There is little doubt that the role of the academic library is changing in the digital age. A recent feature on the future of libraries in the Guardian newspaper stated:

“Academic libraries are changing faster than at any time in their history. Information technology, online databases and catalogues and digitised archives have put the library back at the heart of teaching learning and academic research on campus”. ¹

Such a media attention is welcome and raises the profile of libraries, acknowledging what all information professionals know – that access to high quality information is at the heart of research and the knowledge economy. Over the last decade huge strides have been made in the provision of and access to, information by libraries. Most major journal publishers now provide their entire portfolio in digital format and the transition by libraries from printed journal holdings to electronic journals (e-journals) is rapid.

The traditional journal package as we know it is also evolving. Blogs and Wikis, links to research data, RSS feeds and online peer review are all becoming commonplace. Book publishers are catching up, and electronic books (e-books) are becoming an important element of library collections. Scholarly book publishers increasingly publish both print and electronic versions of their books, although this does not generally apply to textbooks. Amazon – a major player in the mass book market – is rapidly signing deals with publishers to make e-books available and providing access to readers via their Kindle e-book reader. If we also consider the huge amounts of older and rarer research materials being made available online by local and national digitisation initiatives, the vast scale of the rich information resource available to scholars and researchers becomes apparent.

As we consider the future role of academic libraries we should note the words of Clifford Lynch:

“Digital technologies have opened the door to a host of new possibilities for sharing knowledge and generated entirely new forms of content that must be made broadly available. This shift demands that universities take on a much more active role in ensuring dissemination of the knowledge produced by their institutions – both now and in the future”. ²

What we now need to examine is how we, as information professionals, manage, provide access to, and disseminate information resources, now and into the future.

E-journals

Journals have always been one of the most important types of resource for scholars. They also constitute the major expenditure on materials in most academic libraries. Currently there are about 21,000 peer-reviewed journals published world-wide, containing about 1.4 million articles each year. The world market for scholarly journals is estimated at £5 billion. According to Mabe,³ the number of journals continues to grow year-on-year by about three per cent and the number of articles grows at approximately 3.5 per cent per year. Amazingly, these figures have been relatively consistent over the last two hundred years. But the ever increasing output of scholarly journals and articles has created a major problems for libraries and the “serials crisis” – i.e. the inability of library budgets to keep up the ever increasing amount of published journals - has been an enduring topic in the library literature for many decades. ⁴

One might argue that in the print environment the management of journal collections was relatively straightforward. Annual subscriptions were placed for individual titles and when the cost of the collection exceeded the budget, individual titles were cancelled to balance the books. However, the current model of e-journal acquisition is not so simple. Most major scholarly publishers now sell their entire e-journal portfolio in a package – known as the big deal. Initially
this business model was received with enthusiasm by libraries. Payments for the entire portfolio were based on historical print spend and so, for a modest increase in price, libraries were able to license many, many more journals than before. Access for scholars to the journal literature increased dramatically and was well received by all parties. However, as time has progressed, and prices have increased, many libraries now find themselves locked into big deals from the major publishers at the expense of smaller, specialist publications. Only limited cancellations are allowed within big deals and they are devouring an increasing proportion of the library materials budget. A survey in 2009 by Taylor-Roe found that many librarians were maintaining their big deals at the expense of their book budgets and a growing number were considering the cancellation of one, or more, of their big deals.

Librarians and publishers do need to find a solution to the current dilemma. It is important to the survival of both parties that scholars continue to have access to the research literature. At a strategic level, academic institutions should also be concerned. A recent research report from the (UK) Research Information Network shows that even at the current level of spending, e-journals represent good value for money. Users in UK universities downloaded some 102 million articles in 2006/07, at an average cost of 80p per article. However, even more importantly, the spending and the use of e-journals in an academic institution correlate with research outcomes. The research found that per capita expenditure and use of e-journals is strongly and positively correlated with the number of papers published, the number of PhD awards, and the number of successful research grants awarded to an institution. Given that funding bodies world-wide use such metrics to establish institutional funding levels – Vice-Chancellors do need to take heed. It is up to librarians to ensure that their voice is heard by higher authorities and this will continue to be an important role for library consortia and library professional bodies at a national and international level.

