by Elizabeth L Fleischer

Perspectives on Open Access

Introducing Unbound: A New Department in Science Editor

The term *open access* causes heartburn in some, elation and hope in others, and a look of bewilderment in the rest. *Science Editor* is therefore starting a new column, Unbound, to appear as needed, to expand on the issue of open access. What does it mean? What can it accomplish? How can it be achieved? What are the pitfalls? What are the implications for editors? The concept has swept into the medical sciences, and now waves are reverberating into the physical sciences and social sciences. There is much to explore.

What Is Open Access?

The simplest explanation of open access is making the scientific literature available online for everyone to read and use at no charge. It is also meant to be free of most copyright and licensing restrictions. At first, free and easily accessible scientific literature sounds impossible to sustain. But as with any vision, it is important to imagine it fully. And only then should one step back and fit it into practical shoes.

Underlying Values

There are many rationales for open access. By examining the values behind open access, it may be possible to find creative solutions that balance needs of the recipients and needs of the creators of a work (as well as finding appropriate niches for the facilitators in between). The underlying principles include these:

- Results of research paid for by the government should be available to the public.
- Lack of timely access to scientific developments (particularly in medicine) risks health, lives, and well-being.
- Science is best served by ensuring that ideas and information are exchanged as freely and rapidly as possible.
- High-quality information should not be limited to access by the "haves". (There is plenty of bad information for all.)

A Higher Vision

An assumption in the vision is that users of the information will be able to sort through and understand what they read and know how to apply it. "Free" and available seem to be the goals, but there is a loftier goal, which was nicely presented by Shirley M Malcolm, of the American Association for the Advancement of Science, at the 2004 CSE annual meeting in her presentation "Sharing Science with the Public" [Sci Ed 2004;27(5):149]. Free information is of no value if it is not understandable. The higher goal is to *communicate* scientific information, without barriers, to those who need or want it. That is where CSE can play a particularly important role. Free information can be life-threatening if it is wrong or misinterpreted. Clear writing and editing can make information more valuable. Free information is also of no value if the right information cannot be found quickly and does not get into the hands of the people who need it. In a growing mountain of information, an important thrust is toward the development of standards, search tools, and other mechanisms to find information efficiently.

Putting on Practical Shoes

It seems that before the higher vision is realized, practical shoes need to be put on the initial concept. What are the mechanisms of opening up access? In one, new journals are formed on the basis of the new financial model, such as the Public Library of Science (PLoS). Free tools to support such endeavors are also appearing. At the 2004 CSE annual meeting, John Willinsky described the Public Knowledge Project (*www.pkp.ubc.ca*), a federally funded research initiative at the University of British Columbia in Vancouver, which offers free, open-source journal management and publishing software (*pkp.ubc.ca/OJS_Sheet.html*) to help manage submission, review, online publication, and indexing. Another route is for current journals to open their electronic gates and let viewers in. Many journals are moving toward partial open access by opening part of their content, summary content, or older content. Another way is to have a parallel stream to the traditional journals on the basis of a form of self-archiving. Either in preprint form or once an article has been accepted for publication (and perhaps with a delay after publication), authors can deposit their articles into an institutional or independent repository (see sidebar). In addition, authors could post their articles on their own Web

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Open-Access Examples and Resources

Open access can be in the form of peer-reviewed journals and archives or repositories. Archives or repositories can include postprints or preprints, journal articles, and dissertations. They can come in a variety of forms: not-for-profit, commercial, or government. Here are some examples and additional resources for more information.

The **Public Library of Science (PLoS)** is a not-for-profit organization of scientists and physicians committed to making the world's scientific and medical literature a freely available public resource (see *www.plos.org*).

BioMed Central is an independent publishing house committed to providing immediate free access to peer-reviewed biomedical research (see *www.biomedcentral.com*).

PubMed Central is the US National Library of Medicine's free digital archive of biomedical and life-sciences journal literature (see *www.pubmedcentral.nih.gov*).

