New relationships in Scholarly Publishing

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Introduction

In this paper I survey some of the implications of the introduction of several electronic journals as part of the FIGIT[1] Electronic Libraries Programme (abbreviated as eLib). How do these ventures fit into the aims of the Programme? What are the significant issues to be resolved in electronic journals? What will electronic journals mean for the relationships between authors, publishers, libraries and readers?

Electronic Libraries Programme

Programme aims

The aims of a complex Programme like eLib are difficult to summarise. However, the Follett report on which the eLib Programme is based sought to address various of the crises affecting British academic libraries. Since these crises (or at least, their symptoms) are exposed through financial problems, perhaps one simplification is to express the aims broadly in financial terms. Three possible aims might be:

- to reduce costs (to deliver the same amount of information for less)
- to contain costs (to deliver more information for the same cost which will help to cope with the continually increasing pressure to publish)
- to provide better service and functionality, perhaps at slightly higher cost

In practice, history shows us that for IT programmes, whatever their promises, the latter is the most likely positive outcome: a richer environment, with more facilities as well as higher volumes, although perhaps at a higher cost.

Programme status

As this paper is written, perhaps half of the projects to be funded have been agreed. The Programme has to dates been divided into 7 Programme Areas, which are:

1. Document Delivery (4 projects funded)
2. Electronic Journals (6 projects funded)

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[1] FIGIT: Follett Implementation Group for Information Technology

3. On Demand Publishing (4 projects funded)
4. Digitisation (none funded yet)
5. Training and Awareness (2 projects funded)
6. Access to Networked Resources (3 projects funded)
7. Supporting Studies (some studies but no projects funded yet)

More projects are expected to be approved at FIGIT meetings in the summer and autumn of 1995. The rest of this paper will however concentrate exclusively on the second Programme Area: Electronic Journals.

Electronic Journals

Although the relevant eLib programme area is called Electronic Journals, this is not really the issue. The real issue here is scholarly communication in the electronic age. Derek Law quotes Bruce Royan as suggesting that the term *electronic journal* will be seen in the future to be as inappropriate a name as *horse-less carriage* is for a modern motor car. The name helps us consider the new in terms of the familiar, but perhaps hinders us from thinking freely of all the requirements and benefits of the new medium. Nevertheless, there is value in continuing to explore the implications of the electronic journal paradigm.

Scholarly communication needs to satisfy authors and readers with the rapid distribution of quality information at the lowest cost (although often the non-devolved library budget has shielded academics from caring about the cost: the highest prestige journal possible has been the target, whatever the cost). Authors expect no direct financial reward, but want as many as possible to read their work. Copyright laws and the publishing industry have worked for authors in the past, providing the economic base for publishing, but this Faustian bargain, as Stevan Harnad calls it, works directly against them in many ways. The breakdown of copyright law in its ability to deal fairly with the electronic world, and the new opportunities which the electronic world offers, means that new paradigms must be explored. Harnad's Subversive Proposal[2] offers one such, and the eLib programme will explore several others (see below *Charging*).

Some publishers, librarians and readers have expressed concern at the prospect that electronic journals will entirely supplant paper journals within a relatively short time. The "theory of non-displacement" suggests this will not happen. The phonograph did not displace live concerts, nor the radio displace the phonograph, nor television displace the radio, and so on. In most cases, new media provide new capabilities but lose others, so in most cases, both will survive, although there may be a weeding-out process in the older media. Excellence in any medium will continue to be rewarded.

Scholarly publishing is an international activity. Even titles published in the UK in some fields can expect about 10% of subscriptions to be UK-based, and about 10% of articles to be contributed from the UK. There is little a UK programme alone can do to make many changes to publishing as a whole. However, in concert with others overseas, there is a general trend clearly discernible to move towards electronic publishing, and the experiences of the UK eLib programme can provide useful input in the international arena.

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[2] Harnad S (1994) Publicly Retrievable FTP Archives for Esoteric Science and Scholarship: a Subversive Proposal. Presented at: Network Services Conference, London, 28-30 November 1994; and related papers.

