Keynote paper: Visions for fundamental change in libraries and librarianship for Asia Pacific

Warwick S. Cathro

The author

Warwick S. Cathro is Assistant Director-General, Information Technology, National Library of Australia, Parkes, Australia. (wcathro@nla.gov.au)

Keywords

Libraries, Internet, Library services, Archives

Abstract

Libraries and archival institutions are encountering unprecedented pressures for change, arising largely from the emergence of the World Wide Web. Discusses those challenges in the framework of the key imperatives of support for public education, contribution to cultural development, preservation of our heritage for posterity, and information management. As examples, libraries and archival institutions need to support flexible online learning services; support collaborative cross-sectoral cultural programs; respond to the challenge of digital preservation and encourage a program of research and collaboration; manage traditional and digital collections in an integrated manner; manage text in different scripts in an integrated manner; and ensure persistent access to digital information resources.

Electronic access

The research register for this journal is available at
http://www.mcbup.com/research_registers

The current issue and full text archive of this journal is available at
http://www.emerald-library.com/ft

Introduction

The planners of this conference invited me to commence the program by presenting an overview of "fundamental change". It has become a cliché to say that change is impacting on all of us at an ever increasing rate. The fact is, however, that the last eight years – which have seen the emergence and first stage of development of the World Wide Web – have generated unprecedented pressures for change upon libraries and archival institutions. The challenges we now face are more complex, and more compelling in their need for answers, than ever before.

In this paper I will identify and discuss a number of these challenges. I will examine some key issues affecting libraries and archival institutions globally, and make particular reference to responses to these challenges which are taking place in the Asia Pacific region.

Before we examine those challenges, let us take a step back and re-examine what it is that libraries and archival institutions are trying to achieve. What are our imperatives? In broad terms, what are our missions and how do they link to the aspirations of our societies?

I will suggest three broad imperatives for libraries and archival institutions. If you wish to use the language of strategic planning, you can describe these as "key result areas". They are:

(1) support for public education;
(2) contribution to the culture of our societies; and
(3) preservation of our heritage for posterity.

These three result areas correspond to three distinct groups of users of our services:

(1) in the case of our public education imperative, the users are the students and citizens of today;
(2) in the case of our cultural imperative, the users are today's creators of knowledge: the authors, artists, researchers, policy makers and others involved in creative endeavour; and
(3) in the case of our preservation imperative, the users are the citizens, students and knowledge creators of the future.

If we are to achieve results in these three areas, we need to consider a fourth imperative, a means to an end rather than an end in itself: the imperative of information management.

Support for public education

Many observers have drawn attention to the role of libraries and related institutions in supporting the broad goal of public education. This role applies not only to libraries which are attached to educational institutions, but also to our public, state and national libraries. This sentiment has been expressed in different ways by a number of institutions and commentators.

For example, the core mission of the National Library of Singapore and of its public library network is: "To expand the learning capacity of the nation so as to enhance national competitiveness and to promote a gracious society".

The former Swedish Minister for Education and Culture, in opening the 1990 conference of the International Federation of Library Associations and Institutions, commented that public libraries have "a central role as the institution for popular education in the local community" (Goransson, 1990).

In speaking at the 1992 conference of the Australian Library and Information Association, Professor Stuart Macintyre encouraged his audience to consider the "civic role" of the public library, based around the notion of public education. He was referring to education "in the broader, civic humanist sense, to mean the development of the faculties – intellectual, aesthetic and moral – that would realise the potential of the individual and fit that educated individual for social life" (Macintyre, 1992).

Another Australian and a member of the federal Parliament recently wrote that "Australia's 1,600 public libraries ... are critical to our nation's future as a learning society" (Latham, 2000).

A combination of social change and the spectacular growth of the World Wide Web have created profound changes in the infrastructure for education delivery in the past decade. These changes are being felt most keenly in our universities and other formal centres of learning, but they affect the entire educational landscape.

Lim has commented recently on the trend towards "flexible learning", which is really at the heart of these changes. This trend is characterised by:

- more emphasis on student-centred learning than on teacher-centred delivery;
- a great role for learners in deciding how, when and where learning takes place;
- a recognition that learning is a lifelong process; and
- emphasis on developing skills in learning and in "information literacy", and not merely technical skills in particular disciplines (Lim, 2001).

