

FULL TEXT ELECTRONIC JOURNALS - QUO VADIS?

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Definitions

For roughly two decades experiments have been conducted with electronic forms of journals, such as those on CD-ROM, or on disk, but the emergence of the web in the early 1990s as a user-friendly interface to the Internet led to an explosion of Internet use. Estimates are that over 50 million people currently use the web, and this number is expected to more than double each year (Strauss 1999). It is estimated that there are so many Web addresses that it would take 7 years at one per minute to access them all.

In this environment, electronic journals came into their own and in the late '90s there are now thousands of titles available on the web, which is the electronic publishing medium of preference. This paper will deal with that subset which are of relevance to the academic community. The term will cover both those titles "born digital" and those which are electronic versions of well established print titles.

There are many forms of electronic journals even within this definition: there are packages designed for particular groups, such as undergraduates (e.g., *Expanded Academic ASAP*), or health professionals (such as *Journals@OVID*), and packages produced by commercial firms, such as Elsevier's *ScienceDirect* and Academic Press's *IDEAL*. There are also the packages organised around society publishers such as ACM (Association for Computing Machinery) and IOP (Institute of Physics), and those of university presses, such as *Project Muse* from Johns Hopkins University and HighWire Press, founded by Stanford University to publish high quality online journals in collaboration with scholarly and scientific societies. There are also the titles each on its own web site, such as *Evolutionary Ecology Research* and *Journal of High Energy Physics*.

Benefits of electronic journals

- Access is independent of time and place. You can get to the information quickly from your desktop 24 hours a day, 7 days a week, whether you are on or off campus, and whether the physical library is open or closed. This is particularly important for distributed learning environments.
- More than one person at a time can be using an issue.
- Resources can't be mislaid, vandalised or stolen. And they are never at the binders. And there is no need for tedious reshelving of issues.
- Searching the resource is a lot more flexible than with print, e.g., you can use keywords to search anywhere in the database, or search any range of dates you choose all at once, or an individual journal title or many, and
- Download results into your own software program, or email them to yourself.
- Electronic current awareness capability comes with many resources, such as *Current Contents*.
- Some publishers place issues online well before the issue appears in print. This is particularly desirable for users in the southern hemisphere, so far from the main sources of publication. Some publishers are also making individual articles available as they are ready rather than waiting for a whole issue to be completed.
- Connected with this trend is the increasing option to "pay-per-article" rather than being required to buy an annual subscription. Not only can users browse without leaving the office, but they have access to the contents pages of titles the library does not hold. There are a number of sources for this, including commercial document delivery services such as *UnCover* (<<http://uncweb.carl.org/>>), where one can browse contents pages of journals for free and then order journal articles through use of a credit card.

- Embedded supplemental multimedia resources (e.g., audio, video, datafiles). Some publishers are taking the opportunity of electronic access to increase the data available in their journals, e.g., *Science Online* (<<http://www.sciencemag.org/>>), which loads supplementary material only on its web pages adding value to the original form.
- Intra- and inter-literature linking. An example is the site of Institute of Physics Publishing (<<http://www.iop.org/online.html>>). They provide free online access to titles for which the library holds a current print subscription and use software programs like Hypercite to link articles to cited references and to their eprint archive. Another example is the ejournal, *Psychology* (<<http://www.cogsci.soton.ac.uk/psychology/>>), which has variant versions of articles with readers' comments and links to the author's email, etc. One of six successful proposals to the International Digital Libraries Initiative in 1999 relates to the LANL electronic preprints server. In a 3-way partnership, Southampton University, Cornell University, and the Los Alamos National Laboratory (LANL) will hyperlink each of over 100,000 papers in LANL to every other paper in the archive that it cites (Wiseman 1999).
- One of the major advantages for scientists is the possibility of viewing colour images on screen while they are reading, or of printing in colour.
- The transaction logs that are feasible for electronic access allow librarians to receive monthly reports not only of which *journals* our user communities value but which *articles*, so we can better allocate the serials budget.