To re-state a point made earlier, the electronic journal is more than the name implies. It is the start of a new system of scholarly communication, with both advantages and disadvantages compared with the old system. Both will survive.

Parallel or New?

Electronic Journals could be electronic versions of paper journals (parallel journals), or all new, electronic only journals, in the latter case taking advantage of the new facilities and capabilities of the medium.

Parallel journals being paper plus electronic must cost at least as much to produce as paper journals, plus some extra costs to make them available electronically; in other words, they must always be more expensive for the publisher. The distribution costs of the electronic versions should be less (if not zero as is sometimes assumed). Since the publishing costs have to be recovered if the journal is not to fail, it is unlikely that savings will accrue to the library sector as a whole from the introduction of parallel electronic journals unless the market were to expand and the publishers' extra costs be made up from extra subscriptions. The libraries taking up electronic subscriptions could perhaps benefit from the lower marginal costs. Some publishers claim that the savings involved are as little as 30%, although many dispute these claims, expecting reductions of 70-90%.

Paper journals have generally evolved to designs which are very well suited to their paper format. Parallel journals have to be based on the same information, presented on screen, but given the very different demands of the computer screen in terms of size, resolution, formats, fonts etc, at first glance parallel journals do not seem promising. Additional work is needed to adapt the design to the new format, and this may need to be done for each article. Again, the cost rises, not falls.

Nevertheless, the eLib Programme will fund a number of parallel journals, at least partly to exploit the established nature of the printed titles, and to provide readers with the possibility of an easier transition to using the new medium. Many readers find it difficult to cope with reading large amounts of complex material on their computer screens. We can imagine some of these readers using the electronic version of the journal for its searching abilities and for browsing, to find articles of interest. These could perhaps be scanned quickly, and then those sufficiently relevant perhaps studied in more detail in the paper format. Print will continue to be the preferred medium for study for many. Some people still find the portability of the bound paper journal, the ability to read it on the bus or even in the bath to be a compelling argument in favour of its continuance.

Appearance

Many publishers see their "house style" as an important part of their added value: the recognisable appearance that is both a part of their marketing and also a part of the differentiation which is valuable to readers in making their own assessments of the value of any particular article. Unfortunately, it is harder to provide this sort of control of appearance with most current electronic journal technology.

The world wide web looks the current best bet for providing electronic journals, with its abilities to combine text, hypertext links, graphics and other multi-media facilities. However, current web browsers provide all control of appearance to the user, not the publisher. The publisher can select certain attributes for parts of the text, and these will normally be

displayed in a consistent way for any one browser (but differing for different browsers) given the standard defaults, but these can all be changed by the user, and of course the beauty of the web is the wide variety of browsers which can be used.

A publisher who wishes full control of appearance is currently likely to have to use one of the page description systems, such as Adobe's Page Description Format (PDF), supported by Acrobat. However, these tend to mimic the printed page and are awkward from the screen; they are also essentially flat presentation systems, generally with little hypertext capabilities. The *Open Journal Framework* project from Southampton aims to combine PDF/Acrobat files with more powerful hypertext links provided with Microcosm[3], and may provide a solution. Microcosm allows potentially any word or phrase in the journal to be the start of a link, added as an external, semi-automatic activity, rather than having to code links into the article as in HTML. These links can be used on the web like other links.

Another possible solution for publishers on the medium term horizon is the expected introduction of style sheets with HyperText Markup Language (HTML) 3[4]. Currently being defined, these should allow publishers to specify how they wish certain HTML elements to be rendered on the screen.

It is interesting that the web interface, however popular and sensible it is for electronic journals, does not yet provide many of the display capabilities one would wish to see. For example, simultaneous viewing of different parts of the article in different screen windows (e.g. parts of the text, perhaps several figures and tables, and some of the references). These drawbacks appear to be more due to browser design than any intrinsic problems with the web, so it may be that browsers more suitable for viewing electronic journals will appear later.

