DIGITAL PUBLISHING AND THE KNOWLEDGE PROCESS

Colin Steele, Emeritus Fellow, Australian National University

Abstract

The digital information environment has ensured that the twenty first century will be a global watershed, like that of the fifteenth century in the Western world, for changes in the creation, distribution and access of knowledge and information.. Changes however are not being reflected in the formal frameworks of scholarly publishing. In the digital information environment, the challenges will be significant ranging from information overload to a multimedia non-linear access to information. Developments in the public and private web reflect the tensions of initiatives and consequent challenges, such as currently being experienced between the increasing aggregation of multinational publishers on the one hand and Open Access Initiatives on the other.

Globally 'publish or perish' pressures have increased on researchers with the need for publication becoming the pathway to success in research assessment exercises, leading to tenure and promotion. The book and the article are no longer intrinsically a means of distributing knowledge. Depending on one's viewpoint of the "Faustian bargain" between authors and publishers, the scholarly publishing environment has been in crisis for a number of years.

While this has been particularly reflected in the debates on serials, many humanities scholars have experienced declining sales of their monographs and a lack of appropriate outlets for their research publications. While many traditional university presses have been closing down or losing money for a number of years, new models are emerging with different philosophies and capitalizing on new electronic settings. User studies have indicated that Print on Demand (POD) is universally seen as an essential requirement of output. in those contexts

Open Archives Initiatives have seen the creation of a number of E-Print repositories which in turn have organically led to the establishment of E-Presses. Future scholarly publishing patterns will be much influenced by author attitudes at the creation level. Major programs of scholarly advocacy in the context of scholarly communication processes will, however, need to be implemented if scholarly authors, their institutions and their research output are to benefit from the new digital frameworks.

Background

Before examining current trends in digital publishing, an historical framework needs to be provided, however briefly, of the nature of knowledge access and the patterns of textual publishing. The contemporary sources of knowledge in contrast to the past are now multiple, multi-dimensional and often non-textual.

First we must reaffirm the well known adage that information is not knowledge and knowledge is not wisdom. In historical terms, access to knowledge was essentially oral in the first millennium. For much of the second it was textual, following the

introduction of the printing press in the fifteenth century in the Western world by Johannes Gutenberg. By the year 1500 there were nearly 1500 print shops. Eight million volumes had been printed comprising 23,000 titles. (Eisenstein, 1979) A major shift in the ability to disseminate knowledge and information had occurred.

We now need to examine the nature of authorship and readership. In the medieval era, scholars were often indifferent to the original creator. Copying and, what might be termed explicit or implicit plagiarism, went hand in hand and it was thus often difficult to ascribe particular passages to particular authors. Textual integrity was however enforced in a generic sense by the state and ecclesiastical authorities which ensured orthodoxy. It is ironic in this context that the authority of the Catholic Church in the sixteenth century was severely challenged by the European Reformation of Martin Luther and John Calvin. The message of dissent was propagated and accelerated through the printed book revolution.

In a less obviously revolutionary context, a variety of supplementary organizational knowledge devices appeared in the sixteenth and seventeenth centuries which now we take for granted, eg indexes, numbered pages, bibliographies although not all of these appeared simultaneously. The printing of Shakespeare's First Folio reveal the various textual variations of print production and the nature of "best text". The ubiquity of web sources will impact on textual veracity in the twenty-first century. The eighteenth century Enlightenment was a period in which the storage and communication of information accelerated with the developments of the encyclopedia, learned societies and scientific and literary salons which led ultimately to the late nineteenth century movement for bibliographic organization and public domain documentation. Metadata standards are directly related to this latter process.

The intellectual strands of today are derived from the historical models of yesterday. Thus, in the Middle Ages every monastery was its own publishing house and a monk with a desk, ink and parchment was almost his own publisher because of the individual nature of creation, although the output was clearly "branded" in an ecclesiastical framework. A sixth century monk exhorted his colleagues "he who does not turn up the earth with his plough ought to write the parchment with his fingers".