Concerns regarding electronic journals

- Pricing electronic access to scholarly information is far from being a well understood practice; no one really understands the economics of electronic journal publishing yet. Some publishers have a single price for combined print and electronic access, some have a single price for print, with a surcharge for electronic. The most common surcharge is around 20%. Pricing models are, however, becoming more flexible.
- There are extra cost issues such as keeping up to date with hardware and software, both institutionally and individually. Internet traffic load and unreliable network access are related concerns. There is a need to ensure people are not disadvantaged, e.g., hardware, software, expertise.
- Full-text is not always the complete text of the print counterpart, e.g., some parts of the print version are deleted from the online version, such as letters to the editor, conference notices.
- Some academics view electronic journals as lacking authority as a scholarly tool and hesitate to publish in them. This will change as more authors are cited in electronic journals.
- Inadequate 'browsability'. They are not as easily browsed as paper journals; for example, you can't flip through the whole issue at once. (On the other hand, browsing of contents pages is easier online.)
- Images are not necessarily in their original context and lower quality image resolution can be a problem in certain fields.
- Licensing restrictions. Electronic resources are licensed rather than purchased, so the library does not necessarily own the item. If we cancel the subscription, we may have nothing to show for our money. Licence conditions can create problems eg. Some products are not available for Inter-library loan, but we can usually successfully negotiate terms.
- Costs of subscriptions can increase depending on the number of simultaneous users. Sometimes we have to make do with fewer than we need because the costs are so high, but this is still better than one only use for print resources.
- Authentication mechanisms are not yet satisfactorily worked out, though this should change over the next 12 months. In Australia CAUL and CAUDIT are working on a national authentication scheme for academic libraries which is looking very promising.
- Need for more seamless linkage between abstracting and indexing services and articles. This is recognised and work is going forward. For example, ISI are working with AIP (American Institute of Physics), Springer Verlag, Academic Press and SIAM (Society for Industrial and Applied Mathematics) to link the full text of their titles to *Web of Science* citations.

- Archiving/permanency. This is a definite problem, but is capable of resolution. Some vendors already allow libraries to retain the issues of electronic titles we have subscribed to. These include *Project MUSE* from Johns Hopkins University Press, which supplies a yearly CD-ROM to archive our subscriptions. (Data must be migrated every few years to ensure that the information remains readable as technologies advance.) We will never know how much information will be lost in this way.
- Some publishers are worried that electronic access will mean their print subscriptions will vanish. Such journals as *Nature*, *Science*, *New Scientist*, and *Economist*, which rely heavily on individual subscriptions as well as institutional, are wary and either refrain from allowing institutional site licences or make them sufficiently expensive that their revenue streams are not injured. This puts them out of reach of many academic libraries.
- Training of staff and users in use of electronic journals – a problem currently underestimated in its importance.
- Variety of software for searching adds to training problems.
- Electronic journals are invisible and concealed from visual inspection or cues so raising awareness of electronic sources is a significant task. Many libraries have introduced staff who have titles such as electronic information coordinator to deal with this.
- Need robust networks and good management of access protocols to provide efficient access at all times.

Financial issues

The scholarly journal has in recent decades become an important medium for scientists throughout the world. But the system of scholarly communication, particularly scientific communication, is under severe stress. Over more than a decade the number of journals published has increased, the number of pages and articles within journals has increased, and the price of journals has increased by roughly 10% per year, while library budgets have, by and large, remained static or even decreased. The cost of some journals, especially in the sciences, has increased over 20% per year. The price increases, notably those of some of the commercial publishers, has for years exceeded that which might be expected on the basis of price increases in general, currency rates and the expansion of the market (UKB 1999).

The resource base to support teaching, learning and research has been declining and there has been significant and sustained loss of purchasing power in the face of double digit inflation for journals and the extremely high costs of commercial electronic resources. Libraries are attempting to balance inadequate fiscal resources against uncontrollable costs. The cost of maintaining research collections has become unsustainable for most institutions. Even the large and supposedly wealthy libraries are having to cancel more and more subscriptions. Rising costs and the expanding expectations of library users are opposed to shrinking budgets (in real terms) and homogenising collections as more and more libraries collect the same core titles - the ones most requested on a daily basis - and relinquish the specialised titles. The need for these journals has not gone away, but they are now beyond the reach of the scholarly community they were designed to serve.

