Management* (Homebush, NSW: Standards Australia, 1996).

¹² International Organization for Standards, *ISO 15489-2002 Records Management* (Geneva: International Organization for Standards, 2002).

¹³ Sue McKemmish, “Yesterday, Today and Tomorrow: A Continuum of Responsibility,” first published in *Proceedings of the Records Management Association of Australia 14th National Convention, 15–17 Sept 1997, RMAA Perth 1997*. See <http://www.sims.monash.edu.au/research/rcrg/publications/recordscontinuum/smckp2.html>, accessed 8 November 2007. The importance of the interaction of David Bearman, a regular visitor to Australia during the 1990s, and the University of Pittsburgh’s Electronic Records Research Project with Australian recordkeeping traditions and schools of thought cannot be underestimated in the development of records continuum theory and the shaping of the NAA’s new recordkeeping regime. See Adrian Cunningham, “Ensuring Essential Evidence: Changing Archival and Records Management Practices in the Electronic Recordkeeping Era,” *Provenance: the Web Magazine* 2, no. 2 (Spring 1997), available at <http://www.netpac.com/provenance/vol2no2/features/evidence.htm>, accessed 9 November 2007.

and practice to NAA staff. All staff members above a certain classification were given two days a week on work time for twelve months to pursue the education delivered by Monash over the Internet. Many of the NAA's standard operations and services were suspended to free employees for the Monash training. Suspension of normal business was itself an important circuit breaker in moving from the old regime to a new regime. By the end of that year, staff members were equipped with the conceptual knowledge and enthusiasm needed for the NAA to reinvent itself as a recordkeeping standards setter and expert advisor.

The fruits of the reinvention were unveiled in 2000 with the release on the NAA website of the *e-permanence* suite of modern recordkeeping standards and guidelines, the foundations of which were the DIRKS (Designing and Implementing Recordkeeping Systems) methodology/manual¹⁴ and our recordkeeping metadata standard.¹⁵ The suite included guidelines on functional analysis and classification, guidelines for archiving Web-based records, and a variety of training materials. Since 2000, we have continuously expanded, fine tuned, revised, and reshaped this suite of modern recordkeeping tools and guidelines to reflect the changing recordkeeping realities of government and the lessons we have learned during the implementation process.¹⁶ This is a never-ending process, not just because the world never stands still, but also because of the ongoing challenge of turning theoretical models and frameworks into practical advice that can be adapted for the wide variety of circumstances faced by government agencies, large and small.

It is one thing to develop recordkeeping standards and guidelines. It is quite another to get government agencies to take notice of them, understand them, and implement them. Recordkeeping is never going to be a sexy attention grabber in government, except perhaps when things go disastrously wrong and poor recordkeeping is identified (as it usually is) as a major contributing factor to failures in public administration. The NAA is small and has limited influence, while the Australian government is large and complex. Promotional and training strategies alone only get you so far down the path of managing change for the whole of government. To succeed, archivists need strong allies, such as the head of the public service and the Auditor-General.

¹⁴ National Archives of Australia, *The DIRKS Manual: A Strategic Approach to Managing Business Information* (Canberra: National Archives of Australia, September 2001, revised July 2003), available at <http://www.naa.gov.au/records-management/publications/DIRKS-manual.aspx>, accessed 8 November 2007.

¹⁵ National Archives of Australia, *Recordkeeping Metadata Standard for Commonwealth Agencies Version 1.0* (Canberra: National Archives of Australia, May 1999), available at http://www.naa.gov.au/Images/rkms_pt1_2_tcm2-1036.pdf, accessed 8 November 2007.

¹⁶ For example, see *Digital Recordkeeping: Guidelines for Creating, Managing and Preserving Digital Records* (Canberra: National Archives of Australia, 2004), available at http://www.naa.gov.au/Images/Digital-recordkeeping-guidelines_tcm2-920.pdf, accessed 8 November 2007.

