◆ *Acceptance Address: Reinventing Ourselves*

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The decades of the 1980s and 1990s were exciting for scientific editing and publishing.

The rate of evolution was breathtaking. Peer-review systems began shifting from sending paper copies of manuscripts through the mail to sending electronic copies of manuscripts through fiberoptic cables. Recordkeeping during peer review and during the many steps of publishing evolved from lists on paper and entries on file cards and on manuscript folders to computerized databases. Journals evolved from print to electronic formats. Libraries evolved, at least in part, from buildings full of books to Internet Protocol (IP) addresses and tables full of computer workstations. And the organization sponsoring this meeting evolved from CBE to CSE.

Editors and publishers had to reinvent themselves to deal with all these changes or find a different line of work.

Throughout this period of change scientists went on doing experiments, writing up their results, and sending them off to prestigious journals with the hope of acceptance in their hearts.

Despite all the recent changes in scientific publishing, it turns out that peer reviewers and scientific editors and copyeditors and managing editors are still needed. The community of scientists still needs smart, experienced, well-informed reviewers who can filter out the not-so-good papers and suggest improvements in the not-so-bad ones. Scientists still need smart, experienced people to polish the accepted papers, improving their clarity, making sure all the details are right, and laying them out in an attractive format. Scientists still need smart, organized people who can fit all the pieces together into journals that come out in a timely manner and who make the system work smoothly.

Nevertheless, lots of people are beginning to wonder whether printed journals will survive when the evolution from print to online journals has run its course.

If you are a printer or publisher, or possibly even if you are an editor, it's a little frightening to contemplate the future proposed by Stevan Harnad and others. I've been following Harnad's argument in the VPIEJ-L e-mail discussion list. Harnad says that access to the literature is blocked by what he calls "Subscription/Site-License/Pay-Per-View tolls". He argues that the only sensible future for academic research papers is to free them from these tolls.[1]

This concept of freeing the literature began to seem like something more than a pipe dream after we saw the success of the Los Alamos Eprint Archive (*xxx.lanl.gov*) started by Paul Ginsparg. Physicists quickly recognized the value of this free archive for physics papers, which could now be made freely available to anyone before, during, and after peer review. With the establishment of PubMed Central, the free online public archive of the peer-reviewed and "filtered" literature in biology and medicine, and the various other archives now being created, the obvious end point of this development is a group of free archives for all papers in all fields, with free online citation links to all other papers.

If the articles in journals become freely available in archives, will anyone buy the journals? And if journals have little or no subscription income, who will pay the costs of peer review and the salaries of copyeditors and managing editors and computer technicians?

Earlier in this conference, Judith Axler Turner suggested some ways to keep money coming in. Harnad points out that huge amounts of money will be freed up when libraries no longer have to buy and house print journals. Some fraction of this money can be redirected to support the costs of peer review and editing.

So one of the possible paths of this evolution might lead to a virtual future for journals. When that happens,

- Editors will work wherever they live, communicating with other editors and authors by e-mail or through an intranet.
- Authors will submit their manuscripts for peer review electronically, via Web forms (and most authors will simultaneously send their manuscripts to a free archive, where they will be available to everyone as electronic preprints).
- During peer review manuscripts will reside on an intranet, where they can be viewed by editors and reviewers.
- After papers are accepted copyeditors will work with authors via e-mail and post proofs on an intranet.
- Edited, accepted papers will then replace the preprint versions in the online archive. They will carry the journal's stamp of quality control and certification in the form of a URL that includes the journal's name with the volume, issue, and article numbers (and page numbers as well, if a print version of the journal is published).
- The journal might be published only as a table of contents on the Internet, with links to the included articles that reside in databases of the journal and of an archive.
- And if there is a market for a printed version of the journal, it will be produced from the same files that produced the articles online.

If that scheme sounds familiar, it is because such journals already exist. *Conservation Ecology*, the journal that I've been working with for the last 5 years, is one such journal, and the model is being

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replicated widely.

When I first got involved with this new, online-only journal, the penetration of the Web was so limited outside the United States that we seriously considered using e-mail and Gopher, as well as the Web, to distribute the journal. But technology overtook us. By the time we had created software for online submission of manuscripts and automation of the clerical and recordkeeping steps of peer review and publication, it was clear that the future of electronic publishing was on the Web.

The Web has advanced around the world and has even penetrated developing countries much faster than any of us expected. Our journal was particularly interested in bringing scientists from developing nations into discussions about natural resources and public policy. Although we publish exclusively on the Internet, we have subscribers in 94 countries; nearly 20% of them are in the Southern Hemisphere, and many are in developing countries. It turns out that it's a lot cheaper to buy computers and set up Internet connections than it is to build libraries and stock them with a wide range of current journals year after year.

The burden of journal subscription costs was vividly demonstrated to me when I visited the library of the most prestigious biological research institution in Morocco a few years ago. I was initially impressed by the wide range of journals represented on the shelves of that library, but when I began examining the run of volumes of some major journals, I discovered surprising gaps. There were volumes from 1951, 1952, 1953, 1954, then a gap, then volumes from 1968, 1969, 1970, and so on, then another gap. There were no volumes from 1955 through 1967 and nothing from 1980 through 1985. What happened? Well, whenever the administration needed to build a new classroom or research building and couldn't find the money, it canceled subscriptions to dozens of expensive journals for a few years.

The evolution from print to electronic journals continues. How do we keep reinventing ourselves to deal with this evolution? CSE can help us.

CSE has been tremendously helpful to me in keeping abreast of changing technologies in the world of scientific editing and publishing. When I was appointed editor-in-chief and managing editor of two mid-sized journals in 1978, I had no previous editorial experience. Until I joined CBE in 1981, I had to invent my own methods of running the journals. After I joined and started attending the annual meetings, I was delighted to find other people who worried about the same problems I had been trying to solve. I was amazed at how similar the problems were in large medical and chemical and biological journals and in the small journals of obscure fields of biology. In fact, I became so convinced of the universality of both the problems and their solutions that I couldn't understand why the organization's name implied that it was for biologists only.

It was at CBE meetings that I first learned about how SGML was the key to the future of publishing and about the rich environment of XML.

It was also at CBE meetings that I established lots of useful acquaintances and wonderful long-term friendships that enriched my life as an editor. Incidentally, they also enriched my diet. During my travels in North America and abroad, I have delighted in breaking bread with people I met through CBE, especially in Canada, England, Hungary, and China.

In Chengdu, the capital of Sichuan province in China, my wife, Sylvia, and I were treated to a culinary delight by Professor Zhongrong Chen (known to friends in CBE as Basil Chen), whom I had met at a recent annual meeting of CBE. Before the start of the meal we were introduced to a live, green turtle. Professor Chen explained that the turtle is considered to be an excellent tonic for the health.

Later, when we were seated at the dinner table, the turtle made a reappearance. The flesh and internal parts of the turtle were heaped on a small platter, topped by the shell, which had been cut in half. As honored guests, Sylvia and I were invited to eat the shell . . . which we, of course, proceeded to do, to the delight of all assembled around the table. It was a decidedly enriching cultural experience.

I thank CBE/CSE for regularly reeducating us all and for giving us the opportunity to share our experience with each other. I also sincerely thank CSE for honoring me with this award, unaccompanied by a turtle shell.

Note

1. The online discussion of this argument is laid out in the *American Scientist*'s continuing September-Forum: *amsci-forum.amsci.org/archives/september-forum.html.*