

# Recent Trends in Scholarly Electronic Publishing

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## Introduction

In the spring of 1991, I edited and published what I believe to be the first directory ever produced of electronic scholarly journals and newsletters. That slim volume has grown in bulk through annual editions since. I saw it through five editions in my time with the Association of Research Libraries, and my successors there now wrestle with the results. Let me share some numbers with you.

1. The *ARL Directory*: In 1991, there were 110 items in the first edition; 133 in 1992, then 240 in 1993, 443 in 1994, 675 in 1995 and 1689 in 1996. The 1997 edition is due out shortly with no final count in hand.
2. Another benchmark may be taken from the archives of a list that I moderate. The list is *NewJour* and it distributes notices of new on-line journals, magazines, and newsletters to over 4000 subscribers worldwide. It began in August 1993. By January 1995, it had distributed notices of 2000 new titles. In little more than a year, the archive had grown to 200 titles (in May of 1996). Today, in May 1997, 3800 titles are recorded, a number that is low for two reasons: (1) it omits some huge new projects either on-line or about to appear: for example, the 1100 titles of Elsevier journals of which we will hear later in this program and a couple hundred from Springer Verlag; (2) our list is limited in its production capacity to the services of a few volunteers and one diligent student worker at the University of Pennsylvania. We have a sense we are not fully keeping up, but we cannot quantify the shortfall.
3. From a study done by McEldowney at the University of Virginia, we can add some detail with these charts:
  - <http://poe.acc.virginia.edu/~pm9k/libsci/tabejn.gif>
  - <http://poe.acc.virginia.edu/~pm9k/libsci/tablist.gif>
  - <http://poe.acc.virginia.edu/~pm9k/libsci/cejnlr.gif>

In reviewing these figures, several things stand out:

- A. If you build it, they will come. In this case, the "it" was not the network but the browser. The explosion of e-publishing interest came after Mosaic and then especially Netscape created vehicles for delivery of attractive, formatted, high-featured text to readers across a wide variety of platforms.
- B. Nonetheless, the network infrastructure remains important. The boom has also coincided with the permeation of academic life by networked PCs. The leadership shown by countries in which there is a substantial penetration of the audience of readers and writers by readily accessible Internet access is not surprising -- hence, of course, it was not surprising at all to receive this invitation to Finland, which is by some standards the most wired country in the world.
- C. A related factor is the boom in non-academic use of the Internet. The last 1-2 years particularly have seen a huge invasion of the Internet by the general public of readers and the commercial marketplace

of information providers. The *ARL Directory* began at a moment when the group of people producing on-line resources was almost exclusively limited to academics. In discussing the phenomena of Internet life in 1992, Willard McCarty, founder of the influential and pioneering listserv discussion called *HUMANIST* and now Senior Lecturer in humanities computing at Kings College, London, predicted that the academic dominance of the Internet would have about five more years to run. Now, five years later, he seems to have been right. Henceforward, standards for applications and infrastructure will increasingly be driven by the growing base of non-academic users and providers. Whatever we predict or strive for will have to take that change into account.

4. It is also undeniable that a very large percentage of what has come onto the net in the last year or so particularly admirably fits the definition of "shovelware": existing print products whose owners have seen the potential of the Internet and have sought to create an electronic replica of a print resource. Many new e-journals have the look and feel of an awkwardly-presented paper journal. (Think of pages posted as images or as PDF files which require the reader to scroll back and forth left and right just to see a whole line of text, then repeatedly up and down to see text, footnotes, text, footnotes, etc. Examples of such inelegance are too easy to find.) Only a relatively small number of electronic publishers are beginning to take real advantage of the possibilities for new ways of presenting information through the Internet.

In this paper, I will review the current state of play regarding the subset of e-journal publishing that we call multimedia and discuss some of the possibilities. In popular use, "multimedia" sometimes seems to mean no more than a mix of text, sound, and images, preferably moving images. For purposes of the scholarly journal and its future, such a definition is too narrow. It makes more sense to look at the broad variety of things that can potentially be done with networked electronic resources that cannot be done on any flat printed page.