Today, every writer on the Net can be his or her own publisher, admittedly with qualifications as to the authoritativeness of the text. The web makes it possible for instant lodging of material but self-publishing on the web at its base level is vanity publishing. There has to be, all agree, a credentialing of knowledge in the digital environment, but whether it needs the costs imposed by the large multinational publishers is a matter of significant contemporary debate. The nature of the robustness of a digital text refers not only to the physical environment of the text in a web setting, but also the need to re-establish varying modes of textual authority and then ultimately what it means to create and disseminate knowledge.

Global knowledge shifts

The World Wide Web is undoubtedly causing major cultural shifts in terms of the access and dissemination of information at numerous levels. New ways of writing and reading may well come about in the multi-dimensional environments, for example

through hypertext links and non linear approaches to knowledge. Explicit or implicit navigational tools will increasingly offer pre-ordained pathways or the opportunity for unlimited serendipity. Issues with the semantic web are leading to new constructs in the underlying text infrastructure with alternative "meaning functions" being produced.

Elizabeth Daley, the Executive Director of the Annenberg Centre for Communication at the University of Southern California, has argued that we require an expanded definition of literacy in the twenty-first century. (Daley, 2003) The multimedia language of the screen constitutes the current vernacular and provides the opportunity to construct complex meanings independent of text. Many students today often have more exposure to multi-media sources such as television, computer games and the Internet rather than the textual reading of books and newspapers. Thus shared experiences in their context are often derived from images and sounds. To extend into the research environment, multimedia and grid computing applications are enhancing inter disciplinary developments and changing the nature of what we might term "publishing".

Berners-Lee has noted that the Semantic Web will transform access to information and foster greater productivity, especially in science and inter-disciplinary research. (Berners-Lee, 2003). The Semantic Web, Berners-Lee argues, will be created when tiny standardized tags – universal resource identifiers – are added to pieces of data on websites and databases. The tags in turn point to machine readable vocabularies and a set of definitions which allow computers to "understand" the data. The Semantic Web developments have much in common with other emerging web technologies and grid computing.

Professor Tony Hey, Head of the UK eScience program, has commented about the current 'data deluge,' which refers to the flood of scientific data from e-Science experiments, simulations, sensors and satellites. (Hey and Trefethen, 2003). For the exploitation of this material by relevant search engines and data mining software tools such data needs to be archived and stored in appropriate formats with relevant metadata. Hey has argued that librarians should be playing a vital role in this e-Science preservation as metadata experts and digital curators. Hey believes they are neglecting this role, which he implies is at their peril in terms of relevance. (Hey, 2004).

Another interpretation of the changing models comes from Joseph Esposito who has contrasted the printed book of history, the "primal book" with the "process book". (Esposito, 2003) The impact of text in a structured networked environment allows for modifications in the act of knowledge creation. Esposito says this has at least five aspects: as a self-referencing text; as portal; as platform; as machine component and as network node. This allows for a flexibility in access and distribution which will call for different societal patterns of knowledge utilisation. The whole act of reading could be deconstructed from linear models and publishing could become segmented – which incidentally at the student level is becoming increasingly the norm as students use search engines to seek instant electronic gratification.

The digital age essentially creates the framework of two contradictory paths of knowledge access. Firstly the ghettoisation, or the compartmentalization of

knowledge, ie like talking to like, can have significant repercussions in terms of reinforcing values or prejudices. Secondly, as Chartier has argued, this can lead to overwhelming global conformities with the destruction of cultural or indigenous diversity, for example the Murdochian amphitheatre of global television and newspaper publishing, with its almost uniform editorial practices. (Chartier, 2001). At a very simplistic level, one can see this in a decline in indigenous languages and the overwhelming importance of the English language in the global village as defined in the public web debate. In the scientific publishing industry English is a *sine qua non* for publishing, particularly in the context of distribution and bibliometric citation patterns.

James and McQueen-Thompson have argued that "the dominant form of knowledge production is becoming more abstract, even if the dominant content of knowledge follows a strangely contradictory path of an abstract obsession with technical application to 'concrete' outcomes" (James and McQueen-Thompson, 2002). To illustrate this they contrast what they call the "traditional modern cataloguing" of nature in Linnaeus' *Systema Naturae* (1735) to "late modern mapping" of the human genome.