There is however, another possible solution.

**Open Access**

Whilst libraries have traditionally focused on the purchase of journals, the electronic environment has opened up new possibilities. Electronic publishing offers authors the possibility of making their publications freely available on the internet. This is known as open access (OA) and it is gaining momentum both with librarians and authors.

There are a number of OA models. Harnard (a major protagonist of OA) identifies two types - ‘green’ and ‘gold’. Gold OA means that the publisher makes the entire e-journal available on the internet free of charge – finding revenue streams from sources other than library subscriptions (e.g. library membership fees or payments from authors). Green OA means that an article is published in a conventional, subscription-based journal, but if the author him or she subsequently makes it available online, either via personal or institutional web pages or in a repository.

The growth of repositories is a world-wide phenomenon. Many academic institutions across the globe now have their own institutional repository (IR) which contains the research output of their scholars and researchers, including journal articles, book chapters, theses, and research reports. Providing that the IR complies with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) the publications can be discovered by anyone using a generic web search engine (e.g. Google, Yahoo). In many institutions it is the responsibility of the library to manage and populate the IR, which means that generally the library bears the cost of the ‘publishing’ activity – particularly in terms of staff costs. There are also a number of international discipline-based repositories, the best known being arXiv for physics and PubMed Central for biomedical sciences.

If OA publishing continues to grow, the impact on publishers and libraries will be considerable. There could come a time when libraries decide to cancel journal subscriptions because a significant proportion of articles published are freely available online. Indeed, research by Norris shows that in some subject disciplines well over 50% of all published papers are already freely available. But, whether it is traditional publishers, or librarians via their IR, who publish materials, there still a cost associated with the publishing and someone will need to foot the bill.

**E-books**

Whereas journals have traditionally supported research activity within academic institutions, books have traditionally supported learning and teaching. Course textbooks, reading list materials and scholarly monographs and reference materials have all been important library acquisitions for the student body. The e-book market has been much slower in maturing than the e-journals market. Gomez traces the history of the comparatively slow introduction of the e-book. Librarians and users have been challenged by the plethora of e-book readers, the difficulty of reading books on screen, lack of inter-operability between publisher and aggregator platforms, and the business models associated with e-book provision. But it would seem that the e-book is coming of age. Marr, writing in the Guardian newspaper, said: “But it’s clear that after all the waiting and over-hyping, the e-book is arriving. Before long you are going to see them being carried nonchalantly around”. Librarians are keen to expand their e-book collections. In 2006 The Higher Education Consultancy Group (HECG) undertook a survey of UK university libraries on behalf of the JISC E-Books Working Group. Eighty nine out the 92 university libraries which responded said they were either “eager” or “very eager”
to develop e-book collections. In addition, librarians told the consultants that they wanted: multiple and concurrent access for users (not one copy, one user); an easier way of discovering what e-books are available; and easy access for their users (not lots of different platforms and interfaces). Some publishers also see the benefits of e-books. Barnsley, CEO of Harper Collins, pointed out that e-books offer publishers an end to unwanted inventory, no more returns, and no more out-of-print titles. It is extremely difficult to obtain accurate and up-to-date statistics on e-books. However, in August 2009, Michael Smith, Head of the International Digital Publishing Forum, reported that e-book sales were up 149 per cent year to date. He goes on to say: “For me the most interesting thing is that these figures are likely soft, and the true market performance of e-books is probably stronger given that this data is for the US only…”

One exciting new development which may very well impact on the availability of books for library users is the Espresso book machine. This is a print on demand machine that takes a PDF file and prints, collates, covers and binds a single paperback book in a few minutes. The machine is designed for the library and bookstore marketplace and the first one was installed in the New York Public Library in 2007. The first one in the UK was launched in 2009 at Blackwell book store in Oxford, “signalling the end, says Blackwell to the frustration of being told by a bookseller that a title is out of print, or not in stock, the Espresso offers access to almost half a million books” (and this will increase to over a million by the end of 2009).