The rising price of serials, particularly in the science, technology and medicine fields has presented challenges to all research libraries, and it appears that humanities titles are following suit. Australian and New Zealand libraries are particularly vulnerable, because we form such a small part of the market and have little bargaining power. According to statistics collated by the US Association of Research Libraries, scholarly journals costs rose 175% between 1986 and 1998 (Association of Research Libraries 1999).

Universities are paying twice over for research results. They subsidise research undertaken by their academic staff, they pay the salaries of scholars who do virtually all the writing, reviewing and editing of the journals and may provide free office space to journals. In some cases the academic pays for an article to be published. University libraries then buy this material back at ever increasing prices (and often with restrictions on their use). Scholars aim to publish their work in the most highly prestigious journals as this is an important part of

the competitive academic business of obtaining grants, promotion and tenure. All too frequently, the most prestigious are the journals which are produced by commercial publishers at high cost. Increasingly, scientific journals are being published by commercial multinationals, to which academics sign over their copyrights. This is by no means the only, or necessarily the most significant, factor in journal price rises, but it remains a factor for consideration, as public funds are supporting private profit. University libraries are increasingly unable to afford the journals to which their institutions are giving their research results. It would indeed be sad if only one library in the country could afford to subscribe to *Brain Research*, for example.

Researchers and academics protest about the high costs of scholarly information which has been generated through public funding. Gaining access to scholarly information at a reasonable price is an ongoing challenge. The prime instrument libraries have to redress the balance is to refuse to accept irresponsible price increases and/or unfavourable conditions of sale and use. If such refusal assumes the form of a common action on the part of academic libraries, this can be a powerful measure in persuading publishers to revise their price policy. Refusal by scientists and their employers to offer their publications to certain publishers and their journals would be an equally powerful tool in reaching this goal (UKB 1999) as would be the concerted effort by faculty members of editorial boards to campaign to reduce costs (University of Wisconsin-Madison University Library Committee 1999).

Attempts to deal with the crisis

One way libraries have handled this problem is by cancelling journals each year to remain within budget constraints. This method of coping with increasing costs and reducing revenue not only reduces the scholarly material readily available to the university community, but exacerbates the problem, as publishers raise prices to make up for revenue lost by cancelled subscriptions. This unleashes a vicious cycle when a journal's subscriptions begin to decrease. Because income has dropped but expenses have not, the publisher increases the subscription price - which can trigger further cancellations and spiral the price even higher.

Librarians have banded together in consortia to negotiate purchases and have expanded resource sharing agreements in efforts to stretch shrinking budgets as far as possible. Not only are there national and regional consortia, but there is also an international consortium: ICOLC, the International Coalition of Library Consortia, which meets regularly with members drawn from national and regional groupings.

A worrying aspect of large international consortia deals is that rather than libraries taking the lead in breaking down monopolies we may become locked into supporting the very monopolies we are trying to deal with.

There has been a number of calls from the library community. For example, the academic libraries in the Netherlands, associated in UKB (the consortium of all university libraries, the Royal Library, and the Library of the Royal Netherlands Academy of Arts and Sciences) have decided to adopt a common policy with regard to publishers who in their view announce unreasonable price increases for scholarly journals (UKB 1999).

The German-speaking Serials Interest Group (GeSIG) is likewise raising issues of mutual concern for discussion among the whole scholarly community (The German-speaking Serials Interest Group 1999).

Suggestions from Cornell University for how the academic community can help address these problems include the possibility of not submitting articles or providing editorial services to journals which have excessive costs, and retaining copyright (The Cornell Journal Price Study 1999). However in my view this is a difficult argument to sustain while promotion is linked to published output.

One of the major tasks that face all library leaders is to seek innovative ways of maintaining or reducing cost while providing relevant broad access to information for our customers. The Johns Hopkins University Press's *Project MUSE*, Elsevier's *PEAK* experiment at the University of Michigan, and the U.K. NESLI initiatives are all examples where collaboration can help to combat price rises and create a more competitive marketplace. These are examples of larger scale partnerships that can employ skilled negotiators, develop principles for licensing agreements and negotiate cost effective access based on large scale volume of subscriptions and transactions. *Project Muse* has been so successful that, beginning in the New Year, the database will expand to include full-text online access to titles from other university presses. To date, nine other presses have committed 64 titles to joining *MUSE*, bringing the total to 110 and more than doubling the size of the collection.