They identify five key trends in the contemporary production of scholarly knowledge. The first, that knowledge production has become increasingly rationalized, ie using publishing output in a quantifiable sense to be linked to academic performance measures. This will undoubtedly become even more important, rightly or wrongly, in the future, as methods of research assessment. Secondly, knowledge has become increasingly commodified, for example in the way that university education is often viewed primarily as an economic process, eg the recruitment of overseas and full-fee paying students. Thirdly, knowledge in turn has become increasingly codified and information broken down into information bits. The electronic process of digital file information storage has only accentuated this process. Fourthly, they argue knowledge production has become increasingly mediated by technological frameworks. In the information context one could see this represented not only in "scholar" portals but also flexible delivery of course content. Fifthly, technological mediation relates to the more generalised process of extension and new methods of networked communication in a post-Gutenberg era. The collective framework here of knowledge creation and distribution will lead to new forms of social relationships.

In the digital publishing transition we need to be aware of the exact impacts on knowledge dissemination, for example, new kinds of information transmission such as text messages and PDAs in the bio-medical area, the developments of information repositories, new methods of data mining, and the emergence of different commercial business models. In the wider perspectives of information creation transfer we need to ask much more profound questions about the nature of information access, motivation, knowledge synthesis and outputs.

Scholarly publishing: digital dreams or nightmares?

Science publishing in its printed origins in the seventeenth century had the principal aims of protecting intellectual property and ensuring the communication of scientific knowledge. Various email lists in 2003 and 2004 have seen arguments propounding the pros and cons, as to whether science publishing in its early years was essentially

not-for-profit or commercial publishing. Michael Mabe of Reed Elsevier has argued for the early commercialization of scientific publishing, while Guedon has argued the case that scientific publishing remained significantly for several centuries in the hands of learned societies and institutions with motivations being driven more by research dissemination ideals than profits. (Guedon, 2001).

Commercial multinational publishers, particularly in the second half of the twentieth century, have without doubt significantly changed the commercial landscape of STM publishing with increased numbers of journals, high level price increases on an annual basis and the offering of aggregated packages. This has impacted in general on scholarly communication patterns and in particular on the purchasing of material by libraries from smaller publishers and learned societies and on monograph publishing.

The term "crisis in scholarly publishing" has been with us for so long as to almost nullify the term crisis. Indeed the Librarian of Harvard University stated in 1898 that the rising cost of books and serials could not be sustained into the twentieth century! I recall my first meeting in 1976 of the Council of Australian University Librarians when a motion was proposed that Australian university libraries should cease purchasing journals from Elsevier in order to protect declining library budgets for other priorities. Plus ça change ….

Cox has outlined the rise of Robert Maxwell and the Pergamon publishing empire which was eventually incorporated into what is now Reed Elsevier. (Cox, 2002) In 1951 Elsevier was a purely Dutch company before becoming the largest STM publisher in the world at the end of the twentieth century. Cox notes "where would we have been without the US market?" (Cox, 276) This basically reflects the fact that the profits of the major multinationals depend significantly on sales to libraries of universities and research institutions on the North American continent. Solutions to the "serial crisis" may only result by action in North America where 65% of STM sales apparently occur.

The recent downturn of the US dollar could, however, provide a significant catalyst for change. It is somewhat ironic for those in countries whose currencies had depreciated during the 1990s against the US dollar, for example Australia, Canada, New Zealand and South Africa, to hear the cries of American anguish in 2003. What has been beneficial, however, from the American experience is that their universities, as well as complaining about the "serial crisis", have delineated strategies for scholarly communication change which involve their faculties.

Scholarly communication patterns

University and institutional researchers create a large part of the world's knowledge base. Researchers, unless they are tied into institutional policies of copyright protection, or are prudent with their licensing, tend to give away their intellectual output free of charge to publishers. In many instances their work is refereed by other academics free of charge. Academics become Editors in Chief or sit on Editorial Boards for minimal returns as part of a misguided belief in academic collegiality. Editors in Chief usually orchestrate peer review and provide frameworks for manuscript publication. The academic community currently handles free of charge

for commercial publishers a significant proportion of the intellectual infrastructure of journals..