As a British commentator wrote recently: "the continuing pace of change dictates that people must engage in continuing learning in order to gain the knowledge and skills required to remain employable. Increasingly such learning must be accommodated within patterns of work which demand flexible working hours and geographical mobility" (Johnston, 2001).

Latham expressed it as follows: "the learning process can take place at any time, in any circumstances. Lifelong learning needs to flourish in the civic institutions of everyday life: in homes, in workplaces, in shopping centres, in libraries, in the places where people commonly come together" (Latham, 2000).

I will not attempt to describe all of the ways in which libraries are responding to the challenges of supporting the lifelong learning needs of their societies. My colleague, Fran Awcock, will be addressing this theme at this conference using the services of the State Library of Victoria as an example.

However, I will comment on one response, which is the development of Web-based information portals. The significance of portals in this context is that they support flexible, personalised views of the information resources required by the student. Portals allow students to access learning resources wherever they are located, and assist those who are "time poor" by integrating access to a variety of types of information resource that are relevant to their learning.

Leigh (2001) has recently presented an overview of the trends in portal development, and distinguished between several different types of portal. She commented that most of these portal types allow the users to "specify what interests them most and change their personalised profile on a regular on-the-fly basis". By using them, she said, libraries can "increase the availability and usability of their services... in an information rich but time poor society" (Leigh, 2001).

Portals have been used successfully on a university-wide basis, an example being the Monash University portal in Australia. An example of portal development in a public library context is Singapore's TiARA service, which was launched in late 1996 as a joint effort of the National Library, two other government authorities, and participating libraries. It provides to the citizens of Singapore a wide range of information resources including access to online databases, library catalogues, full texts of selected newspapers and journals, and an online alerting service.

Of course, portals can be only one part of a response to the flexible learning challenge, and technology alone cannot ensure that users will have the capacity to obtain and use information effectively. In recent years considerable attention has been paid to the concept of "information literacy" as a prerequisite for lifelong learning. Information literacy is about people being able to engage with their information environment: to interact with and use information effectively however it is packaged.

It has been noted that information literacy must be integrated into curricula, and that librarians can be involved by fostering educational partnerships with course designers and academics. For example, the standards published recently by the Council of Australian University Librarians commented that the development of information literacy in students requires the collaborative efforts of administrators, teachers and librarians. As well as selecting, evaluating and organising appropriate information resources, librarians should be involved in providing advice and coaching to students and staff (Council of Australian University Librarians, 2001).

Contribution to the culture of our societies

In a speech early in 2000, the Singapore Minister for Information and the Arts spoke of the need to "provide cultural ballast in our nation-building efforts". He said "in order to strengthen Singaporeans' sense of national identity and belonging, we need to inculcate an appreciation of artistic and cultural heritage. We need to strengthen the 'Singapore heartbeat' through the creation

and sharing of Singapore stories, be it in theatre, dance, music, literature, film or the visual arts" (Lee, 2000).

Just as the public policies of our societies recognise the importance of public education, so also do they recognise the importance of cultural identity. Societies wish to celebrate the unique features of their culture, and prevent those features from being obliterated by culture that is imported through the global mass media. They advance these aims by fostering (and in part, funding) a variety of forms of cultural expression and knowledge creation.

Libraries, museums and archives are part of this cultural and creative process. Dempsey has described them as "memory institutions" which constitute "an important part of the civic fabric, woven into people's working and imaginative lives and into the public identity of communities, cities and nations" (Dempsey, 2000).

In speaking at the 1992 conference of the Australian Library and Information Association, Ian Templeman suggested that the library should serve the creative impulse by being a "cultural transformer" and a "stimulant to community imagination" (Templeman, 1992).

Libraries provide an environment for authors and other creators to be stimulated by the ideas of others, to explore and to create. The Australian author Sophie Masson has written of her experience in using libraries, describing them as "strongholds and gardens of the imagination" (Masson, 2000).

Many libraries and archives also undertake a direct role in the creative process, for example through their oral history programs. For example, the National Library of Australia has developed a collection of more than 50,000 oral history and folk recordings over the last 40 years, by conducting interviews with Australians who have made a contribution to a variety of enterprises and disciplines. In late 1997, following a national inquiry into the separation of Aboriginal and Torres Strait Islander children from their families, the Library was commissioned by the Government to conduct an oral history program to record and preserve the stories of indigenous people and others involved in or affected by the process of child removals. This project provides a notable example of the intersection between public policy and the

role of libraries in supporting societal memory and identity.