## Adding Value to Journals -- Multi-media Plus

Let us list briefly some of those things:

1. An electronic resource should be searchable in ways that no paper product can be.
2. It may allow the "searching" to be not only a query for keywords, but also an intelligent search for combinations of information in a way that use the on-line resource to produce "new information" as if from a database.
3. It will be possible to include "live data" in a publication; i.e., databases or mathematical equations that can be manipulated with appropriate software so as to apply the published work more directly to real problems, to transform equations or try them out with different values, and to ask different questions of a database than the original researcher thought possible or relevant;
4. An electronic resource can include hypertext links to other resources; links will be made up *and down* the chain of scholarly communication, and the downstream links are a real breakthrough. (Traditional publishing has upstream links: we call them footnotes, which reference earlier work on the subject. Downstream links have the benefit of pointing to work done subsequent to the article one happens to be reading, work that continues the discussion in one form or another.)
5. An expanded form of up and down linking is the practice known as "open peer commentary," where the editors solicit peer review of a traditional sort but publish it simultaneously with the article under review, and then continue to add similar commentary over time. In this model, what was a static "article" begins to resemble a living seminar.
6. The content of what is published may then be further enriched by the narrowest set of "multimedia" possibilities, including but not limited to:

- A. Graphics and photographs, monochrome and polychrome, with various possibilities for size and quantity. Even where a limited set of images may have been published in a print journal in the past, the electronic publication may typically include many more images, including detailed enlargements far beyond what is economically feasible in print;
  - B. Motion video is improving in quality almost as we speak (but, n.b., full motion video is bandwidth-intensive and thus VCR-quality playback is still a rarity);
  - C. A particular subset of "video" will be one form or another of virtual reality presentation, but this largely awaits more bandwidth and a broad standard of presentation that is accessible to end users easily and across platforms.
  - D. Audio presentation. For the moment I will comment that audio "text" appears to be the most successful multimedia component of Internet resources and only in composing this talk did I realize why. Audio appeals to a different sense than any video representation, and so one does not readily experience the frustrating loop of waiting impatiently for an audio file to load -- one can be reading text or looking at images both while the audio file loads and as it is playing. Even the slight delays of, say, RealAudio, could be noticeable but in practice they are rarely noticed or felt to be annoying.
  - E. Combinations of the above. At the moment, the best still, motion, and audio representations on the network are slightly out of synch for most users. We do not yet see high-quality production values that synchronize sound and image, but it is surely reasonable to think it is only a matter of time, probably a very short time, before we do.
7. Electronic resources are regularly convertible to other media, and in particular many users find it important to be able to print and take away as much of what is online as they can. This desire conflicts directly with the desire to do things that are technology-dependent (like full motion video), but it will clearly be an editorial choice for the future to know what parts of what is published to make printable and how -- real experience in the library user community shows that it is easy to provide the ability to print but difficult to provide it in a truly functional way.
8. Finally, there are features of electronic publishing that take advantage of the infrastructure that surrounds a given publication.
- A. First, e-versions of print publications can and should appear before the print version does; this is not always the case, and one should acknowledge the economic motives at play for publishers who wish to continue to encourage use of the print version.
  - B. Second, decoupling of distribution and peer review is possible, with various opinions as to its desirability -- are unedited preprints worth reading? The answer will vary from field to field.
  - C. Third, alerting services can be of great value. The user's relationship to the world of information can be enhanced if the interested reader is alerted of its existence through a profile that matches his interests.

This list is not exhaustive; at the same time, it true to say that no electronic journal in existence today takes advantage of more than a few of these features. Let us review briefly the ways in which current e-journal publications *do* take advantage of multiple media and then consider some of the factors that restrain development in this direction. Technology permitting, we will look at some sites and conclude by summarizing the issues in building libraries of electronic journals.

## Looking at Sites

Note that some venturesome e-publications exist. However, multimedia and value-added features are sparse. Current journals have hardly begun to implement the novel features that online delivery theoretically makes possible.

1. ***NewJour***. (Yale University, University of Pennsylvania, and UC San Diego).

Let us begin with the ***NewJour*** archive site and inquire how many titles have multimedia in the title or full-text description (approximately 115).

<http://gort.ucsd.edu/newjour>

2. ***Australian environmental site*** from a governmental authority: lets reader invent new information. Via a WWW form, the user of the environmental site may input names of one or more genus and species of plants and these will be plotted on a map that shows their location and incidence in the country. Useful interactivity.