The UK ALPSP Report, *Authors and Electronic Publishing,* found that fewer than 1% of academics considered direct financial reward to be their primary publishing objective (ALPSP, 2002). What attracts authors is the ability to communicate with their peer group (33%) and career advancement (22%) which comes primarily from publication in a highly regarded and, even more importantly, highly cited journals. This latter point is somewhat worrying as the ISI citation rankings are not infallible and need to be taken into account with other metrics in terms of research assessment.

The "Faustian" perspectives on the publishing cycle are generally meant to relate to the giving away of by scholars of their research output to multinational publishers in return for the branding and accreditation that results from publication. Parks believes "namely that the actors in the academic publishing game have little or no incentive to stop publishing in the current journals". (Parks, 2001) By the time of publication academics moreover they no longer take much responsibility in their knowledge facilitation. Academics have often disseminated the contents of their article by email to their global peer groups or their product is "mined" by other interested academics in the net environment through email alert services and or web searching.

There is thus an almost schizophrenic nature (the Jekyll and Hyde syndrome) to an academic as author of an article or book, who is not overly concerned about his or her intellectual property as long as it is branded and accredited, and the academic as reader, who complains about the high cost of journals for the library and increasingly prefers electronic free access to material. The academic is both the creator and consumer of knowledge but acting dysfunctionally if viewed in theoretical terms of the scholarly communication of knowledge.

In Frank Capra's award winning 1946 movie, "It's a Wonderful Life". Clarence the angel shows George Bailey what life would have been like in the small American town if he had not existed. We all make a difference in some way but, according to Schnoor, publishers and, by implication academics, have taken this idea to a new level by trying to quantify the impact of everybody's research on everyone else, for example, counting citations and publishing impact factors. (Schnoor, 2003)

Research assessment and implications for publishing

The Australian Government funded research project *Changing Research Practices in the Digital Information and Communication Environment* reflected this dysfunctionality in the scholarly communication processes and recommended that a much more holistic understanding of the dynamics of the whole scholarly cycle. (Houghton, 2004).
New opportunities in scholarly publishing have however, to be placed within historical frameworks such as the need for performance measurement and research assessment. We need, however, in terms of research assessment, to establish a more complex set of citation indicators to establish new publishing paradigms. Rowlands has foreshadowed that we need a broader range of indicators. (Rowlands,2003).

At present, however, the increasing dominance of quantitative research assessment procedures and citation analyses plays into the hands of multinational publishers, particularly in the Northern Hemisphere, and particularly citation sources such as those operated by the Institute of Scientific Information (ISI). There is increasing evidence that authors are switching to the aggregated commercial publishing outlets because of their impact factor in such areas as citation listings. (Oppenheim, 2004) Such processes also affect new researchers, multi-disciplinary researchers and those who publish in "smaller" journals.

Authors are thus encouraged by their Departments or Institutions, because of research assessment practices, to seek out publishers who are included in the ISI citation rankings. There is also evidence that journals are changing their practices, eg by theme issues and accelerated manuscript processing, to obtain citation increases. In an ISI website description of leading journals, the editors reported that in order to seek maximum citations they changed editorial practices such as accelerating the editorial review process, moving to theme based issues, reducing the size of the editorial board and increasing the rate of submissions – which also increased the rate of rejections. (Jeste, 2003). It is clear there are major issues at stake and that the process will need to change in the publication arena to match the required outcomes. Publishing has to be seen within the totality of the research process.

Citations in themselves should not be seen as sacrosanct in a policy making context. For example, in the higher education sector we need to consider a whole range of inputs that facilitate knowledge production, outputs and downstream research impact and quality measures. In research assessment exercises, for example in the United Kingdom and New Zealand, there is considerable emphasis on standard metrics, particularly publications within the ISI citation indices. In some instances it has been foreshadowed that publications indexed by ISI provide sufficient metrics for analysis that articles do not need to be read for assessment processes. This is known as "peer review by peer review", ie assessors do not need to review again publications which have already been allegedly peer-reviewed by branded journals.