It looks as if we are well on the way to achieving Dame Lynne Bindley’s prediction that: “by the end of the year 2020, forty per cent of the UK research monographs will be available in electronic format, while a further 50 per cent will be produced in both print and digital. A mere 10 per cent of new titles will be available in print alone”.

Clearly publishers see the growing demand from libraries for e-books and as can be seen from the above statistics, many are now providing both their current titles and back catalogues in e-format. They are also responding to the student and consumer demand for e-books to be read on mobile devices such as the Sony e-book reader, Amazon’s Kindle and now the iPhone. It is interesting to note that in May 2009 Amazon stated that where their site had books available both in print and e-book format, the electronic versions have sales of 35% of the same books in print. However, there is one category of e-book which publishers still remain reluctant to make available: that is the e-textbook.

In the UK, the JISC E-Books Working Group – which oversees e-book consortia activity – has been in repeated dialogue with publishers to persuade them to make their e-textbooks available to libraries. But to little avail. Publishers’ over-riding concern is that if they allow libraries to make e-textbooks available, the student market for textbooks would decline significantly. So in 2007, funding was obtained to undertake an ambitious project – called the National E-Book Observatory Project - which would make high demand reading list texts free at the point of use to all students in the UK for a period of two years and monitor the use of those titles and the impact on publisher sales. In order to provide a safe environment for the publishers involved, JISC licensed (at considerable expense) 37 key titles from a range of publishers. The use of the titles at some 120 university libraries was tracked and analysed by the CIBER research group at University College London, using a technique called deep log analysis. Huge amounts of data were collected on user behaviours and in addition, surveys were conducted at the start and finish of the project. In total, 35,000 responses to the surveys were collected and analysed – almost certainly the largest ever e-book survey ever undertaken. The key findings from the project were highly insightful. Students used the e-textbooks in huge numbers at all times of the day and night. rarely reading linearly but skimming and dipping into the content most reading was done on screen. However, the most significant findings were that the availability of the e-textbook did not impact upon the circulation of printed textbooks in library collections and online availability had little impact upon publisher sales. It is to be hoped that, following this project, publishers will be keener to sell e-textbooks to libraries – the proviso being that an appropriate business model can be negotiated. JISC has already started work on a series of business model trials.

So far, in this discussion on e-books, the focus has been on traditional library and publisher activity. However, there is another, probably more powerful player in the e-book marketplace – Google. Google’s mission is “to organise the world’s information and make it universally accessible and useful”, and it has moved into the book world in a massive way. Google has gone into partnership with a number of the world’s largest research libraries and is digitising in-print and out-of-print titles in their millions. Unsurprisingly, the company has been the subject of lawsuits issued by the Association of American Publishers and the Authors Guild who claim that the scanning and digitising of library books is a massive infringement of copyright. That aside, publishers of the world beware. The more digital rights management (DRM) they wrap around e-books making them difficult to use, the more they refuse to sell certain books to libraries, and the more they cling to a publishing system and business models that worked in the print environment but do not work in the new digital environment – the quicker users will migrate to Google (if they have not already done so). This of course will have a significant impact upon libraries. Perhaps traditional publishers and libraries have some lessons to learn from Google. On its’ corporate web pages, Google lists 10 things it
has found to be true: the first of these is “Focus on the user and all else will follow”.21

Other Digital Collections

Whilst journals and books comprise the most significant proportion of library collections, there are many other types of publications, archives and multimedia held by libraries. These can include: theses; scientific and government reports; local and national newspapers; manuscripts; sheet music; ephemera collections; maps; musical and sound recordings; and, art works. In some ways, these other materials may be more important to posterity because unlike many books and journals they can sometimes be unique to a particular library, or be in a fragile condition, and lack high quality metadata – making them difficult for scholars to locate and access. Librarians, particularly from major research libraries and national libraries, are very conscious of these facts and much effort has been put into raising the profile of such collections. In the past, libraries have gone into partnership with commercial organisations and produced microfiche/film of the materials – many newspapers around the globe, for example, have been preserved in this way. Furthermore, over the years, printed catalogues of all types of special collections have been diligently compiled by librarians.