Another example of the scholarly community's attempts to deal with the crisis is SPARC. SPARC (Scholarly Publishing and Academic Resources Coalition, <<http://www.arl.org/sparc/>>), established in 1998, is an international consortial effort to create partnerships with professional societies and other nonprofit publishers to publish high quality low cost online journals. In March this year SPARC inaugurated its Scientific Communities Initiative (SCI) program, which offers a total of \$US500,000 in grants to universities and professional societies for projects that offer a promising strategic alternative to inefficiencies in the current, traditional scholarly communication process. The aim is to create electronic repositories where research can be posted, discussed and seen by scientists worldwide, without waiting for journal publication. The best-known model of such a resource - the Los Alamos e-print archives - is a "macro" example of what SPARC hopes to fund, says Jim Neal, dean of university libraries at Johns Hopkins University and a member of the SPARC steering committee (Wadman 1999). SPARC's Leading Edge Program likewise encourages and supports projects that represent a paradigm shift in technology use and meet the needs for flexibility and timeliness of the scholarly and research oriented STM fields. SPARC has joined the American Institute of Biological Sciences (AIBS, a federation of over 50 scholarly societies in biology), the Big 12 Plus Libraries Consortium (US), the University of Kansas, and Allen Press in a venture they have entitled BioOne. Their intention is to provide online access within a single, searchable, hypertext linked database to the dozens of research journals in the biological, ecological and environmental sciences published by the AIBS member societies. BioOne is scheduled for beta release in early 2001, and ultimately, the database could include nearly 200 science titles, including those from non-AIBS members.

At this point I would like to discuss some of the initiatives of the Council of Australian University Libraries which have helped to address price increases. CAUL is a single collaborative body comprising the 38 university libraries in Australia, regardless of whether the library is a research library, a technical library or a regional library. It was established by the university librarians, to obtain greater leverage from cooperation and collaboration. CAUL now has sufficient standing to have membership in its own right on particular government information policy committees such as the Higher Education Information Policy Forum and has representation on the Australian Vice-Chancellors Committee's Sub-Committee on Information Policy. CAUL works with the New Zealand Librarians and with CSIRO (The Commonwealth Scientific Industrial Research Organisation).

CAUL has a formal committee, the CAUL Electronic Information Resources Committee (CEIRC) for the purchase of electronic products. There is a very active closed discussion list of its members to discuss who will buy what, under what terms, and what formula will be used for sharing costs. The CAUL office which has one full time executive officer and a part-time assistant, handles all the negotiations. There is no central pool of funds to purchase licences and each CAUL member subscribes to what they need and can afford. (Sood)

It is important that all Australian university libraries work together. The market in Australia is small and will fragment if more groups were to attempt to negotiate in it. We try to fight differential pricing and Australia has a common rate for interlending supply which is accepted practice for most libraries. We are working towards common national reciprocal borrowing protocols. These already exist in each state of Australia. Currently work is being undertaken

by CAUL to develop a standard national site licence. This initiative has been developed by the New South Wales group of CAUL but is expected to be adopted nationally. Subgroups of CAUL meet in each state, but all initiatives are available to all members. The idea of a single cooperative last copy store for low use print items, which have been relegated from library collections, is currently being considered. It is hard to get funds for building projects in Australia and more material needs to be stored each year but we need to ensure that this material can be delivered anywhere in Australia within a reasonable time. This is the kind of initiative that can attract government funding because it has the potential to save millions of dollars for individual building and storage facilities. Before returning to the international scene I would like to touch on two further CAUL initiatives.