Dramatic changes are now taking place in the way that memory institutions provide access to cultural objects and experiences. The Web is being used to deliver interpreted cultural content to the citizen in the form of online exhibitions. Many institutions are embarking on wide-scale digitisation programs, following the lead of the "American Memory" project at the Library of Congress. The National Library of Australia, which initially confined its digitisation efforts to its pictorial collections, is now expanding its program to include rare maps and selected manuscript collections. The projects dramatically enhance access to such collections by making them available for study at any time and in any place.

By embarking on such programs, libraries, museums and archives, which have always had shared research interests, are now moving into a "shared network space". The expectations of users, and the way that they view our collections, is changing. Dempsey (2000) has pointed out that users wish to "refer to intellectual and cultural materials flexibly and transparently, without concern for institutional or national boundaries".

Memory institutions will thus come under increasing pressure to provide their users with the power to search across their institutional boundaries, and across categories of information resource that have traditionally been separated. Providing such services represents a significant challenge.

In a later section of this paper, I discuss some of these technical solutions which are available to meet the needs of users for "convergence" in resource discovery. Given the existence of these solutions, it appears that the obstacles to achieving convergence are not primarily technical – they are more managerial, organisational and attitudinal.

Preservation of our heritage for posterity

Speaking at the 1992 conference of the Australian Library and Information Association, Patricia Battin reminded her audience that one of the unique roles of libraries, not shared by the information providers that we access over the networks, is a genuine concern for the users of the future.

Memory institutions such as national and other research libraries have stewardship obligations, and "the moral imperative" to transmit the knowledge of the past not only to the present, but to the future (Battin, 1992).

Many examples of this imperative can be found in the mission statements of national libraries. For example, the corporate philosophy of the National Library of Malaysia has as one of its strategies "ensuring that Malaysia's intellectual heritage [is] collected for the . . . reference of present and future generations" (National Library of Malaysia, 2001).

Prior to the 1990s, libraries and other memory institutions already faced significant challenges in discharging this stewardship role, given the costs involved in providing suitable storage environments, and in the conservation and format migration of collection items. These challenges have now increased many times.

The proliferation of forms of publishing – and particularly the advent of electronic publishing – has made the work of research libraries, including national libraries, significantly more complex. At the National Library of Australia, we accepted in the early years of the Web that online publications are important social, intellectual and cultural resources and that our responsibilities in relation to this material were no less than for material traditionally collected (Fullerton, 2000).

The critical problem is that computer technology is changing so rapidly that the interfaces, technical standards and file structures which will be used by computers even 20 years into the future are likely to be quite different from those used today. For national libraries and other research libraries, which have a tradition of building collections to meet the needs of scholars many decades or even centuries into the future, this presents a very formidable challenge. The ability to access and read digital information in the future will depend on strategies such as migration (in which the data is migrated, if technically feasible, to new operating systems and data structures) or emulation (in which modern computers emulate the operating systems and data structures of previous eras).

A number of eminent commentators have expressed serious doubts about the

practicality of digital preservation. For example:

> The investment necessary to migrate files of data will involve skilled labour, complex record-keeping, physical piece management, checking for successful outcomes, space and equipment. A comparable library [project for] data migration cost and complexity at approximately this order of magnitude would be the orderly photocopying of books in the collection every five years (Graham, 1993).

Comments such as this rightly warn us of the depth of the challenge that this issue presents. However, it would be premature to assume now that the problem is incapable of a solution. Many international research efforts (including the CEDARS and NEDLIB projects in Europe, the work of Jeff Rothenberg on emulation, and the work of the Digital Library Federation) are actively pursuing the digital preservation question from a wide range of perspectives. There is a great imperative to find a solution, or a combination of solutions.

Last year saw the release of a major report (familiarly known as the *LC21 Report*) on the digital strategies of the Library of Congress (Committee on an Information Technology Strategy for the Library of Congress, 2000). The report found that the Library of Congress "lags significantly in receiving and archiving the born-digital product of the nation". The Library, it said "cannot go on as before". Amongst the key actions which the *LC21 Report* advocated were:

- greater cooperation in digital collection building (across geographical and sectoral boundaries);
- greater power – legislative and technical – to collect digital publications; and
- a stronger engagement in digital preservation with electronic publishers, other major collecting institutions and the research community (Committee on an Information Technology Strategy for the Library of Congress, 2000).