But now in the digital age, new possibilities have opened up. Take, for example, theses. In the print era, students had no other alternative if they wished to read a thesis from another university, to first of all locate it using a printed copy of Dissertations Abstracts, then order it via interlibrary loans, and then wait for many weeks, if not months, for it to arrive. Now in the UK all that is changing. Many UK universities already require students to submit their thesis electronically and so a digital copy already exists. The JISC funded EThOS (Electronic Theses Online Service)22 project has taken things a step further. The British Library, working in partnership with a number of universities, is utilising a system for harvesting theses metadata from institutional repositories and making it freely available on the internet. So students can now find out about the existence and location of UK theses, regardless of which institution they belong to, via one simple internet search. In certain instances, where the full text of the thesis is already stored in the IR, users can immediately access the text. Moreover, funding has been made available for retrospective digitisation of older theses and these are gradually being added to the service.

Many individual libraries are also undertaking interesting and ambitious digitisation projects. One successful example has been the Great War Archive23 initiated by the University of Oxford and originally intended to digitise poetry manuscripts relating to the First World War. The poetry manuscripts incorporated into the online archive were located in a diverse range of institutions (e.g. the Imperial War Museum) as well as private estates. However, the project took an interesting turn and sought to digitise relevant items held by members of the public. People were encouraged to submit items in digital format or attend special collection days at local libraries where items could be photographed. All material was uploaded to the project website and in addition a Flickr group (a Web 2.0 social networking site for digital images) was established to allow further dissemination to a wider audience.24 The results were astounding. In a short period of time over 6,500 items were collected – including photographs and diaries – and members of the public contributed unique knowledge and authoritative comments on the items presented.

It is also heartening to see the extent of national commitment to the provision of digital information. In the United States, the Library of Congress is leading a nationwide digitisation effort to scan aging brittle books – some of which are often too fragile to be handled by researchers – and make them freely available. The program is sponsored by a $2 million grant from the Alfred P. Sloan Foundation and it involves over 100 libraries, universities and cultural organisations.25 In Europe another initiative is underway. The European Digital Library – Europeana – is aiming to link users directly to digitised heritage content accessible in a Web 2.0 environment. It hopes to expose national content to new audiences and all levels of learning, and extend the knowledge and understanding of each nation’s heritage.26 In the UK JISC has funded a £22 million digitisation programme which has run in two phases. The first phase saw collections such as the British Library Archival Sound Recordings and British Newspapers 1800-1900 digitised. In the second phase Historic Polar Images, Radio News Archive and the British Cartoon Archive, among others, were made freely available online.27 Many challenges remain to be addressed in terms of sustainability of digital collections and applications of international standards but the message for libraries and publishers is clear. The way forward is to continue the digitisation of our valuable heritage materials but also work towards improving the flow of digital content into wider arenas and allowing users to interact with the digital data.

The Role of Library Consortia

Having examined the role of the library in the development of digital collections, let us now move on to consider the role of library consortia. To misquote the poet John Donne28 ‘no library is an island’... and that is so true of the way in which the power of libraries can be harnessed by working together in consortia. Library consortia are not a new concept, Perry29 claims that they date back at least 130 years in the US – although the importance of their role has significantly increased in the digital environment. For many years, libraries have been working together in a myriad of different areas – for example, document
delivery, printed book and journal acquisition, and shared storage. However, developments in technology have opened up a whole range of other collaborative activities and enabled libraries to band together to acquire enhanced bargaining power with suppliers, provide shared services and develop new services which are only possible in a wired world.

