The Library as Digitorium: New Modes of Information Creation, Distribution and Access

Cathrine Harboe-Ree
University Librarian
Monash University
Cathrine.Harboe-Ree@lib.monash.edu.au

Michele Sabto
Manager, Monash University ePress
Monash University
Michele.Sabto@lib.monash.edu.au

Andrew Treloar
Project Manager, Strategic Information Initiatives
Monash University
Andrew.Treloar@its.monash.edu.au

Abstract
Libraries have always been creators or publishers of information. Digital technology, combined with library expertise in bibliographic control, distribution and access, provides new opportunities for libraries to create and publish material in support of teaching, learning and research. Monash University Library, as an early adopter of new technologies, has developed digital services to support more effective and creative learning and teaching. More recent initiatives are specifically intended to support research, and to work towards the transformation of scholarly communication. The word coined to capture the newly expanded role for higher-education libraries is digitorium*, a play on* scriptorium.

Introduction

Libraries have always been creators or publishers of scholarly information. In ancient and medieval times the library, or *scriptorium*, was the centre of creation of information. More recently, libraries' creative role has mainly been in the areas of bibliographic access and control, such as catalogues, indexes and bibliographies, although a number have published material from their rare books and manuscripts collections.

Digital technology, combined with library expertise in bibliographic control, distribution and access, has provided new opportunities for libraries to create, or publish, a wider range of material in support of teaching, learning and research. The term *digital revolution* is widely used and rarely challenged. While the benefits of pervasive, globally networked information technology are well known, it is less clear is how this revolution will transform scholarly communication. Cathrine Harboe-Ree, one of the authors of this paper, has coined the word *digitorium*, to reflect a radically changed role for libraries, one where they can participate fully in all forms of creation and distribution of, and provision of access to, information. More commonly, this is referred to as the 'library without walls', but that phrase does not do justice to the enormous potential for change that accompanies the digital revolution.

Clifford Lynch, Executive Director of the American Association of Research Libraries' Coalition for Networked Information (ARL CNI), says that the digital revolution allows universities to "[move] beyond their historic relatively passive role of supporting established publishers … exploring more transformative new uses of the digital medium" (Lynch 2003). In the same article, he goes on to say that academic institutions should support their most creative faculty members, those who have been exploring ways in which works of authorship in the new digital medium can enhance teaching and learning and the communication of scholarship.

The key activities of any university are the generation of knowledge (research) and the transmission of this knowledge to new generations of scholars (teaching and learning). This paper examines recent Monash University Library initiatives to support these key activities, demonstrating that in these projects lie the seeds of a radically changed or expanded role for higher-education libraries as *digitoriums* of the information age. The authors recognise that many of these activities are also being undertaken by other university libraries. However Monash University Library provides a useful case study because of the comprehensiveness of the range of approaches it has adopted. This paper also examines how this transition to a new-generation library model poses strategic planning challenges for University libraries, demanding a flexible and collaborative approach to managing change.

Teaching and learning

Monash University, the largest university in Australia, serves approximately 55,000 students (38,500 EFTSU) and 10,000 staff (6,000 EFT) over six Australian and two overseas campuses. Monash University has an extensive international and distance education commitment, with more than 12,000 students (8,000 EFT) being external, distributed around the world. Monash University Library has a tradition as an early adopter of new technologies, and is recognised in Australia as having been at the forefront of the digital revolution. Over the past five years it has introduced a number of projects and strategies designed to push the door open in support of more effective and creative learning and teaching at Monash University.

Catalogue-based Initiatives

The first of these initiatives, and the platform for many others, is the library's catalogue, which, using Endeavour's Voyager integrated library management system, has been transformed into a significant digital, web-based database, containing records for 2.8 million collection items, 380 networked electronic databases containing over 18,000 electronic journals and 140,000 e-books. There were 19,989,730 searches of the library catalogue in 2002.