Currently if a publisher demands to control appearance, it is likely that either PDF or a proprietary interface such as Guidon[5] from OCLC will be used.

Capability

Electronic journals provide enormous new capabilities, beyond those of paper journals. The most obvious are the almost endless possibilities from hypertext links, especially when extended across the network as with the world wide web. So, for example, references can be included not just as citations but as hypertext links to the actual cited articles, allowing them to be checked up on the spot.

Hypertext links are also generally used to provide access to figures and tables, and even to mathematical formulae, but this is generally incidental rather than added functionality.

Hypertext links also allow direct access to the raw data on which an article is based. The eLib project for an archaeological journal (led by Dr Mike Heyworth of the British Council for Archaeology) plans to use this capability, which will allow readers to perform their own analyses and decide whether they support the conclusions of the author.

Links to raw data are likely to be done through invocation of some interpreting program; for example, a particular spreadsheet program if the data is stored in spreadsheet form. If the data

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[3] Microcosm: A Technical Overview, Dept of Electronics & Computer Science, University of Southampton

[4] <URL ftp://ietf.cnri.reston.va.us/internet-drafts/draft-ietf-html-specv3-00.txt>

[5] [Now defunct]

is interpreted as sound or moving video, this then provides the multimedia capabilities of the web, which can further extend the capabilities of the electronic journal, allowing the inclusion of sound and moving video images. Both of these could have enormous impact, for example in medical articles, where a sound related to a particular heart or breathing problem might be included, or the video of a trembling limb, conveying information almost impossible to put across in words. The eLib project for a sociological journal (led by Prof. Nigel Gilbert of the University of Surrey) will use multimedia capabilities.

Hypertext links also allow much more powerful feedback, with articles linked to up to the minute lists of email messages, or mailing list archives. Harnad calls such moderated discussions following from articles *Scholarly Skywriting*[6].Much remains to be explored in this area.

Mutability

Once an article is in print, there is generally little that can be done if an error is discovered. While new editions of books provide opportunities for their authors to update their earlier work, this seldom happens with articles. However, with an electronic journal it becomes quite easy to make corrections when errors have been discovered.

However, this mutability of electronic journal articles provides new problems. At what point does it stop being reasonable to allow corrections? Minor alterations which correct trivial errors would seem to be highly desirable, however much better it might have been to catch these errors in the refereeing and proofing processes. More major errors pointed out by readers might have profound implications for the authors' conclusions; could the article be extensively revised as a result? How then should we distinguish the different versions of articles?

There are yet more disturbing problems. If an author can easily change the text, so perhaps can others. It would have serious implications for the moral rights of authors if their articles were changed by others, perhaps subtly in ways which might escape notice for many years.

Authors themselves might be tempted to change their articles fraudulently, perhaps to assist in a later claim for scientific priority in some discovery.

To overcome these problems, and to determine which version of an article is authoritative, we may need to draw on the experiences of the software industry, where version control and records of changes have been used for years. It may also be highly desirable to introduce some systems of electronic signatures, which will allow us to determine who wrote the article, and preferably when it was last changed. Non-revisable formats such as PDF may be boosted in popularity as they tend to protect against these problems.

Preservation

Articles which can change with time provide just one of the many problems which confront those who wish to ensure that articles in electronic journals can still be read in 200 years or so. The problem of very long term preservation of data in electronic form is one whose dimensions we are just beginning to guess at. Archives of data already exist in forms where

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[6] See Harnad, S. (1990) Scholarly Skywriting and the Prepublication Continuum of Scientific Inquiry. Psychological Science 1: 342 - 343 (reprinted in Current Contents 45: 9-13, November 11 1991).
http://cogprints.org/1581/00/harnad90.skywriting.html

access is a problem, because both the hardware required to read the medium and the software needed to interpret the data are not available, even if the data has survived on the medium (and some magnetic media, like magnetic tape, have quite short lives). Even if an ancient copy of Microsoft Word for Windows v6.0 is available, for example, will there be the supporting hardware and systems software to run it? In some more complex systems, for example Encarta, the data and the access software are inextricably linked.