There are many different types of consortia world-wide: national consortia such as FineLib in Finland, JISC Collection in the UK; regional consortia such as OhioLink and Viva in the US; and subject-based consortia which bring together, for example, medical or law libraries. On the whole, this new breed of consortia was originally set up to negotiate for, and licence, electronic content for members. By clubbing together, groups of libraries can do one single negotiation for all members and make significant cost savings. In the UK in 2008, JISC Collections has saved its members £43 million through national negotiations.30 There is also the added advantage of being in a stronger position to negotiate favourable and standard licence terms. Many consortia world-wide also belong to the International Coalition of Library Consortia (ICOLC) which has over 200 consortia members listed on its website. ICOLC has become a powerful force in the land, and publishers do take heed of it. Periodically, ICOLC produces statements on behalf of its membership. The most recent is “Statement on the Global Economic Crisis and Its Impact on Consortial Licenses” in 2009.31 The purpose of this particular statement was to help publishers better understand how the current unique financial crisis is affecting the world-wide information community, and to suggest a range of approaches that would be in the mutual interest of libraries and publishers. It states: “We expect significant and widespread cuts in budget levels for libraries and consortia and these cuts will be prolonged”.

It then articulates two principles for the publishing community:

**Principle 1**: Flexible pricing that offers customers real options, including the ability to reduce expenditure without disproportionate loss of content.

**Principle 2**: It is in the best interest of both publishers and consortia to seek creative solutions that allow licenses to remain as intact as possible, without major content or access reductions.

The statement produced a range of reactions from publishers – some positive, some not so positive. But the important point to stress is that ICOLC had acted on behalf of its member libraries and it had been listened to, and, in some cases acted upon. In the following months a number of publishers issued press release announcing zero percent prices increases for 2010.

In addition to being a powerful voice for library consortia, ICOLC also provides a forum for consortial collaboration on a global basis such as sharing analysis of new business models, management of usage statistics, and sharing best practice on licences. ICOLC members are involved in a range of collaborative activities. In The Netherlands the FOBID Project is working with cultural heritage institutions to get permission to digitise works that form part of the Dutch cultural heritage. Many of these materials are out of print or not commercially available and many are authorless and/or unpublished. The project is working with publishers to find rights holders and getting permission to digitise. In Finland, FineLib is working on another collaborative project to broaden the licensing scope of its consortial acquisitions. It is addressing this issue because of changes in legislation in Finland, the re-structuring of higher education and research institutions, and increasing co-operation at a national and international level. But the topic is of relevance to all consortia – many countries are finding that they are required to add new user group to their licences (e.g. further education, hospitals, and museums) and the Finnish experience has been shared among ICOLC members.32 It seems fairly certain the library consortia will continue to play an important role in supporting academic libraries now and into the future.

**Developing services for the digital library**

It has already been noted earlier in this paper that academic libraries are changing out of all recognition and much of this has been driven by technological developments. The British Library’s report on the Google Generation33 published in 2008 made a huge media splash. The research, conducted by the CIBER research group based at University College London, examined the information behaviours of the researchers of the future and found that much information searching comprised “power browsing” or skimming documents and shallow “horizontal” research. Most users only spent a few minutes looking at a journal article online. However, most interestingly, this behaviour was not limited to the Google generation. Factors specific to the individual, personality and background were more significant than age. So, our professors are just as likely to behaving in this way as our undergraduates.

Other research has also demonstrated the ubiquitous use of the web and the power of Google – and most librarians recognise that Google is the preferred starting point for information searches for the majority of our users, compared to the multiple “clunky” library interfaces offered by academic libraries. The dilemma for librarians is summed up in article by Duddy.34 She says: “As a young librarian and student, it is easy to feel pulled in two directions. I grew up on Google and it is naturally my first port of call when I identify a gap in my knowledge. However, as a librarian-in-waiting, the idea of a ‘quick and dirty’ search in Google is an illicit thrill. It is almost too easy”. Some academics are also concerned about this issue. Indeed, Professor
Tara Brabazon of Brighton University in the UK has banned her students from using Google.\textsuperscript{35} This is an interesting reaction from an academic as it recognises that evidence, also encompassed in the Google Generation report, that whilst we tend to think of our students as being “digital natives,” i.e. brought up on the internet from a young age, this does not mean that they are necessarily information literate. The report highlights that many students and researchers don’t have the idea of different sources and types of information and they have difficulty in evaluation the quality of information and do not have a mental map of the information landscape. This has huge implications for librarians – and demonstrates the importance of information literacy programmes which are becoming ever more essential in today’s world of information overload.