In the context of this paper, the focus on what the library is doing from the base of that digital resource to create something new. As one example, systems staff have written a program that, on a weekly basis, creates a list of new resources, which highlights new books, videos, CDs, CD-ROMs, microforms and tapes. This constantly changing new product is based on the library's catalogue.

Another catalogue-based initiative is a *metabase* that contains metadata about the catalogue, administrative data such as service-problem alerts, licence limitation advice and other Monash-specific information about resources in the catalogue. This *metabase* replicates itself across the various campuses and locations and its records allow automatic sorting by subject area. From the user's perspective, there is now an improved databases page, with much of the usability design based on comments received in a 2001 survey. This *metabase* has been operational since mid 2003.

eReserve and Exams Database

Monash University Library has transformed its reserve collections in support of learning and teaching. There are now online reading lists that link to electronic resources in the catalogue and to over 120,000 pages of material – usually journal articles or book chapters – that have been digitised. This digitised material repository is a newly created product that has made the reserve material dramatically more accessible. Given that Monash has students on six Australian and two overseas campuses, and distance education students reside in over 120 countries, this is a key development. The library's aim is to make the material required in courses as available as possible, as quickly as possible.

We are now creating online lists as a framework from which to hang the digital articles, chapters and links (for instance http://lib.monash.edu.au/resourcelists/matheson1/). Some of the links go to material that is digitised by the university's Digitisation Centre, which is a unit of the library. One of the goals of the Centre is to improve the university's control of copyright compliance for teaching materials offered digitally. The library does not, however, create everything that the links connect to – many of the links go to digital content held elsewhere in electronic databases or in open information on the Internet.

Some indication of the success of the digitisation of readings and reserve material is the fact that there are approximately 30,000 accesses per week to the library's image server.

In a similar service to the eReserve, Monash University Library has created 14,000 links to PDF files in the past exams database, with 1,350,000 hits in 2002.

Monash Lectures Online

The Monash Lectures Online service provides digitised lecture recordings to students via the Internet. Thirty-three theatres across five of the Monash campuses are wired to provide streaming audio. In 2002 almost 130 courses in each of semesters 1 and 2 were digitised, involving more than 5000 hours of audio recordings. A total of 145,881 extended live audio streams were delivered on the Internet to the end of November 2002. This service is now being reviewed with an eye to adding streaming video from some of the high-use lecture theatres.

Virtual Librarian

Library staff have created a suite of online instructional modules to train people to use the catalogue. These modules are referred to as the Virtual Librarian service, and the peak use in 2002 was 55,000 hits per week in the first semester.

AARLIN

Under the leadership of the former Monash University Librarian, Edward Lim, a number of Australian university libraries are collaborating to use new technologies to transform access to electronic resources. This project, which is called AARLIN (Australian Academic & Research Library Network), involves the development of customised front ends to library catalogues. The intention is to allow simultaneous searching of databases, with the capacity to self select a database profile, and with the potential into the future to keep adding value to individual inquirers in response to their profile.

AARLIN fits in with Monash University Library's strategy of providing services superior to the current end-user information-gathering default service (Google!), thus reinstating the library as the first source of information for both students and academics. One of the best aspects of AARLIN is that it not only allows searching of multiple databases, but it will then link users to full text where this is available. This is one of the key features of Google, and one that is rapidly becoming the basic expectation of undergraduate students.

AARLIN will also allow the library to address issues raised by users in a recent survey of database use, such as the inability to recognise which databases to use.

Supporting Research

We now come to three recent initiatives that draw on the library's expertise in the management of digital information to provide a greater degree of support for Monash University's research activities. Together they comprise a set of initiatives that focus not only on traditional library goals — such as access, effective resource discovery, and preservation —but also participate in a worldwide push to establish methods of dissemination and access to scholarly research that overcome some of the problems currently associated with the commercial publishing industry. In Clifford Lynch's (Lynch 2003) words, these initiatives move the library beyond the traditionally passive role of "supporting established publishers … exploring more transformative new uses of the digital medium".