Given *any* single data set of sufficiently high value, provided the bits have not been lost from the medium, it is likely that our successors will be able to read and decode it, with the resources of electronic laboratories and some good cryptologists. However, such expensive interventions will not be adequate for the vast quantities of electronic journal articles which will appear in the next many years.

The chances of preservation are increased where standard rather than proprietary formats are used. The most likely technique is to roll the data forward as new media and new formats become the norm. Standard techniques of preserving the originals should also be used, including standard backup procedures, although these are generally not aimed at long term preservation, rather at preservation in case of short term accident. Rolling forward to new software systems in particular is likely to lose information each time it occurs.

Preservation became easier with the invention of print because many copies of books were made and widely distributed, and the chances of them all being lost were much reduced. In some models of electronic journals, wide distribution will not be made; the journal will be accessed from one server. This then introduces a single point of vulnerability, an electronic Alexandria Library.

Preservation will be an expensive business, and it is not clear who will bear the cost. If it is libraries rather than publishers, then new skills will be required and new co-operation learned, to ensure that someone somewhere is acting to preserve all that deserves preservation. Co-ordinated activity with archivists is also likely to be essential. Archivists are used to many of the questions to be faced even if in another context; these questions include assessing the value of what might be preserved, deciding whether only the latest or the authoritative version should be preserved, or all available versions, in order to study the development of ideas.

Extending Legal Deposit to electronic documents may provide some of the motivation to ensure that preservation is addressed.

Quality

The mechanisms provided to ensure quality in the traditional scholarly publishing process are based on the refereeing process for individual articles, with editorial boards defining markets and quality targets for journals. The refereeing process is slow and of arguable effectiveness, but so far it is all we have.

One of the major challenges to the traditional journal is the rise of the electronic pre-print archive, such as that run by Paul Ginsparg at Los Alamos for High Energy Physics. Such archives make only limited judgements of quality, and do not aim to replace the journal; indeed in most cases the articles posted will be withdrawn when accepted for publication by a journal. No doubt the early exposure provides feedback to the authors which can be used to improve the quality of the articles, and this feedback might be more useful as being broader based than that from traditional referees.

It might be possible to devise systems where the referee is brought into such a pre-print system, and acts as moderator to filter outrageous or destructive criticism, but provides a publicly accessible trail of the comments and counter-comments on the paper. The author might be encouraged to take these into account in modifying the paper, until at some point the moderator feels there is sufficient (not necessarily complete) support for *publishing* in the associated electronic journal (the electronic source of accepted quality papers as opposed to those still in preparation).

Other areas of information technology have produced other quality ideas, including the notion of Seals Of Approval (SOAPs), associated with the Internet encyclopaedia (Interpedia)[7] project (possibly defunct). SOAPs are also briefly discussed in the Internet Draft *URC Scenarios and Requirements*[8].

Whatever system is used, we certainly need some selectivity and quality mechanisms, and these could and should be better than current systems.

Delivery

Electronic journals raise new issues of the delivery mechanisms. There is a choice to be made on whether the journal is delivered to the subscriber (using the term loosely), or whether the subscriber fetches the issue or individual articles from some repository, local or remote.

The obvious methods for delivering to the reader include electronic mail and USENET NEWS. Email has been used in some early electronic journals, particularly those where straight ASCII text is used. It is harder to use email where richer formats are involved, although MIME and even X.400 provide the necessary capabilities. MIME is beginning to be deployed widely enough to be genuinely useful, but the X.400 price barrier and lack of penetration in the academic market rule it from serious contention. NEWS has been relatively little used, and as it involves delivering to most USENET-connected computer systems in the world, it is probably not an appropriate delivery route for scholarly journals, which tend to have a narrowly defined interest range. The eLib programme will fund at least one electronic journal, in History, with email-based delivery, but this is no longer the usual method.