While the *LC21 Report* was directed at the Library of Congress, it really speaks to all of us. We are all facing this challenge and all of our energies will be needed to address it. As Lynne Brindley (the British Librarian) said in her recent keynote speech to the Preservation 2000 Conference in York:

> We simply do not have the luxury that our predecessors in their curation of printed materials enjoyed, of being able to rely on "benign neglect" as a plank of our digital

preservation strategy. Action has to be taken at the outset to ensure viable and sustainable access to digital content. As responsible creators and commissioners of digital content and curators of the digital future are about content creation for long term access, however long we determine that access period to be (Brindley, 2000).

For the last four years, the National Library of Australia has been building an archive of selected, significant Australian Web sites – the PANDORA archive. During the next three years the library will gain practical experience in preserving access to content in the archive by migrating obsolete file types, and possibly by using emulation techniques as well.

There is a need for a global process of sharing data about the large number of electronic file types, the software that supports delivery and viewing of these files, the scheduled releases of that software, the obsolescence of that software and the emergence of new file types. There needs to be an orderly process of alerting archives to those file types that are in danger of obsolescence and that must be migrated to an alternative format if some form of access is to be maintained.

There is also a pressing need for rigorous scientific research to seek reliable and affordable solutions to the digital preservation problem. Governments should fund such research just as they fund other projects to preserve their nations' cultural heritage. We need a global network linking such researchers with each other and with the archives and libraries that are grappling with the preservation problem. The basis of a reporting and information sharing mechanism already exists in the Preserving Access to Digital Information (PADI) Web site which is maintained by the National Library of Australia.

Information management

This paper has identified three broad "result areas" for our library and archival services: support for public education, contribution to the culture of our societies, and preservation of our heritage for posterity. If we are to deliver results in these areas, we need also to harness our information management skills.

Integrating management of physical and digital resources

A key information management tool used by libraries is the Integrated Library Management System (ILMS). Five years ago, the ILMS seemed like a "problem solved": no individual system was perfect, but the ILMS as a species was well defined and its purpose was clear. However, now that libraries are making available to their users an increasing proportion of information in digital form, the ILMS is feeling the strain (Pearce *et al.*, 2000).

Separate systems have evolved within the library community for managing physical format and digital collections. This is understandable, as digital collections have their own unique management and access requirements. The National Library of Australia is currently in the process of acquiring a digital object management system, separate from its ILMS, in order to give it the capacity to properly manage its digital collections.

This dichotomy creates a danger that users of digital services will be left ignorant of the rich collections of libraries that are not yet accessible in electronic form. It may also cause the library catalogue to diminish in value as the first point of entry to a library's collections.

Consequently, one great information management challenge confronting libraries is to find technical solutions to the problem of integrated collection management. "Within a single library... there is a need for a collection management architecture that can provide full system support for... collecting, storing, managing and delivering access to information resources regardless of format. This architecture may consist of separate modules, including a digital collection management module, which can be integrated through the use of appropriate protocols".

Integrating management of text in different scripts

Another information management challenge, and a particularly pertinent one for the Asia Pacific region, is to provide full support in our library systems for text in all of the world's scripts.

The last decade has seen the initiation, development and implementation of UNICODE, one of the most important of all information technology standards. UNICODE gives us:

- a single model for international text;
- a stable framework for multilingual computer applications;
- a much greater ability to share textual data worldwide; and
- support for the globalization of e-business (Sellers, 2000).

UNICODE has continued its steady development through the past decade. The latest version (3.0), which was launched in February 2000, supports 49,000 characters.

However, the implementation of UNICODE in library systems has been frustratingly slow. Libraries have generally been forced to deal with some scripts through separate systems or through script conversion (such as romanisation). The result is an incompletely integrated approach by users to library collections.

Countries in the Asia Pacific region are at the "leading edge" in terms of their requirements for multi-script support in library systems. Their experience and their assessment of such systems will be an important benchmark for the rest of the world.

Integrating access to resources in libraries, museums and archives

Another major information management challenge also concerns integration: the need to support integrated access to the collections of a variety of memory institutions, including libraries, museums and archives.

Integrated access to diverse materials are usually accomplished through services in which the metadata for those materials is searched simultaneously. One potential barrier to integrated access is the variety of metadata standards used by the different types of memory institution. Although we are now seeing the beginnings of attempts to compare and map them, the descriptive practices of libraries, museums and archives exhibit significant differences.