The digital environment has opened up new opportunities for cooperative collection development. The JANUS project for example is looking for a sustainable business model for collaborative national collection development. The model is being tested with discipline based groups of academic staff, looking at national infrastructure costs and testing whether centres for discipline based material can be established where resources and services come together both for broadening support and availability of information to a defined subject base. The areas currently being tested in this model are Philosophy, Agriculture and Chemistry. There are some excellent examples of local cooperative purchase agreements. One example is where the three largest universities in Melbourne have agreed to put contents of pages of journals on the Web which are not held by the other library. Academic staff order articles on the Web and the selected article is sent to their office by courier or fax. The idea is to share titles between the libraries to give broader coverage. No money changes hands and because the titles were once held in all libraries they are likely to be in reasonably high demand. This is seen as an interim solution to a problem but it allows researchers to remain internationally competitive by increasing the quantity, breadth and depth of the most current literature available to the research community. This project is called READS (Regional Electronic Access and Delivery of Serials). All of these initiatives are to increase buying power, negotiate broader access and distribute anywhere anytime.

To return to the international scene one exciting new initiative has been the proposal to develop an electronic preprint server for the life sciences, to complement the successful Physics eprint archive at Los Alamos National Laboratory (LANL, <<http://xxx.lanl.gov>>). Biologists, unlike physicists, have no strong tradition of distributing preprints. But this could be changing - and quickly. LANL has been the inspiration for a highly controversial proposal for a National Institutes of Health (NIH)-operated, freely accessible, web-based database for research reports in the life sciences, including plant and agricultural research as well as biology and medicine (<<http://www.nih.gov/welcome/director/pubmedcentral/pmcprint.htm>>). The name PubMed Central is based on the repository's natural integration with the existing freely available PubMed abstracting and indexing tool. PubMed itself will extend its coverage of the life sciences and continue its linkage to external online journals. The repository is expected to go live on the Internet in January 2000. PubMed Central will archive, organise and distribute peer-reviewed reports from journals, as well as reports that have been screened but not formally peer-reviewed. It will also be possible to enrich the database with large data sets, including detailed photographs and movies, and the results of failed experiments, improvements in experimental methods, or unsuccessful clinical trials, often usefully annotated with commentaries posted by others in the same field. The proposal has generated a vast amount of comment, some of it supportive and some of it very critical, particularly from biomedical scientists and from journal editors and publishers. The Association of Research Libraries (ARL) and SPARC have endorsed the proposal and the Asia-Pacific International Molecular Biology Network (IMBN), which includes Australia, has endorsed it in principle. The proposal has certainly focussed the biomedical community's mind on the potential of electronic networks for the dissemination of information. It will be interesting to see what effect PubMed Central will have upon scholarly communication in the life sciences.

Announced in July this year by Los Alamos National Laboratory, the Universal Preprint Service Project (UPS, <<http://vole.lanl.gov/ups/ups.htm>>) is a similar venture. The aim is to

build on PubMed Central, the LANL archives and other discipline-based archives to create a method of unifying these sites to create a freely accessible source of scholarly information.

As libraries move further into the Internet environment it is predicted that academic library budgets for materials will shift to a 30:30:40 ratio for access, serials and books. A major portion of the information resources budget will comprise delivery of information and access charges. This portion will include charges of commercial document delivery services, the hardware and software to support the access to information tools, and the equipment within the library needed by students and other users for access. The library needs to meet the needs of scholars and students in both the networked and the traditional environments. The quality of the traditional services needs to be maintained while the new digital services are developed - within the existing budget.

Hybrid library

Most libraries are hybrid, i.e. they deal with a variety of media, and have done so for decades, if not centuries. What is new is that *digital* library elements, such as multimedia presentations, quantitative data, electronic preprints and web sites augment the more traditional elements.

In academia, the physical library will remain important as a locus for research and learning, but will house both traditional resources, and workstations to access digital resources. Many resources of academic libraries are still print based and academic libraries are under strong pressure to continue print based collections, services and systems, under increasing pricing and budget pressures. The challenge is to provide a scholar-centred information universe: to integrate digital resources with the traditional functions of libraries so that access to information in a variety of formats and from a number of local and remote sources is as seamless as possible. The library is becoming a conduit for content as well as a repository for physical items, i.e., a logical gateway to its own services and those of other libraries and information providers.

Successful hybrid library implementation will involve forging strategic alliances among academics, library staff, computing services and educational development staff so that the library becomes a central element of teaching, learning and research activity (Pinfield 1998).