ArXiv.org is an e-print service that presents papers in physics and related disciplines, mathematics, nonlinear science, computer science, and quantitative biology. It is a fully automated electronic archive and distribution server for research papers (see *www.arXiv.org*).

A **directory of open-access journals** can be found at *www.doaj.org*.

For general background, history, and news of open-access progress, see the SPARC [Scholarly Publishing and Academic Resources Coalition] Open Access Newsletter at *www.earlham.edu/~peters/fos* (by Peter Suber, Earlham College).

sites, perhaps substituting for the reprints that authors used to hand out on request. All those ideas are taking shape in the community. And each will require careful scrutiny to make sure that implementation is cost-effective and fair and does not sacrifice scientific integrity and editorial quality in the short or long term.

A New Cost Model: Moving from a Free Market to a Free-Product Environment

So who pays? What is free at one end is paid for somewhere else. Currently, the scientific literature is paid for by a combination of authors, subscribers, libraries, institutions, association members, advertisers, and other sponsors. Full open access eliminates revenue from the users (other than for the print versions). That shifts the cost burden to the other sources or requires cost savings or service reductions. Some models move much of the cost to the authors or their institutions, with exceptions for those with economic hardships. In some disciplines, particularly the social sciences, that will be a strain. Alternatively, sponsors, donors, or even the government could contribute funds. A favorable outcome could be cutting waste as cost structures are reengineered. A danger is that a piece will be cut out if its value is not evident. That is why we need to look carefully at the role of editors and cut the fat where we can and show the value for the rest. Perhaps Stevan Harnad, of the University of Southampton, in his provocative keynote address at the 2003 CSE annual meeting [Sci Ed 2003;26(5):150-1] is pushing for just that. In his promotion of self-archiving, he contends that the cost being charged by "toll" publishers is too high, and he seems to discount the value added by editors. That is where the higher vision needs to be remembered!

Forces of Change

The Internet swept in and changed how we do business, adding costs but increasing efficiencies. Before those changes have settled, the sweep of open access is upon us, with equal strength and unrelenting speed. On 3 September 2004, the National Institutes of Health (NIH) released a document on a pending policy, "Enhanced Public Access to NIH Research Information", *grants.nih.gov/grants/guide/notice-files/NOT-OD-04-064.html*, which presses for articles supported by NIH funds to be placed in the freely accessible PubMed Central 6 months after publication. The National Academy of Sciences quickly latched on (see *www4.nationalacademies.org/news.nsf/isbn/s09162004?OpenDocument*). Interestingly, it is not affecting only the biologic and medical communities. The physical sciences are increasingly engaging with NIH, and other government agencies may follow. My own organization, the Materials Research Society, quickly rallied forces to prepare a response to NIH's proposed policy, adding concerns about standards across disciplines and across international borders. The American Institute of Physics, despite earlier indifference, is embarking on open-access experiments in 2005. Even the commercial publishers are joining the fray. Elsevier in June 2004 announced its plans to allow authors to self-archive their completed manuscripts on their personal and institutional Web sites so long as the original journals are cited and linked to. The Nature Publishing Group announced that starting in January 2005 authors are encouraged to submit their accepted manuscripts to their relevant funding bodies' archives, their institutions' repositories, and their personal Web sites 6 months after publication.

Going Forward

Open access is not a fad that is likely to fade, but both the end point and the route to it are far from certain. Issues of copyright, standardization, and cost models are still in flux. How it will be used in different disciplines, for government-supported vs commercially supported work, and across international borders is a pertinent question. For editors and publishers, the issues will include determining a value for copyediting and review coordination, keeping publishing honest as cost models change (for instance, watching for bias based on sponsor or government pressure), and balancing the moral high ground with fiscal responsibility. We hope to visit many of those issues from the points of view of authors, readers, editors, librarians, vendors, doctors and scientists, publishers, associations, industry, advertisers, government agencies, and others. Please join in the "open" discussion.