If the subscriber is to fetch the material, then we must still choose the mechanism, e.g. FTP, world wide web or proprietary. The web looks the best bet at the moment. The subscriber may benefit from a table of contents sent by email, to provide the stimulus to seek out new material. This might be enriched as a current awareness type of service, where notification is sent for articles which fit a submitted interest profile. A journal might also choose to provide mechanisms for searching with article delivery.

In the paper journal, the economics of delivery have dictated the need to collect several articles together into an issue. This too is an idea which needs to be examined; it seems likely that we can publish individual articles when they are ready, which will reduce lead times (but of course also reduce some of the other useful benefits of issues, including the associated editorials, news and letter pages, and advertisements, although most of these could be provided in substitute form, with some thought). Will readers prefer individual articles as they are ready, or an issue collecting articles together. Lorcan Dempsey suggests the psychological argument for issues is strong; there is an expectation when it is due, and

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[7] Rhine J, Interpedia Home Page <URL http://www.hmc.edu/interpedia/index.html>

[8] <URL ftp://ietf.cnri.reston.va.us/internet-drafts/draft-ietf-uri-urc-req-01.txt>

satisfaction from reading a range of articles at the same time, rather than a steady, distracting stream of articles that will be harder to relate to one another.

Charging

Many users of the Internet, academics in particular, argue strongly for free access to information on a free network. In reality, little in this world is truly free; someone has to pay for the costs of the network, for the computer systems which hold the information, and for the work involved in creating it to an adequate quality.

Leaving charging strategies to one side for a moment, Harnad and others have argued strongly for the subsidised creation of electronic journals, with distribution and access being free. They point out that the original material is paid for by the academic sector, that editorial boards are paid for by the academic sector, and that quality control through refereeing is paid for by the academic sector. It is not too much to imagine that type-setting and distribution should also be subsidised at source by the academic sector, rather than paid for by libraries as part of a profit enterprise.

Although there is some experience of journals (e.g. Harnad's Psycoloquy) which use the fully subsidised model, it seems from the FIGIT submissions that there are still substantial costs associated with electronic journals, particularly as more of the newer capabilities are utilised. It is difficult to see hard pressed academic departments being willing to take on these sort of costs. One possible alternative might be page charges, but history shows that academics are quite resistant to publishing in journals with page charges compared to journals without, even if the latter will cost their libraries much more (an entirely rational position to take, if not at all altruistic!).

In general, FIGIT is committed to providing information free at the point of use. However, since the eLib programme funding is for a limited period, FIGIT has also required ongoing projects to have a business plan which indicates how they will continue to survive once funding ceases. In most cases, this translates into some form of charging strategy.

Broadly speaking, there are two possible charging models for electronic journals: subscription/licensing and use/transaction charges. In most cases, the former model is preferred by both libraries and publishers, as financial commitments and revenue are predictable, but for many institutions which have a relatively limited interest in some particular area, use-based transaction charges may be more appropriate. This does tend to merge into the realms of document delivery. The model of *subscribers* who also pay per use is unattractive, although if the subscription cost is low enough and helps to cover the cost of maintaining address lists, credit information and billing, it might be acceptable.

Use-based charges without subscriptions enter into the realms of electronic commerce, requiring a commercial transaction over the network. The complex areas of electronic cash or credit systems, which are currently flawed, are being developed rapidly to provide support for this.

With paper journals, the financial device of the subscription provides a well-understood set of benefits, including ownership of the physical journal, and a set of rights under copyright law. We are able to read the journal as many times as we wish, and to make copies free of royalty payments under certain conditions.

For electronic journals, it seems likely the subscription will be replaced by a licence. This is primarily because copyright law would not allow us even to *read* the journal, given that reading requires a copying process (onto disk, into memory and onto the screen).

Licenses will need to be available for individuals as well as for institutions. If possible national licences (on the CHEST/BIDS models) may be negotiated.