In this context the Dublin Core Metadata Element Set has been found useful as a kind of "lingua franca", supporting the discovery of digital information resources from a variety of communities.

While it is a relatively crude standard which lacks a well designed data model, Dublin Core has attracted support from a number of

governments (including Australia, Denmark and the UK) for access to government information, and it has also been well tested by the library and museum communities.

A current example of the use of Dublin Core to advance convergence can be seen in the Picture Australia service, which is hosted by the National Library of Australia. It is a cross-sectoral service: in March 2001 its ten collaborating institutions included a museum, a gallery, an archive and a government agency, along with six libraries.

Picture Australia is a resource discovery service which provides access to over 500,000 images hosted by the partner institutions. Resource discovery is integrated through the use of a central metadata repository which supports the search service. The metadata are harvested at regular intervals from the partner institutions. The search result sets make use of thumbnail images which are retrieved "on the fly" from the Web sites of the partner institutions. Dublin Core is used as a common metadata standard.

The Encoded Archival Description (EAD) is another standard which has attracted support across traditional sectoral boundaries. It has exciting possibilities for facilitating convergence in resource discovery.

EAD is a structural markup standard. It defines a standard way of marking up a finding aid or collection description. Within the EAD framework, collections are described in an intellectual sense rather than a physical sense. That is, the description reflects the logical hierarchy of the collection, rather than physical components such as boxes or folders.

There are now many examples of the use of EAD to describe collections such as manuscript and pictorial collections in libraries, art museum collections (Berkeley Art Museum), medical archives (Johns Hopkins) and government archives (UK Public Record Office).

To actually achieve convergence through the use of EAD, we need mechanisms for institutions to cooperate and to develop federated search platforms. A good example of such a platform is the one developed by the Research Libraries Group (RLG). RLG has for many years included archives and museums, as well as libraries, amongst its members. In 1998, RLG introduced its Archival Resources Service, which enables users to locate finding aids that are distributed across the Web, and to study the entire finding aid content through a Web-based search interface. Services such as this have the potential to create entry points to regional, national or global archival holdings across library, museum and archive boundaries.

Ensuring persistent access to digital information resources

A fourth key information management challenge arises from the lack of a reliable, stable and future-proof method of accessing digital information resources.

Information resources on the Web are cited in many places: in other Web documents, in scholarly articles, in library catalogues and databases, and in bookmark files within browsers. Currently the only widely deployed standard for citing and locating a resource on the Web is the uniform resource locator (URL). The URL describes the current location of a resource, and is subject to change if the resources are moved – which frequently happens in practice.

The success of a distributed information system such as the Web depends in the long term on the consistency of these citations. Libraries, archives, academic institutions and publishers have an interest in identifying Web resources in a manner which will persist. A successful persistent identifier system requires:

- a naming standard which is not based on current location;
- "resolution services" to convert the name automatically into the current URL; and
- processes which ensure that changes of location are always incorporated into the resolution services (Dack, 2001).

In a 1996 paper, Miller drew attention to the important role of national libraries, as institutions of long standing, in relation to persistent names:

> There must be one or more entities that take institutional charge of the issuing and resolving of unique names, and a mechanism that will allow this entire set of names to be moved forward as the technology progresses... The Digital Library community must identify institutions of long standing that will take the responsibility for resolving institutionalized names into current names for the foreseeable future... I propose that a small consortium of well-known (perhaps national) libraries could work to provide the computing infrastructure (Miller, 1996).

A number of national libraries have taken a strong interest in this issue, and an

International Taskforce on Persistent Identifiers was formed in 1999 to plan a suitable program of concerted action.

During the last year the National Library of Australia engaged a consultant to examine and report on existing standards and processes for persistent identifiers. The library will use this report as the basis for its future policies, standards and procedures in this area.

Conclusions

In this paper I have identified a number of challenges which libraries and archival institutions are now encountering. These challenges include the need:

- to support flexible online learning services in both the academic and public library contexts;
- for libraries to embark on collaborative cultural programs with other types of memory institution in the shared network space created by the Web;
- to respond urgently to the challenge of digital preservation and to foster a related program of research and collaboration;
- to manage traditional and digital collections in an integrated manner;
- to manage text in different scripts in an integrated manner; and
- to ensure persistent access to digital information resources.