The first two initiatives, the ePrint Repository and the ePress, address, in differing ways, what has come to be known as the 'crisis' in scholarly publishing. Peter Suber, from Earlham College, says that we are at present facing two crises, a 'serials pricing crisis', and a 'permission crisis', both of which are damaging open learning and research (Suber 2003). Suber says that "prices limit access, and intolerable prices limit access intolerably", and that the permissions crisis is the result "of raising legal and technological barriers to limit how libraries may use the journals for which they have paid so dearly. … The permission crisis is a quadruple whammy arising from statutes, contracts, hardware and software".

Over the past 5–10 years academic libraries have assisted publishers to lock up a major proportion of the world's scholarly information, so that it is now mainly available to those fortunate to be part of either an academic institution or a research organisation affluent enough to be able to pay the very high subscription costs of aggregated electronic datasets. This is one form of collateral damage resulting from the eager embracing of electronic journals. Another is the gradual squeezing out of monographs from library collections.

The third initiative, Australian Repositories Online to the World (ARROW), has a broader scope that encompasses innovation in resource discovery and delivery. However, ARROW, like the ePrints Repository and the ePress, can also be seen as part of the global push towards alternative publishing models.

In each instance, in the absence of local models, Monash University Library started by looking at overseas experience. The level of activity, both in the US and Europe relating to similar library or institutionally-led publishing and repository initiatives is impressive and indicates that the time is ripe for Monash University Library to be embarking on these projects.

Particular sites of interest investigated were:

- **SPARC** (http://www.arl.org/sparc), a US-based alliance of research institutions, libraries and organisations that fosters competition in the scholarly communications market
- **HighWire Press** (http://highwire.stanford.edu), a venture originating from Stanford University Library. Highwire produces ejournals, focusing on biological, medical and physical sciences. While recent Highwire content is available only to paying customers, Highwire makes a significant proportion of its content (much of it back-issue content) available free of charge. Highwire also produces and sells BenchPress, manuscript-management software that manages the submission, review and editing of journal content
- **California Digital Library** (http://www.cdlib.org/), the name given to a range of digital initiatives undertaken by the University of California. For example the escholarship project (http://www.escholarship.cdlib.org/) provides repositories for research and scholarly output (including pre-publication scholarship as well as peer-reviewed content) as well as technologies for researchers to build and publish their own ejournals
- **BioMed Central** (http://www.BioMedCentral.com), an 'open access' publisher run on commercial lines. All content is provided free of charge, with submitting authors paying an article charge to submit articles to BioMed Central journals
- **Figaro** (http://www.figaro-europe.net/), a European academic epublishing initiative focused on the creation of an effective and affordable communication and publishing environment for scholars
- **Project Euclid** (http://projecteuclid.org/), a Cornell University Library ejournal publishing initiative that publishes ejournals in mathematics and statistics. Content is available on a subscription and pay-per view basis.

Monash University ePrint Repository

Monash University Library has recently started to participate in the national and international eprint repository movement. An eprint repository stores and makes available (in digital form) preprints and postprints. Preprints are papers that have not been peer reviewed and can consist of working papers, conference and seminar papers, draft book chapters, and theses. A postprint is material that has been successfully peer reviewed and is either published or awaiting publication.

Context and rationale

The rationale behind these repositories is to reclaim institutional scholarly output and make it widely accessible internationally, thus removing barriers to learning and research.

Eprint repositories have been proliferating in recent years. Many have been set up by university libraries, but many have also been established by scholarly and professional societies and higher education research centres. Australian universities running eprint repositories include The Australian National University (http://eprints.anu.edu.au/), The University of Melbourne (http://eprints.unimelb.edu.au/), and The University of Queensland (eprint.uq.edu.au). There is also the CAUL-administered Australian Digital Theses Program (http://adt.caul.edu.au/).

Current activity

Monash University ePress

Monash University ePrint Repository is one way of providing alternative access to material usually published in for-profit journals. In contrast Monash University ePress aims to offer services and functionality similar to those offered by commercial presses, but in a way that is more aligned with University and library objectives, thereby tackling specific problems associated with the current scholarly publishing climate. These problems include the pricing and intellectual property issues discussed above, but also include long lead times for publication and publishing models that do not allow for publication of media rich titles.