Peer review issues

There has been concern expressed about the efficiencies of peer review particularly as the demands increase on academics in terms of their time. Peer review done properly takes considerable time and earns the reviewer little "kudos" except for the warm feelings of (misguided?) collegiality. A recent study for the Cochrane Collaboration has provided somewhat damaging evidence about the inefficiencies of the peer review system to improve the quality of published bio-medical research. (Jefferson, 2003) While their conclusions have been vigorously debated, most agree that there are relatively few comprehensive analyses of the peer review process particularly if viewed historically. The Cochrane study was based on twenty-one studies of the peer review system based on a literature survey of 135. The well accepted practice of concealing the identities of peer reviewers appears to have little impact on the quality assessment process. Anecdotal evidence often indicates the exercising of academic rivalries within the peer review process when blind refereeing is the norm. There also seems to be a confusion at times between elements of copy editing and the peer review processes.

Garca-Berthou and Alcaraz, researchers at the University of Girona, apparently found that 38% of a sample of papers in *Nature* and a quarter of those sampled in *The British Medical Journal*, two of the world's most respected scientific journals contained one or more statistical errors. (Garca-Berthou and Alcaraz, 2004) While not all of these "errors" led to wrong conclusions, the authors believe that 4% of the errors may have "caused non significant findings to be misrepresented as being significant". We undoubtedly need more research into editorial peer review. If only a fraction of the money that has gone into scholarly publishing had gone into analyses of the peer review process we might have a clearer picture of the cycles involved and assertions perceived or understood. This is similar to the spending of billions of dollars on the acquisition of knowledge but relatively few studies on its use once the material has been acquired.

Copyright and open source issues

Another area like peer review which is seen as sacrosanct but is often the cause of academic misunderstandings is the issue of copyright. Drahos and Braithwaite in their publication *Information Feudalism* have argued the major importance of intellectual property rights in the modern knowledge economy. They take their title from the European medieval period when feudalism became a system of government and the majority of the working class had to live with the arbitrariness of ultimate power. They argue it was the loss of the Roman Empire's capacity to protect its citizens that provided an important pre-requisite for the feudalisation of its social relationships. (Drahos and Braithwaite, 2002). We now need to protect citizens from knowledge monopolization imposed by ruthless digital rights management systems.

When governments set intellectual property rules they start to interfere in markets in information. This action is only justifiable if the costs of deregulated information markets outweigh the benefits. Drahos and Braithwaite suggest that governments rarely take a cost benefit approach to intellectual property and standards which today are largely the product of the global strategies of a relatively small number of companies and business organisations that have realised the value of intellectual property sooner than anyone else. The situation in scholarly publishing reflects some of the dialogues in the computing industry between Microsoft and open source providers. It is important to keep pressure on commercial providers by judicious consideration and evaluation of open source offerings, while recognising the need also for open standards.

Protection of the ownership of original creation, which is vested in the creator, is a pre-requisite, at least in theory, for knowledge access and distribution. The retention of electronic rights by creators of knowledge in universities is an essential process in terms of scholarly communication in the twenty-first century. In monograph publishing some trends in commercial E-book offerings are leaning towards 'imprisoning text'. This tendency needs to be balanced against the global distribution of ideas by the Academy in the most effective manner, given that financial reward is not a prime motivation for the academic author.

Professor Lawrence Lessig of Stanford University has argued the creation of a "Creative Commons" as a common intellectual space. Lessig has defined four categories for licensing or authorising the use of creative and intellectual work:

- Attribution (author shares work, but requires right of attribution)
- Non-commercial (author shares work but only for non-commercial use)
- Derivative (author allows distribution but disallows derivative work)
- Copyleft (share and share alike).

Lessig's extension of this in 2004 into a Science Commons concept focuses the debate in a particular discipline and across formats. Lessig believes that "education has to become part of this debate. Unless it makes its interest apparent, people will not think about the significant costs to education that increased copyright protection will produce". We need "to make more people more critical consumers of copyright law rather than just obedience consumers". (Lessig, 2004)

The work by project RoMEO in the UK, now assumed by SHERPA, has established a base listing by publisher which documents the ability or not to place material in institutional repositories, This is an essential framework for those wishing to adopt advocacy programs within their universities. The development of the Creative Commons licenses and the issues arising out of Open Access initiatives also constitute major developments in the increasing availability of open networked research.