Most of these challenges arise from the emergence of the World Wide Web in 1993, and its subsequent spectacular development into an essential global mechanism for information access and delivery. A number of them are "integration" challenges which arise from the potential of the Web to foster convergence (amongst memory institutions) or to create fragmentation (between digital and traditional information resources).

The greatest of the challenges lie in managing the future. The world of digital publishing and digital information delivery is focussed overwhelmingly on the present. Electronic publishers and Web developers are concerned with finding better and innovative ways of facilitating current information access, but few have any concern about how this information might be accessed in the future, and how it might be cited reliably over time.

Many of the challenges lie in the arena of information management. The growth of digital collections in libraries and archival institutions has created a need for new types of system infrastructure to manage these collections, and has raised dilemmas in how to maintain a coherent management architecture for digital and traditional collections.

Information management is not an end in itself. But we must solve these challenges if we are to continue to serve our societies though the imperatives of support for public education, contribution to cultural development, and preservation of our heritage for posterity.

References

Battin, P. (1992), "Beyond crumbling books: preservation strategies for the nineties", *Libraries: the heart of the matter: Proceedings of the Australian Library and Information Association 2nd Biennial Conference*, pp. 15-18.

Brindley, L. (2000), "Preservation 2000: keynote speech", available at http://www.bl.uk/concord/otherpubs_speeches04.html

Committee on an Information Technology Strategy for the Library of Congress (2000), *LC21: A Digital Strategy for the Library of Congress*, National Academy Press, Washington, DC.

Council of Australian University Librarians (2001), *Information Literacy Standards*, Council of Australian Libraries, Canberra.

Dack, D. (2001), "Persistence is a virtue", paper presented at the Online Information Conference, Sydney, January.

Dempsey, L. (2000), "Scientific, industrial and cultural heritage: a shared approach", *Ariadne*, Vol. 22 January, available at http://www.ariadne.ac.uk/issue22/dempsey/intro.html

Fullerton, J. (2000), "The information environment in the 21st century: societal issues", paper presented at The Australian Library and Information Association Biennial Conference, Canberra.

Goransson, B. (1990), Opening speech at the Conference of the International Federation of Library Associations and Institutions, Stockholm, August.

Graham, P. (1993), "Intellectual preservation and electronic intellectual property", available at http://www.ifla.org/documents/infopol/copyright/graham.txt

Johnston, P. (2001), "After the big bang: forces of change and e-learning", *Ariadne*, Vol. 27, available at http://www.ariadne.ac.uk/issue27/johnston/

Latham, M. (2000), "Libraries in the 21st century learning society", *Aplis*, Vol. 13 No. 4, pp. 146-51.

Lee, Y.S. (2000), Speech by Minister for Information and the Arts on the Renaissance City Report, 9 February, available at http://www.gov.sg/mita/renaissance/speech.htm

Leigh, S.-A. (2001), "Portals, virtual portals and information clumps: technologies, issues and trends", *Information Online 2001: Proceedings of the 10th Australasian Information Online Conference*, pp. 75-85.

Lim, E. (2001), "From 'bricks and mortar' to 'clicks and mortar': leveraging e-commerce technologies for flexible learning support", *Information Online 2001 Conference*, available at http://www.csu.edu.au/special/online2001/papers/digital_issues_Ia.htm

Macintyre, S. (1992), "Libraries, information management and cultural heritage", *Libraries: the heart of the matter: Proceedings of the Australian Library and Information Association 2nd Biennial Conference*, pp. 195-98.

Masson, S. (2000), "Imagination's stronghold", paper presented at *ALIA 2000*, available at http://www.alia.org.au/conferences/alia2000/proceedings/sophie.masson.html

Miller, J.S. (1996), "W3C and digital libraries", *D-Lib Magazine*, November, available at http://www.dlib.org/dlib/november96/11miller.html

National Library of Malaysia (2001), *Corporate Philosophy*, available at http://www.pnm.my/philoso.htm.

Pearce, J., Cathro, W. and Boston, T. (2000), "The challenge of integrated access: the hybrid library system of the future", *Proceedings of the Victorian Association for Library Automation Conference, Melbourne*, February.

Sellers, D. (2000), "UNICODE standard marches on", *MacCentral online*, 29 February, available at http://maccentral.macworld.com/news/0002/29.unicode.shtml.

Templeman, I. (1992), paper presented at The Australian Library and Information Association Biennial Conference, Albury, 1992.