One of the UK's eLib programmes is on hybrid libraries. The projects within this program, such as *BUILDER* (Birmingham University Integrated Library Development and Electronic Resource <<http://builder.bham.ac.uk/main.asp>>, and *HyLife* <<http://www.unn.ac.uk/~xcu2/hylife/>>, focus on creating interfaces specific to particular needs and integrating various resources within one searching mechanism.

Gateways

There is a wealth of information on the web to support teaching, learning and research, and a large number of search engines available. Nevertheless, many academics are deterred from using the web as it is often slow and cumbersome identifying and accessing relevant and authoritative information from the vast amount of unstructured information of variable quality, authority and stability. They don't want to waste time combing the Internet for possibly relevant material. Academics have made comments about the Internet such as, "It's like an enormous dustbin with a few diamonds in it". Libraries can offer useful filters as they understand both the customers' needs and the materials. The role of the library is to select, acquire, organise and make available the "diamonds" to serve up to our students, many of whom are ill equipped to assess the quality of the information resources they retrieve. Libraries can in this way become "knowledge centres", adding value by packaging reliable information for different customer groups. It is increasingly a concern that students are relying on unmediated access to the Web as an easy option, the quality of which can be highly valuable.

The need to systematically organise information resources to enable searchers to find relevant information quickly and with precision has led to the development of what have been termed “gateways”. The gateway concept is nothing new: it serves as the point of access to other research resources, a very traditional role. What is new is the emphasis on using electronic technology and how that changes so much of what the library does and how it does it.

A subject gateway is a single focal point on the web for providing access to information of all kinds for that discipline, including print as well as electronic resources. It provides access to Internet information such as electronic publications, databases, research projects world-wide, data sources, software, online teaching modules, conferences, teaching departments, research institutes, etc. It may also provide links to library catalogues and document delivery services, both commercial and library collection based. An important feature of the gateway is that each site identified is evaluated, described, classified and indexed. The provision of evaluated information resources assists the library’s customers in the selection and assessment of the value of a diverse range of information resources applicable to their learning and research needs. An efficient and effective means of locating and accessing up to date and relevant information is a key enabling infrastructure for any researcher.

The University of Melbourne Library is involved in three Australian gateway projects: MetaChem for Chemistry, <<http://dioxide.ch.adfa.edu.au/>>), AVEL (Australasian Virtual Engineering Library, <<http://avel.library.uq.edu.au/>>) and Agrigate (for Agricultural Sciences, <<http://www.agrigate.edu.au/>>).

Conclusion

The web will continue to be a vital source of information into the foreseeable future, and librarians and information providers will find better ways of managing the overload. Electronic journals will thrive in certain fields, and will unbundle as fast access to relevant articles becomes a priority. Costs will reduce over time and pay per use will stabilise. Libraries will partner to provide library users with broader access to information at reasonable costs. Portals and gateways will allow for greater customisation and web based services will provide just in time access to a broad range of researchers. The proportion of electronic information available and accessible from academic libraries will increase, and reliance on print information will be less compelling, as scholars become more comfortable with the technology and their information literacy skills are developed. While the future is difficult to predict, it is important that we actively engage in thinking about it so that we can plan for tomorrow knowing what the technology can provide.

Learners will want both on campus and off campus experiences. They will want information which is easily accessible, well organised, and tailored to their particular needs. They will want to be able to explore more broadly from their original point of access and they will want to be able to interactively manipulate information to create knowledge.

Leading edge technologies will provide new opportunities to extend our horizons and deliver relevant, accurate, information readily to scholars in a form that is most useful to their needs without their needing to know who is providing the service and how it was obtained.

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URLS

Gateways

Builder

<http://builder.bham.ac.uk/main.asp>

HyLife

<http://www.unn.ac.uk/~xcv2/hylife/>

Agrigate

<http://www.agrigate.edu.au>

Metachem

<http://dioxide.ch.adfa.edu.au/>

AVEL

<http://avel/library.uq.edu.au/>

READS

<http://www.lib.monash.edu.au/reads>

SPARC

<http://www.arl.org/sparc>

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