The academic monograph

Much of the debate on the so-called crisis in scholarly communication has focused on the article, particularly in science, technology and medicine but few have analysed in depth issues relating to the future of the academic monograph. Monograph sales have been declining globally in the social sciences and humanities, while many university presses have either closed down or are in dire financial straits. (Steele, 2003) The monograph is still the prime instrument of research output for many scholars in the humanities and social sciences, although again, like with articles, the end product is often seen more as a prerequisite for tenure and promotion rather than for an effective mechanism for the dissemination of knowledge.

Cronin and La Barre have revealed that despite rhetoric to the contrary by many universities, the publication of a monograph remains the "gold standard for tenure and promotion" in the humanities, despite the fact that many markets for traditional publishing have been drying up. (Cronin and La Barre, 2004) Within the monograph sector, it is clear that the brand name of an institutional press, eg Cambridge University Press or Stanford, is itself enough to be a major factor for promotion and tenure unless reviews are severely critical.

New models based on existing institutional infrastructures are emerging through the Open Access initiatives and institutional repository developments. Two strands, now beginning to intersect, namely the 'decline' in university presses and the 'rise' of university libraries/repository centres could allow the rebirth of the scholarly book in a significant way. Digital publishing technologies, linked to global networking and international interoperability protocols and metadata standards, allow for an appropriately branded institutional output to serve as an indication of a university's quality and also as an effective scholarly communication tool through visibility, status and public value.

Institutional repositories

Institutional repositories have received a very good press but the reality is, at the time of writing, that many repositories are under populated. The issues in populating them are in fact cultural and political rather than technical. (Steele, 2004) It is clear, however, that E-Prints and open access repositories/ activities have not yet entered the consciousness of many researchers and that there are a number of issues that need to be addressed particularly in the context of copyright and peer review and long term utility that have to be overcome.

Often academics, particularly in the sciences, do not see a need to deposit in their institutional repositories as they already deposit in global subject repositories or they are "catered for" by the multinational publishers. Nonetheless their publications, if they have been deposited in subject repositories, can be relatively easily harvested back to their own institution's repository. Younger scholars are often reluctant, at say the post-doctoral level, to deposit articles, but on the other hand, in the social sciences and humanities the digital publication of theses provides a publication opening which is rapidly disappearing in traditional publishing markets.

The need for an institutional repository is something that requires commitment at a number of levels within the institution, eg by the university to provide a coherent administrative structure to support trusted digital repositories and by the individual authors to deposit material. Institutional repositories can also be relatively easily incorporated into existing library and IT structures within universities. Experience has shown that the effort and organisational costs required to address academic concerns regarding publishing and copyright and scholarly communication issues in general have tended to far outstrip the technical requirements.

Scholarly advocacy, preferably on a one to one basis, is the key to scholarly communication change. The movement to deposit material in institutional repositories often needs a one-to-one dialogue or dedicated departmental meetings to explain to academics that depositing in their own repositories will not impact upon their output in traditional journals, apart from the fact that such deposits often increase global access to their publications. The process of populating repositories will no doubt be incremental and modular and will require institutional backing at local and national levels. Lynch sees institutional repositories as the essential infrastructure for scholarship in the digital age. (Lynch, 2003). In his opinion, they allow "universities to apply serious, systematic leverage to accelerate changes taking place in scholarship and scholarly communication".

The Australian National University E-Print repository (http://eprints.anu.edu.au) has been one of the more successful repositories,perhaps by concentrating on "guild literature" and not so much on the STM post printed article. By March 2004 the repository held just over 2,000 "documents" which covers material from pre-prints to refereed articles and from conference papers to books. By May 2004 these e-prints had also been included in the ANU's D-Space Repository, which has a wider role in terms of inclusion of material such as art and archival images. A number of universities are now examining the wider scope of defining, populating and supporting digital repositories. In this latter development publishing is seen in a much wider context ranging from databases of various complexions such as statistics and astronomical sky charts. Scholarship has become data intensive and we are now

looking at appropriate cyber infrastructures for the larger end of science research. This is not the purpose of the current paper, ie to examine and document dataset repositories and technical infrastructures, but we need to recognise that institutional repositories have a wider remit than simply textual frameworks.