Perhaps the biggest single factor in getting Australian government agencies to take recordkeeping seriously has been the activism of the Auditor-General. Auditors are natural allies for archivists, because they absolutely understand the importance of good records. Since 2002, the Australian National Audit Office has conducted three separate audits of recordkeeping in Australian government agencies, the results of which are sobering to say the least.¹⁷ Heads of agencies pay close attention to published audit reports, much more than they will ever pay to the messages coming out of the National Archives. The combination of agency readiness to transform recordkeeping systems from paper to digital (which took quite a bit longer than we originally estimated) and the heightened administrative attention being given to recordkeeping has now finally made recordkeeping one of the major topics of bureaucratic discussion in the Australian Public Service.¹⁸

In 2008 we still have a very long way to go to achieve recordkeeping nirvana in government agencies. In fact, I doubt if we will ever achieve this nirvana. In this day and age, working with government to improve its recordkeeping is complex, frustrating, and difficult. But we have no option but to keep trying. Improvements in one agency will probably be matched by deteriorations in other agencies. Nevertheless, we must keep striving for continuous improvements, while developing strategies for coping with recordkeeping imperfection. We cannot expect perfect recordkeeping, but we can expect agencies to take the issue seriously and to address the high-risk/high-significance areas of their operations with achievable, sustainable, and fit-for-purpose recordkeeping strategies.¹⁹

Digital Preservation Project

Following the launch of *e-permanence* in 2000, the NAA decided that it could set aside resources to address the long postponed issue of digital preservation. As a result, we instituted the Agencies to Researcher Digital Preservation Project in 2001. The first stage of the project was to research approaches to digital preservation from around the world and to devise an approach or mix of approaches suitable for the NAA. This work culminated in 2002 with the release

¹⁷ Australian National Audit Office, *Recordkeeping*, Audit Report No. 45 2001-2002; *Recordkeeping in Large Commonwealth Organisations*, Audit Report No. 7, 2003-2004; *Recordkeeping including the Management of Electronic Records*, Audit Report No. 6, 2006-2007, all available from the ANAO website at <http://www.anao.gov.au/>, accessed 8 November 2007.

¹⁸ Management Advisory Committee (Australia), *Note for file: A report on recordkeeping in the Australian Public Service* (Canberra, 2007), available at <http://www.apsc.gov.au/mac/noteforfile.htm>, accessed 9 November 2007.

¹⁹ Adrian Cunningham and Margaret Phillips, "Accountability and Accessibility: Ensuring the Evidence of E-governance in Australia," *Aslib Proceedings* [United Kingdom] 57, no. 4 (2005): 301-17.

of a Green Paper, “An Approach to the Preservation of Digital Records.”²⁰ The Green Paper argues that digital records are performances—the result of an interaction between data and technology. The preservation imperative, therefore, is not so much one of preserving the data, as of preserving the ability to re-create the performance in a way that accurately and authentically replicates the essential aspects of the user’s experience of the record.

In implementing the approach presented in the Green Paper, the NAA decided against relying on regular software migrations across proprietary platforms. Instead, we opted for a strategy of “normalizing” records created in proprietary software applications and file formats into openly documented archival file formats and linking those objects to the necessary contextual and descriptive metadata. In the case of text-based records, the archival file formats and all of the metadata would be encoded in XML. A suite of open-source software tools and plug-ins²¹ called Xena (XML Electronic Normalisation of Archives) was developed for normalizing and then re-rendering for use records originally created in proprietary formats. At the same time a suite of open source software tools for performing and documenting digital preservation activities was also developed. While these tools were developed primarily for use within the archival repository, the NAA has also developed “Xena-lite” for government agencies and other organizations that need to preserve the digital records that they retain in their own custody. All of these tools are available for inspection and download on the SourceForge website.²² Because it is open source, anyone anywhere in the world with some Java programming skills can use, extend, or enhance the Xena source code. Indeed, the NAA welcomes global community collaboration of the kind embodied in the open-source movement.