Context and rationale

Monash University will join the growing number of academic institutions that, mainly through their libraries, are trying to establish sustainable publishing alternatives to current commercial publishing practices. A similar initiative is being established by the Australian National University, which is building an epress with a primary focus on monograph publishing. RMIT Publishing been a successful aggregator of databases for several years now and their relatively new Informit Library venture is now publishing content online as well.

This form of publishing is what John Iremonger (Steger 2002) referred to as "just advanced librarianship" when asked to comment on the profitability of electronic publishing. He is probably right for small presses, although one might question the use of the word 'just', and we need to see this comment in an environment that also includes the mega-publishers such as Reed Elsevier, which had a turnover of £5bn, and profits of £927m in 2002 (Walsh 2003).

The library's intention is to keep pushing the limits of what new technologies offer. Electronic publication of research output has many advantages over print, although parallel print and online publishing is still viable for many titles. In comparison with print publication, electronic publication can increase research impact by increasing access to titles, and online publication can offer many features not possible with print publication. Some examples:

- the inclusion of colour images that would be prohibitively expensive in print
- reference linking: pointing users to the full-text of references cited in ePress content
- automatic inclusion of content in indexing and abstracting services, thereby increasing access to that content
- forums for readers to discuss content and interact with other readers
- speeding up and streamlining the submission and refereeing process by providing online tools to the editorial boards of journals
- an overall reduction in publication lead times, making the publication of research in fast-moving disciplines viable
- usage statistics for authors and institutional subscribers
- flexible subscription offerings to meet the needs of different users
- the opportunity to repackage content cheaply and in response to emerging market opportunities (for the publisher this means multiple revenue streams)

Monash University, which does not have a traditional press, is attracted to an initiative that offers flexibility and the ongoing capacity to transform itself as new opportunities emerge.

ePress offerings and publishing model

Monash University ePress will publish, online, a critical mass of quality scholarly publications. The main content type will be ejournals, but the ePress will also publish selected conference proceedings and monographs. While parallel print publication of titles is not envisaged in the first year of operation, the publishing model envisaged supports short-run printing and the ePress aims to roll this out at a later stage.

Both unpublished and previously published material will be considered for publication with the ePress, including material already published or being published in electronic form.

Some ePress content will be open access while some will be offered on a subscription and pay-per-view basis only. In order to achieve sustainability, publication of content will involve cost recovery mechanisms. The costs of publishing quality content online are significant, if under-appreciated. They include software licensing (modules include content management, storage, publish-to-web, authoring and conversion tools, ecommerce, and access control) hardware, installation and maintenance, customer support, modifications, and site design (Hulbert 2002). These are in addition to standard costs associated with publishing, such as editorial, marketing and administration.

The ePress will offer flexible costing arrangements for titles, involving a traditional royalty payment (sharing of subscription and pay-per-view revenue between the publisher and the journal, or author), direct contribution to costs, and author-pays (known in traditional publishing as 'page charges' or 'article charges'). Depending on the nature of the title, an agreement with a journal may include one, or a mix, of these options.

The ePress will launch its first set of titles in October 2004.

Guiding principles

Decisions about software, workflow and operating procedures are largely being driven by the following key factors :

- The need to build up a critical mass of content quickly
- Human resources. In the first two years, there will be a maximum of 3 dedicated ePress staff
- The choice of a native XML storage model for ePress content (Rosenblum 2003).

This means that, in the case of journals and edited collections for example, responsibility for processing initial submissions, refereeing, and editing will be devolved to the journals or, in the case of an edited collection, the author who is putting together the collection. The ePress will exercise quality control in the selection of titles for publication: the commissioning process will involve independent review of proposed titles, and assessment of proposals by the ePress Advisory Committee. The ePress will accept only the final, publication-ready version of articles/papers (refereed, edited and proofed). In the case of a journal or edited collection, the ePress will deal primarily with the managing editor, who will be the main point of contact between the journal and the ePress. Other than providing support about submission formats and procedures, the ePress will have minimal contact with the authors of articles and papers.