E-Press initiatives

Australian university libraries were amongst the first in the world to move to electronic versions of serials and to relinquish print copies. Similarly Australian universities are pioneering access to electronic monographs through new E-Presses (Steele, 2004a). E-Press developments have been accelerated because of the lack of suitable global markets for most Australian material and secondly a decline in the number of local outlets for scholarly monographs. Major scoping and benchmarking activities led to the establishment of the ANU E-Press in early 2003. The ANU E-Press has a focus on monographs, while the University of Monash E-Press, founded at roughly the same time, has an initial focus on serials.

Production implements XML standards and the facility to view via HTML, with PDF as the main print output format. Material is free of charge on a website, (the cost of printing being the responsibility, if required, of the reader at their home site) or is priced to maximise purchase.. It is interesting that the University of California eScholarship monographs are monitored for PDF downloads in terms of consideration for eventual traditional publishing outlets. The technical issues in relation to this are covered in detail by Roy Tennant of the California Digital Library. (Tennant, 2002). The abstracting and indexing of chapters of the monographs ensures content is picked up by appropriate indexing agencies. Some of the existing commercial models such as Oxford Scholarship Online, allow searching across their monograph platforms, and emphasise linkages through abstracts and indices for each individual chapter. This model follows the commercial model of serials from subscription packages to abstracting infrastructure.

As a consequence of the development of such consortial electronic packages, problems might flow for independent scholars who do not belong to an institution. In the past in most libraries, an interested member of the public, could enter a physical library and read a book on the shelf, even if they were not affiliated to that institution, but in the future they will need to be authenticated and at best, given one-day walk-in privileges. Electronic intellectual ghettos may be created in which the bulk of the population is prevented by passwords from accessing information which was previously available ‘free’.

Some presses, like ANU, restrict themselves to the output of their own institution, at least in the first instance. They operate as a ‘public good’ like the library of that particular institution. Many would agree with the Director of the University of Illinois Press who has stated ‘Universities may find that a more honest way to track the cost of publications would be to fund them up front, publish them electronically and publish them free’. (Regier, 2002). The desire to make available the intellectual output, particularly of “guild literature” from the university is just as valid a resource demand within a university as the acquisition of research material by the library for the university. The repositioning of the University library in the digital repository movement will mean changes in the role and function of libraries, for example, in the

areas of collaborative research, publication and digital archiving. As a result Cervone has commented that "on the way to changing scholarly communication, libraries may end up changing themselves". (Cervone, 2004)

Print On Demand (POD)

Several publishers have found that posting a free copy of a book on the Internet encourages sales of the print copies through their normal press outlet. Jason Epstein, the opening keynote speaker at the 2003 Cairns International Conference on the Book, has outlined his vision for the future in commercial print on demand machines which will be ubiquitous in the delivery of print documents in fashion similar to ATM machines today. (Epstein, 2001) The primacy of the printed form will remain as the main access mechanism for research scholars in the social sciences and humanities and area studies. The issues surrounding print on demand facilities (POD) are not new, but the opportunities for printing through institutional network frameworks are now more easily available. Electronic templates can now be filled in at the desktop with either departmental budget codes or personal credit card details. Requests are sent down the line to the University Printery to be printed in off-peak times, often within twenty-four hours. Output can be picked up or delivered from a central university point of sale, eg the campus bookshop or a Kinko's fast copy type operation.

E-Books

Lynch has noted, 'issues of preservation, continuity of access and the integrity of our cultural and intellectual record are particularly critical in the context of E-Book readers and the works designed for them. These have enormous importance both for individual consumers and for society as a whole'. (Lynch, 2001) Lynch makes a distinction between electronic publishing, which is the incremental evolution of print publishing to the digital world and the new models of digital authorship. There is a requirement to differentiate between the two forms of digital knowledge in an historical and prospective context.

The term E-Books is taken here to refer to text which is created electronically and made available in a variety of forms from print on demand to E-Book readers. Primarily it does refer however to the initial reading/ browsing of text on a screen. We are already seeing a variety of E-Book offerings. It is clear that many of the models that were adopted for electronic serial sales are now being replicated, rightly or wrongly, (mostly wrongly in this author's opinion) in the E-Book arena. It would be wrong if the models for the research monograph, via electronic access, were taken from those publishers who are seeking to make significant profits from the textbook, undergraduate or coursepack market.