However, there is a strong feeling among librarians that we need to move away from the constraints of huge, expensive Library Management Systems and particularly the online catalogue (OPAC). To our users they appear old-fashioned and complex compared to the ease of Google. It is clear that the library building and the materials inside it no longer define the concept of the library. There is some hope being expressed in the new generation of library systems such as Encore, Primo, Summon and Summa – which are attempting to create a new search and information management system for libraries. But technology moves on apace and libraries do need to react much more quickly. There is a great need to take services into our user’s spaces and make more use of Web 2.0 applications such as social networking (e.g. Facebook, Bebo), mash-ups, blogs and Wikis and RSS feeds. This is happening in some libraries but only a relatively small scale so far. Lorcan Dempsey of OCLC, said at the 2008 JISC Conference: “In the past users built workflow around libraries, now the library must build services around user workflow”.\textsuperscript{36}

Another significant factor in this dynamic environment is the changing nature of our user communities. Our student communities are expanding. Many universities are opening overseas campuses or franchising courses oversees. In the UK and Europe governments are encouraging more interaction between universities and other education sectors (such as museums and schools) and with business and industry. Add to that the cost of university education, the concept of the student as customer and the increasing importance of remote learning, part-time and working students, and we get a picture of growing diversity which we, as librarians, need to address in terms of our services. If we add into this mix the changing nature of our research communities which are becoming far more internationalised and involved in cross-disciplinary research collaboration – and who require access to not only the published literature but also research data for text mining etc then we see an even more tangled web.

The development of services for the digital library has been on the radar of librarians for some time now. Physical space appears high on the agenda as libraries clear large numbers of back runs of journals from their shelves and replace them with digitised back files of journals. Physical library space is being re-shaped with the creation of large areas devoted to IT provision and associated wireless access and plug-in points for laptops and other mobile devices. No longer are libraries sanctuaries of silence. Most libraries are now required to provide space for group learning and group projects. Some universities are creating radically different spaces, for example, the Learning Grid at Warwick University in the UK. “The Learning Grid is a technology-rich, flexible and informal learning environment…. and provides users with the ability to work collaboratively, to be able to engage with discussion, debate and the pragmatic development of study, transferable and professional skills”.\textsuperscript{37}

Our bricks and mortar buildings still represent an important space for our users. They offer a focal point for face-to-face interactions with information professionals, friends and colleagues; space for face-to-face learning and information literacy training; quiet individual study space and areas for group work; as well as advice and support services. But in many academic libraries footfall is declining. Users know that they no longer have to visit the building to gain access to information. So while face-to-face interaction is diminishing, the use of our collections is soaring with 24x7 remote access. The implications for librarians of remote user access, present further challenges. There is a perception by some students, and indeed some faculty, that information on the internet is free. When a journal article which is paid for by the university library is accessed via Google Scholar, for example, how do we ensure that the user knows who has actually made it available? Branding and marketing have become a priority for academic libraries and we must ensure that we continue demonstrate value for money and impact to our funding organisations.

A final comment relates to the role of the librarian of the future. Chris Batt, CEO of the Museums, Libraries and Archives Council, speaking in 2009, says that in order to step up to the mark in the digital age “there needs to be a fundamental shift in how librarians are trained and how they perceive their roles.”\textsuperscript{38} Information professional need to be committed to changing the relationship between information and the people who want it. We will need new skills, new organisational structures and new partnerships. The change is already underway, but clearly more work remains to be done.

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