The guiding principle for the content management and publish-to-web aspects of the ePress system is that source content and metadata will be stored in true XML (Rosenblum 2002). All source content (articles, chapters/papers) will be converted to fully structured XML, with the HTML and PDF versions rendered dynamically from that XML. A series of Document Type Definitions (DTDs) will be used by the ePress for different sorts of publications.

The ePress will not make submission of content in XML a mandatory requirement. Instead where managing editors and monograph authors are unable provide source content in XML, they will be able to provide it in a limited set of other formats, such as Word. The ePress is also looking at providing an optional package of online tools to managing editors and authors. For managing editors, these tools would manage tasks for which the ePress is not responsible: receiving and accepting/rejecting submissions, refereeing, and editing.

ARROW

The Monash ePrint repository and the ePress are activities that are moving ahead. Let us now turn to a new initiative, which is an extension of both the ePrint Repository and the ePress, emerging from a wish to move into the future with an integrated interoperable suite of software to manage all of Monash University Library's digital library activity. Monash University is the lead member of the ARROW consortium, which includes University of New South Wales (UNSW), Swinburne University of Technology and the National Library of Australia (NLA). ARROW has been funded by the Australian Government Department of Education, Science and Training (DEST) under the Research Information Infrastructure Framework for Australian Higher Education. ARROW is an acronym for **A**ustralia **R**esearch **R**epositories **O**nline to the **W**orld.

The ARROW project will identify and test a software solution or solutions to support best-practice institutional digital repositories comprising eprints, digital theses and electronic publishing. A wide range of digital content types could be managed in these repositories. The NLA will develop a repository and associated metadata to support independent scholars (those not affiliated with an institution). A complementary activity of ARROW will be the development and testing of national resource discovery services (developed by the NLA and others) using metadata harvested from the institutional repositories, and the exposing of metadata to provide services via protocols and toolkits. This will include a potential path for the redevelopment of the Australian Digital Theses (ADT) metadata repository incorporated into the NLA's national resource discovery services.

The defining characteristics of ARROW are:

- an emphasis on interoperability
- recognition of the benefits of a distributed and federated approach
- awareness of the requirements for preservation and archiving
- a clear commitment to advocacy.

Initially ARROW will be tested in the four partner institutions, prior to it being offered more widely across the higher-education sector. The solution will be open-standards based, or will support open standards, and will facilitate interoperability within and between participating institutions. The programme of activities for this project is planned to occur in three overlapping stages: Demonstration, Deployment and Distribution. These stages will be staggered over three years.

The Future: Strategy and Collaboration

All over the world, universities, their libraries and their information technology and course development divisions, are struggling to manage the digital revolution. Will we open the door wide and step through into a creative future, or will the door keep slamming shut on us, or (and this what the situation currently looks like) will there be so many doors that we cannot choose which ones to go through? The opportunities are many, but so are the challenges.

As with electronic publishing, it is instructional to look to the North American experience, where budgets are more generous than our own, and where it is possible to attract significant philanthropic or government grants to develop digital strategies.

The California Digital Library, already mentioned, has four strategies for the future (Greenstein 2003). These are:

- building, sharing and preserving digital collections
- creating tools and services
- influencing and supporting innovation in scholarly communication
- fostering strategic partnerships for digital library development.

A number of North American universities are exploring management of digital information through cross-divisional collaboration, including faculties, the library, information technology divisions and centres for learning and teaching support. Cornell's University of Virginia Libraries is developing a reference implementation of the FEDORA (Flexible and Extensible Digital Object and Repository Architecture), which is to underpin interoperable web-based digital object collections, or libraries (see http://www.fedora.info/). FEDORA is also being tested by other universities, including Indiana. An alternative repository implementation, DSpace (http://www.dspace.org/) is being jointly developed by MIT and HP.