The E-Book situation is a very confusing one and resembles at the time of writing, the early days of electronic serial offerings in the myriad of forms, access mechanisms and payments. Publishers are either "locking up" the text of their offerings, presumably fearful of the distribution of text and thus a loss of revenue or are making the text available by 24x7 aggregated subscriptions. Apparently one of the boom areas in the e-book offerings of the British firm Taylor and Francis, is the one, two or three day electronic loans take out by students of material for relative small prices.

Given the total cost of textbooks and the use patterns of the "Net generation", this perhaps shouldn't come as a surprise.

Conclusion

It is clear that the digital environment is both a transforming and an uncertain one. The impact of Open Access initiatives could have a profound impact on scholarly knowledge distribution. The process will be both liberating and disruptive, but in the short term will undoubtedly be a hybrid situation for access to and distribution of knowledge. Liberating in that it could release a large amount of scholarly material in a variety of forms globally without the financial barriers imposed by multinational publishers. Disruptive in the sense that major changes will be required in scholarly practice to change the paradigms of scholarly communication.

The new business models for E-Presses are often predicated on "public good" foundations rather than a return to the investor in a shareholder context. Prospective viewpoints of the information society are extremely complex and there are no simple answers. Viewpoints vary from the utopian to the share market driven, to others formed by technological determinism. (Hornby and Clarke, 2003) In this process it needs to be recognized that the consumer is the focal point of the knowledge environment, as it is they who will ultimately determine needs and information search patterns.

Libraries are already working in an institutional context to provide coordinated portals within broader content management frameworks. Certainly they need to "morph" into new roles where they are as much involved with the interactive taxonomy of knowledge as they were initially with the print. Keller, the Librarian of Stanford University has argued that libraries face becoming obsolete, not simply because they are losing the fight to be the "internet for eyeballs", but because they are abandoning their role as collection builders and managers. (Keller, 2003)

"Scholar portals" which search across commercial and free databases and customize for the individual at the desktop, will become more widespread both in commercial and non commercial settings. This is particularly relevant as consumers are time poor and they are being fast forwarded in Google-type directions . Research at the Centre for Information Behaviour at City University London has indicated that some users are gradually being divorced from the traditional frameworks of communication/ knowledge and become almost "promiscuous " in their information seeking behaviour (Nicholas, 2003)

Incentive changes can thus impact on publishing practice. The JISC Open Access survey published in 2004, noted that while almost two thirds of respondents were aware of open access concepts, only 25% were made aware of this by their institutions. Academics indicated that if publishing work in an open access outlet was a condition of a research grant (and presumably also mandatory university policy) they would comply. (Key Perspectives, 2004)

The age of digital information or rather the age of digital information overload is certainly with us. Scholarly publishing symbolises the public/private struggles within the knowledge economy. Willinksy has indicated that the future lies "in convincing

scholars, in their capacity as writers, reviewers, editors and professional association leaders, and that it is now time to move away from the commercialisation of academic publishing that has taken place over the last four of five decades". (Willinsky and Wolfson, 2003)

New models will need to be developed which may not fit late twentieth century business models, ie changing to ones which will utilise and benefit from the public domain infrastructure to support access to scholarly knowledge. As indicated earlier, there are likely to be profound changes in the role and function of many research libraries as user patterns change in terms of accessing information and libraries become more active partners in the scholarly communication process. (Greenstein, 2004) Research and teaching platforms will link appropriate repositories through digital asset management systems, with automated metadata harvesting. Such repositories will be linked to new universal citation processes and open source/open access philosophies.

Access to knowledge in the twenty-first century could be liberated in terms of cost for the vast proportion of material created. As history has shown, the ability to predict knowledge access and transfer patterns is a complicated one. The digital revolution has brought us to another set of information crossroads. While some information highways could lead to scholarly dead ends, hopefully there will be sufficient open access pathways that can be traversed for the benefit of scholars in particular and society in general.

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