The NAA now has a fully functioning, secure offline digital repository and is accepting and processing transfers of born-digital, archival-value records from agencies. Nevertheless, we regard this work as still at the cottage industry or proof-of-concept stage. We know that we need to be able to perform this work on an industrial scale for billions of records. We also know that we must be able to provide greater support for digital preservation work in those agencies that preserve long-term, temporary value (i.e., not archival value), born-digital records for a long time, in some cases for as long as 120 years. At this time, we do not have the capacity to perform all of this work at this scale, even though

²⁰ Helen Heslop, Simon Davis, and Andrew Wilson, *An Approach to the Preservation of Digital Records: Green Paper* (Canberra: National Archives of Australia, 2002), available at http://www.naa.gov.au/Images/An-approach-Green-Paper_tcm2-888.pdf, accessed 8 November 2007.

²¹ For example, some of the Xena plug-ins use the Open Document Format, or ODF. More information on the NAA’s digital preservation program and suite of tools can be found at <http://www.naa.gov.au/records-management/secure-and-store/e-preservation/at-NAA/index.aspx>, accessed 8 November 2007.

²² <http://www.sourceforge.net/>, accessed 8 November 2007.

we are confident that we know how. We need our government to recognize our needs in this area and to fund us over the transitional period during which we must maintain dual archival operations for both paper and digital records.

Total End-to-End Digital Archiving

Having in place a regime for improving recordkeeping in creating agencies and a program for the ingest and preservation of digital archives are two important pieces of the digital archiving puzzle. But we need more to be a fully functioning digital archives. At first, we at the NAA, like most archival programs, thought doing digital preservation was all we needed to do to become a digital archive. It took two or three years, but we eventually realized that the digital preservation project was not going to give us all the tools to perform end-to-end digital archiving. Just as archival operations are more than preservation, digital archives are more than digital preservation.

In 2004, the NAA instituted a new project called MADIRA—Managing Digital Records for Access. MADIRA identified the remaining pieces of the digital archiving puzzle needed before NAA could fulfill the original 2001 “Agencies to Researcher” vision. The “Agencies to Archives” part of the process is now in place—we can get digital records from agencies into our deep, secure archival digital repository and fully document all of our processes up to that point. Other archival functions, notably intellectual control/context description (once known as arrangement and description) and access management, still need to be put in place before we can deliver meaningful digital records as performances in context to our end users. Because we have the luxury of a thirty-year closed-access period for most of our holdings, this is perhaps not the most urgent priority we face. Nevertheless, we will have to address it before too long and—make no mistake—it will require serious resources and intellectual effort. In fact, at present, we are not at all sure where these resources are going to come from, but one way or another we will have to find them—perhaps in the form of additional funding from government.

Before leaving this overview of the NAA’s digital archiving endeavors, I need to point out that the NAA is not the only player in the digital archiving space down under. In fact, the NAA is but one of ten public records institutions in the different jurisdictions in Australia and New Zealand.²³ As a small, somewhat incestuous, community, these ten institutions have collaborated and shared ideas and best practices for a some time. In 2004, this collaboration was

²³ For example, a well-known Australian archival digital preservation project has been the Public Record Office Victoria’s Victorian Electronic Records Strategy (VERS), available at <http://www.prov.vic.gov.au/vers/vers/default.htm>, accessed 9 November 2007.

formalized in the Australasian Digital Recordkeeping Initiative (ADRI).²⁴ ADRI members are committed to working together to develop and implement a common Australasian approach to making, keeping, and using digital records across the entire records continuum in each of the member jurisdictions. Our limited resources are deployed collectively to work on priority joint projects and develop products of benefit to all the ADRI member institutions.