<http://kaos.erin.gov.au/database/TAX990R.html>

3. ***Global Health Network***. One site both talks about what can be done and exemplifies it:

<http://www.pit.edu/HOME/GHNet/publications/assassin/index.html>

The presentation for the home page (Global Health Network) also appears in English, Japanese, Portuguese, and Spanish. On the web site is an article that discusses the future of journals (bravely predicting that most print scholarly journals will disappear by 2001), and does so by incorporating a "hypertext comic book" and ample opportunity for feedback from readers to authors. The feedback asks the viewer to look at the presentations (lay version, scientific version, or editor version). With each there is ample opportunity to provide comments concerning presentation style or content.

4. SOUND: The journal ***PostModern Culture*** (one of the first peer-reviewed electronic journals ever, having started in fall 1991) routinely employs multimedia.

<http://jefferson.village.Virginia.EDU:80/pmc/contents.all.html>

Hypermedia articles co-exist alongside more traditional text-only material. As an example, McNeilly (1995) contains links to a number of sound files which are used to illustrate particular points in the article. For example:

"Ugly Beauty: John Zorn and the Politics of Postmodern Music," by Kevin McNeilly

[http://muse.jhu.edu/journals/postmodern\\_culture/v005/5.2mcneilly.html](http://muse.jhu.edu/journals/postmodern_culture/v005/5.2mcneilly.html)

(click on Yamtsuka Eye or Ennio Morricone, etc.)

5. SOUND: For a much more traditional and well-structured use of sound, it is no surprise that one would go to a musicological journal, the ***Journal of Seventeenth-Century Music***, a publication of the Society for Seventeenth Century Music. See especially the article by Sally A. Stanford, "A Comparison of French and Italian Singing in the Seventeenth Century." Go to audio examples.

<http://www.sscm.harvard.edu/jscm/v1no1.html>

6. ***The Journal of Artificial Intelligence Research*** similarly uses a breakthrough contemporary field to exploit the possibilities by offering multiple file formats and an appendix to one article in QuickTime video:

<http://www.cs.washington.edu/research/jair/volume1/schlimmer93a-html/schlimmer93-0.html>

7. The American Geophysical Union is to be praised for pressing forward with what promises to be a true multimedia journal, *Earth Interactions*, but in its early days it has remarkably little innovative product to show. The recently launched electronic journal represents a major electronic publishing initiative for the Society. From the Web description: "Planning for this journal started in 1992, at which time two important decisions were made: 1) the Society should seek to undertake a bold initiative in electronic publishing that would go beyond the limitations of the printed page, and as a result, this publication should be independent of the established print journals; and 2) this effort should be carried out as a collaborative effort among similar societies to spread the risk and increase the likelihood of success. The electronic journal that grew out of this extensive planning effort is a collaborative effort in which the American Geophysical Union (AGU) and the Association of American Geographers (AAG) are joining with the American Meteorological Society (AMS) as copublishers. The Oceanography Society (TOS) and the Ecological Society of America (ESA) have cooperated in the planning of this journal, as well, and it is hoped that their input will continue as the journal becomes an established publication."

<http://earth.agu.org:80/ei/>

(Panorama dependence)

8. *Experimental Biology Online*. (Springer Verlag)

<http://science.springer.de/ebo/ebo-main.htm>

This item includes supplementary multimedia files, QuickTime movies, and the eerie and transfixing sound of a scorpion's heart beating. (That highlights a truth about all media of communication: it isn't simply the discovery that one can do something with a new medium, but it is the choice of what to do.)

==> Others that we will not take the time to do more than show home pages for (also mention elib's CLIC & Elsevier's Gene-COMBIS)

9. *Journal of Image Guided Surgery*. (Wiley)

<http://www.igs.wiley.com>, (here I omit because in order to see it you have to go through a complicated registration process)

10. *Science*. (AAAS)

<http://www.aaas.org/science/Grubmuller.htm>

(video, but requires the particular helper application called Sparkle in order to see them: an example of the standards problem)

11. In early 1996, Steven Hitchcock of the University of Southampton (UK) conducted a study that tabulated the features of some of the most prominent electronic journals. (Scroll through this if time permits)

Table 2: <http://journals.ecs.soton.ac.uk/survey/table2.html>

## Why are the Numbers Small?

1. **Paper publication is a proven technology.** Writers and readers alike have a lot of investment in the skills that let them manipulate it efficiently, as well as a relatively established comfort level with its limitations.
2. **Paper publication is prestigious.** As thrilling as we may find the sight of our own home page, nothing that cyberspace offers quite compares to seeing one's name in print over a distinguished publisher's logo.