A major concern is that the terms of licences will be varied, limited only by the imagination of the lawyers employed by the publishers. Librarians and users then have to deal with a wide variety of terms and conditions, potentially a nightmare. It is highly desirable for there to be a common licence, and the eLib Programme's journals will work towards this (and we will also work with other publishers who also see this as a problem).

Licences will probably define some way to restrict access to the institution which has signed the licence. This may cause problems to some libraries, required to provide services to whoever walks through the door. The restrictions will also provide problems in terms of infrastructure. Institutions will have to provide acceptable mechanisms for identifying who is entitled to use licensed electronic journals: mechanisms for authenticating the reader and the privileges that reader has. Licences will also place demands on us to hold the licensed items secure.

Access

In ancient times libraries were closed access: readers had to request access to material they were interested in, and if the librarian felt it was appropriate, access would be provided. In the UK, this has moved strongly towards open access in most academic libraries, except in the area of precious, sensitive or very high demand items; the latter are often placed in reserve or restricted short loan collections.

Electronic journals and some of the document delivery proposals bring the possibility of opening up access even further. One of the great benefits of an electronic document is that (copyright permitting) it can be simultaneously accessed by many readers. Access is available not just within the library (remembering the implications of this for library infrastructure; if the workstations are not available, then we may have a situation where the journal *cannot be read in the library*), but also in student laboratories and academic offices. With good enough communications, it should also be available from off campus; from home or halls of residence. Here is one area where the eLib programme can make a difference to academic libraries.

New relationships

The traditional paper-based journal is time-honoured and fairly well understood. It is worth noting that it is *not fully* understood; even important characteristics such as how many people read the articles, or how many articles are *never* read at all other than by their authors, are not known (and both of these could be easily discovered with electronic journals).

The roles involved in the traditional journal include author, referees, publisher, type-setter, printer, agents, libraries and readers. Many people of course appear in several of these roles. Academics often seem surprisingly unclear on the value added by the publisher in this process, and indeed it varies widely with different publishers.

Although all of these roles could appear in the electronic journals, to realise the significant savings we should be looking for, I would like to re-characterise these roles as including the author/type-setter, quality control, database administrator/networking, access provision, preservation, and entrepreneur. It is important to recognise the key role the latter can play; I have deliberately used a different name than *publisher*, as the move towards electronic journals may reduce the cost of entry to the point at which an entirely new set of players become involved. Some of these may be academics or scholarly societies. It is important for the academic sector at least that these re-structured relationships do result in both improved capabilities and reduced costs: yes, we desperately need more for less.

Where is the library in this list? Not performing a conventional role of stacking issues on shelves, binding them into volumes, and so on. The Library will have a role more of the agent, the enabler, dealing on behalf of the University with the entrepreneurs, deciding on whether local hosting or remote access are appropriate, and arranging with computing colleagues the environment for access, which will make a huge difference to the effectiveness of the "collection". These thoughts seem to argue in favour of converged services, library and IT more closely linked. This is increasingly popular and will continue to be so.

If all the plans of the eLib programme came to fruition, there might be 60 or so parallel or new electronic journals introduced. Although others are being introduced elsewhere, this is still a small number compared with the available market of scholarly journals, scarcely 1% of the number of journals taken by many academic libraries. Libraries will continue to have a role for many years to come.

Summary

The electronic journal is a new and different beast, not just a paper journal presented electronically. FIGIT's eLib programme is aiming to fund trials of new ideas, to give them some large scale practice. Major cost savings seem unlikely in the short term, although greater use of informal e-prints, not yet explored in eLib, may help reduce costs, for material which is not quality tested. The major way we might reduce costs would be to *reduce* the pressure to publish, through further changes to Research Assessment criteria. Reduced costs are possible indirectly, however, given suitable license terms and conditions.

The electronic journals will provide new challenges for authors, for publishers, libraries and readers. The effectiveness of electronic journals will be reduced until a large enough corpus is available, which is one reason why parallel publishing is desirable.

The effect of these new technologies will be radical changes in the relationships between all of those involved.

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