Concluding Thoughts on the Skills and Capabilities Needed for Digital Archiving

Back in the early 1990s, a colleague regularly lamented just how much today's archivists need to know. At the time, he was reacting to the influx of desktop computers, online networks, and the increasing demands of public sector management reform—all of which added to pre-existing needs to know about archival theory and processes, Australian history, and more. Well, things have not got any better since then—in fact, they are probably more challenging.

Certainly, the NAA's experiment with the Monash University training course in 1998 was an early recognition that traditional skills and training do not provide adequate preparation for the challenges of digital archiving. While we can and must forge partnerships with other professions, such as information and communications technology professionals, lawyers, business analysts, communications experts, and educators, today every digital archivist needs a range of knowledge, skills, and qualities. Some of the more important are:

Knowledge of²⁵

- the full range of recordkeeping theory and practice and the role of archives in society;
- the relationship of records to the broader information management landscape;
- the work processes of modern organizations, office processes, and the machinery of government;
- current affairs and history;
- the workings of e-business and e-government;
- metadata regimes for discovery, recordkeeping, and data management;
- legal, regulatory, and governance frameworks;
- information and communications technologies;
- auditing and compliance assessment approaches and regimes;

²⁴ The ADRI website can be viewed at <http://www.adri.gov.au/>, accessed 8 November 2007.

²⁵ While I recognize that few if any individuals will ever attain a thorough knowledge of all of the topics in this list, it is not unreasonable to expect that digital archivists should strive to attain at least a basic working knowledge of them.

- security management regimes in information and communications technology, including encryption and authentication;
- broader digital communities and initiatives;
- documentation of provenance and context in archival systems;
- XML;
- approaches to quality control/assurance; and
- digital storage options and technologies.

Skills, capabilities, and qualities in

- communication, influence, and change management (and the willingness to “get out of the basement and into the board room”²⁶);
- consultation and negotiation;
- flexibility and good judgment;
- research;
- risk assessment and management;
- systems design and implementation;
- preparing business cases;
- modeling and analytical ability (including functional and work process analysis); and
- disaster preparedness and business continuity.

Given the length of these lists, not surprisingly, few (if any) individuals can confidently claim to be fully rounded digital archivists. Indeed, I sometimes wonder if only superhumans can deliver our expectations! Like the rest of the world, Australia experiences a chronic lack of digital archiving capabilities. While we have developed competency standards²⁷ and capability frameworks, we find it is quite another thing to build and sustain the education and training infrastructure needed to develop these capabilities, especially for a niche occupation not especially well remunerated in a small country. Australia has only two accredited university-level archival studies programs (Monash University in Melbourne and Edith Cowan University in Perth). Recently, the Australian National University in Canberra, in close consultation with the NAA, instituted a program called “A Systems Approach to Management of Government Information.”²⁸ Time will tell whether this promising development attracts sufficient enrollments to be a viable, long-term source of the kinds of education that we so badly need.

²⁶ Sarah Tyacke quotes Terry Cook who noted in 1996 that archives are moving from “basement to board room,” in “Archives in a Wider World: The Culture and Politics of Archives,” *Archivaria* 52 (2001): 2.

²⁷ For information on the Australian Records and Archives Competency Standards and associated training packages, see <http://www.rmaa.com.au/docs/profdev/standards.cfm>, accessed 8 November 2007.

²⁸ Australian National University, “A Systems Approach to Management of Government Information,” 2007, available at <http://engnet.anu.edu.au/DEpeople/Zbigniew.Stachurski/recordkeeping.pdf>, accessed 8 November 2007.

Ultimately, digital archiving is not just an interesting source of research projects and academic theorizing. Our national and state institutions, in the face of pressing societal and organizational needs, must develop sustainable, industrial-scale digital archiving implementations. The NAA cannot yet claim to have such an implementation because of shortfalls in funding and in available skills. Nevertheless, we are confident that we are close to fulfilling this vision and that we have a firm grasp on the details of how such an implementation can work and what it will look like—notwithstanding the fact that digital archiving will forever remain a contested work in progress, rather than a settled orthodoxy.