A scan through the current situation of a number of North American universities reveals the following issues and challenges (Greenstein 2003):

- Universities have to support an overall digital library strategy at the highest level for the most effective outcomes (this is not something that libraries, or IT departments, can undertake on their own).
- Highly decentralised institutions find it more difficult to agree on overall strategies.
- It is expensive to undertake the research and development necessary to explore new territory.
- Universities are at different stages of cultural awareness of the challenges and opportunities presented by the digital revolution; some universities will explore new territory more willingly than others.
- It is very difficult to manage intellectual rights without strategies and coordination.

The model that seems to best encapsulate an integrated response to these challenges is Ohio State University's Knowledge Bank concept (Rogers 2003), which recommends building on existing digital initiatives to create a linked institutional repository to collect, preserve and create value-added services from digital content produced by and for teaching, learning and research. Sally A. Rogers, spokesperson for this project, says: "The advantage of this approach is that it promotes integration of all forms of academic digital content and [recognises] that seemingly independent initiatives are actually related".

Taking this approach at Monash University Library would lead to the further linking of the library's catalogue and various digital initiatives outlined in this paper with course web sites, electronic course packs and learning objects.

Conclusion

Let us finish this paper by referring back to the *digitorium* concept that we introduced at the beginning. Monash University Library is already an extensive creator, publisher and disseminator of digital products. Our aim is to continue to explore innovative responses to technological opportunities, and, in so doing, to find new forms of expression and new outlets for Monash University scholarly endeavour, as well as new pathways to the world's scholarly output for our staff and students. In doing this, we are also committed to the restoration of scholarly information to the wider community.

In the immediate future the library is keen to play a lead role in the university as it moves towards an overall information management strategy. One outcome of this activity might be a Monash University Knowledge Bank, made up of an interconnected network of teaching, learning and research digital objects and resources, easily accessible in a variety of formats and for a variety of purposes. Such a storehouse of the university's intellectual property, and the role of the library in facilitating it, harks back to the role of the monastic libraries in the preservation of knowledge during the Dark Ages. From *scriptorium* to *digitorium*? Who knows what the endpoint will prove to be, but the journey will no doubt be full of excitement and challenge.

References

Greenstein, D. & Thorin, S.E. 2003, 'California Digital Library', in *The Digital Library: a Biography*, 2nd. ed, http://www.clir.org/pubs/reports/pub109/section2.htm (14 November 2003).

Hagedorn, H. (n.d.), 'A call for change in academic publishing', in *Journal of Insect Science*, http://www.insectscience.org/about/change/index.htm (14 November 2003).

Hulbert, T. 2002, 'Alternative business models – what are they?', *Institute of Physics Publishing*, http://www.leeds.ac.uk/library/scholpub/iop.ppt (14 November 2003).

Lawrence, S. 2001, 'Online or invisible', *Nature*, vol. 411,no. 6837, p. 521.

Lynch, C. 2003, 'Institutional repositories: essential infrastructure for scholarship in the digital age', in *ARL Bimonthly Report 226*, http://www.arl.org/newsltr/226/ir.html (14 November 2003).

Rogers, S.A. 2003, 'Developing an institutional Knowledge Bank at Ohio State University: from concept to action plan', in *Portal: Libraries and the Academy*, http://www.lib.ohio-state.edu/Lib_Info/rogersKBdoc.pdf (14 November 2003).

Rosenblum, B. 2002, 'XML in Journal Publishing Today', http://seminars.seyboldreports.com/2002_new_york/files/presentations/082/rosenblum_bruce.ppt (14 November 2003).

Steger, J. 2002, 'When making money is not entirely academic', in *The Age*, 26 April.

Suber, P. 2003, 'Removing the barriers to research: an introduction to open access for librarians', unabridged ed (a different edition was published in *College & Research Libraries 64*, February 2003), http://www.earlham.edu/~peters/writing/acrl.htm (14 November 2003).

Walsh, F. 2003, 'Reed soothes City on targets', *This is money: news and markets* http://www.thisismoney.com/20030220/nm59431.html, 21 February (14 November 2003).