3. **Paper publication is universal.** No library in the world is incapable of receiving and using the most advanced paper publications. Still, too many libraries and end users are unable to use electronic technologies at all, and many who do use them have severe limits on their capacity.

Thus, a difficult decision has to be made by publishers and editors of prospective new journals. A publication based on the print journal model cannot have real interactivity without moving away from paper process and content. This is a dilemma.

4. **Technologies are imperfect.**

- A. SGML offers a powerful language for tagging text to use it to full advantage in an electronic medium. But there is only one commonly available SGML-viewer on the net, Panorama, which is still not available for all platforms; and given the complexities of SGML, even when one uses it, one experiences considerable delays in loading and using text.
- B. Java offers the possibility of "smartening" up a web site and letting it do things on the user's machine that greatly enhance the power of the resource and the user. But Java has been slow taking off partly because people push it to do too much. If one looks, for example, at OVID's Java solution to delivering large databases for librarians, one finds that the client the user must download at the beginning of every session is so large that the downloading time is equal to at least the time it would take to search and browse the first half dozen articles one might be interested in.
- C. The imperfection of technologies puts pressure on standards. It is clearly in all parties' best interest to have standards widely agreed to and used. Yet every publisher wants to do the most advanced work possible, and so there is constant pressure to choose a technology just one or two steps ahead of existing standards. Most of us know the irritation of clicking on a link only to be told that one doesn't have the right plugin; then to be offered the chance of browsing Netscape's plugin site to find the software one needs, download it, figure out how to use it, and then look at the link one first clicked on two or ten minutes ago. Every time we seem to converge on a standard (such as HTML), divergence follows immediately as some influential source pushes the envelope further.
- D. Bandwidth. Desktop machines and the bandwidth that links them to the network are *extremely* variable (and disturbingly variable according to the economic and social power of the individual user). Bill Gates believes bandwidth will soon be essentially limitless and if he is right, it will be a great day, but for now, there is truth to the comic strip depiction of the inventor of the World-Wide Web as a fiend who thought up a plot to get millions of people to sit staring at computers waiting for something to happen.

5. Many e-journals are small independent startups originating with individual scholars or institutions. They may be, thus, financially unstable or weak in attracting or developing the wider network of support services, staff, and production necessary to provide a high-quality level of scholarly publishing in the online environment.
6. Finally, the social, economic and legal structures of traditional publishing are, with good reason, powerful ones. Issues of intellectual property law, methods of cost recovery, and permission to use are all difficult ones, only gradually being thrashed out. For example, what are the legal and ethical constraints on "citation" in networked publication? When may one link to another's site, when may one incorporate an image or a video file from another's site onto a page of one's own creation? There seem to be some real limits to the law here, and a current lawsuit involving Microsoft and Ticketmaster bids fair to complicate the situation before it clarifies it. (Fuller discussion of licenses, cost recovery models. Go to LIBLICENSE site, <http://www.library.yale.edu/~okerson/alo.html>)

That said, no list of obstacles is complete without the observation that in spite of them, much is in fact being done.

# In Summary

First, the possibilities are endless.

Second, in the real world of today, those possibilities are being exploited far less aggressively than a mere count of numbers of e-journals might make one expect.

Third, the reasons for this gap between possibility and actuality are divided between technical and what we might call socio-cultural. Technical obstacles have to do with specific standards and possibilities. Social obstacles involve the climate within which scholarly and scientific communication function -- e.g., the resistance of authors to publish in a medium whose prestige has not yet caught up to their own ambitions for prestige.

And so I end with the suggestion that we must both advocate and admire the ejournal as it is and as it will become. It is possible, as many of the things we have seen today demonstrate, to accomplish a great deal today and much more in the near future. At the same time, we need to maintain a perspective that lets us see just how remarkable a change we are part of. It lets us enjoy numerous benefits even when they are imperfect, and gives us inspiration to move forward with resolve.

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