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The Public Library of Science and the ongoing revolution in scholarly communication

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I enthusiastically support the goal of making scholarly articles easily available on the Internet to everyone, without any fees or other barriers to their use. However, I have not signed the Public Library of Science (PLS) petition. My own contribution to the freeing of scholarly literature has been both to have long lobbied for this through articles and lectures, and to make all my e-prints available for free on my home page, and e-print servers. When discussing copyright transfers to journal publishers, I have also consistently reserved the right to post e-prints on the Web, and urge other scientists to adopt this policy.

The difference between my outlook and that of the PLS (which requires publishers to make articles available for free access from centralized servers within half a year of publication) is one of degree. Both courses of action produce improved access to scholarly publications. The improvement is especially dramatic for the general public, but also for those not fortunate to be at the few hundred institutions around the world that have first-class libraries. Both courses of action also serve to encourage scholars, publishers and librarians towards embracing the new era of learned discourse that is evolving.

The reason I do not endorse the PLS petition is because it assumes a certain fixed model for scholarly publishing. By requiring free public access to published articles after six months, but not earlier, it implicitly says that publishers need some barriers to induce subscribers to pay. Yet why should it be six months and not six days, or six weeks, or six years? Furthermore, the petition requires the posting of articles on centralized servers, whereas the choice between publishing on centralized servers rather than distributed databases is far from clear-cut. I do not wish to commit myself to not publishing in outlets that might wish to experiment with different policies.

The PLS petition also fails to promote the free circulation of e-prints. While published papers that are peer-reviewed might be of greater utility to the general public, for active researchers it is the early versions that matter most. Some journals still adhere to the policy of refusing to consider for publication papers that have been widely circulated as e-prints. This practice serves to impede progress in science, and should be discouraged.

One thing that is certain in these uncertain times is that there will be much experimentation. This is unavoidable, since nobody can be sure how scholarly communication will evolve. We will be working our way free of the shackles imposed by Gutenberg's print technology and exploring the novel flexibility of the electronic medium for some time to come. A prominent feature of the evolution that is unfolding is the acceleration of communication. A recent article (by A. M. Campbell in *Science* in April 2001) about a new high temperature superconductor noted that ��every superconductivity laboratory in the world immediately began to make measurements on this new material and dash into print. Fifty e-prints had been posted on the Web by the end of February -- before the original paper was even published.&#65533; Some traditionalists bewail this hurried pace of research and publication, but that is how the world is evolving. No group that has embraced rapid electronic communication has been willing to relinquish it. The leisurely pace we have grown used to was forced on us by the print medium and was not a result of an informed choice.

The faster pace of communication, including e-prints, but also other informal means, such as phone, fax and e-mail, is creating a continuum of publication. This will require a continuum of peer review as well. Some of the opposition to the PLS (or earlier to any kind of electronic publishing) was based on fears that the peer review system might collapse. I am not concerned about that danger, as displacement of traditional journals from their central role will not be so rapid as to incur such risks, while novel forms of peer review will quickly emerge. Modern communication enables scholars to organize quickly. It is noteworthy that the fifty papers on the new superconductor were not written at the same time by chance; some form of informal peer review helped persuade the authors that this was a promising subject to investigate.

Some of the coming transformations may appear uncomfortable today. For example, the notion of a final definitive version of an article, which seems so basic to scholarly publishing, is likely to fade away. Could anyone propose a definitive version of the human genome database? It already is a living object, constantly enlarged, corrected and updated. Increasingly, scholarly communication will take the same road.

While I do not endorse PLS fully, I do see it as a sign of an imminent transition in scholarly communication. The huge number of signatories to the petition shows that scholars are waking up to the opportunities that free distribution of their works offers to them as authors and to society in general. The scholarly publishing area is full of complicated feedback loops and perverse economic incentives, to the extent that I have often compared it to the American medical sector. Both fields are full of inefficiencies and resistance to change. Moreover, there are no magic solutions in either. Many simple solutions (such as demanding lower prices from journal publishers) are doomed to fail, since they ignore not only the dynamics of the free-market system but also where many of the real costs of the system are -- namely inside the libraries. There are also paradoxical phenomena, such as print sales increasing as a result of making a complete book or journal available for free on the Web. All these factors make it impossible to plan the evolution of scholarly publishing. However, rapid evolutionary change is coming, especially since authors, who ultimately possess the greatest power, are slowly realizing this and beginning to accelerate the pace of change.

The PLS may fail in their boycott threat. But change is on its way. We are reaching the point where even in fields that have not traditionally relied on e-print distribution, there are demands for freer circulation of e-prints and reprints. A direction that used to be of interest only to a small group of early adopters is gradually becoming accepted as part of mainstream scientific communication (see Open Archives Initiative). We are entering a period where the new rapid communication technologies will begin to dominate in very visible ways. The transition to the new era will not be easy, but it does offer enough opportunities that it will accelerate. It is exciting to watch this evolution, even if the slow speed at which it is unfolding is often frustrating.

Andrew Odlyzko was until recently a researcher and manager at AT&T Labs - Research. Aside from technical work on computational complexity, cryptography, number theory, combinatorics, coding theory, analysis, probability theory and related fields, he has also been investigating electronic publishing, electronic commerce and economics of data networks. His papers on electronic publishing and other subjects are available on his home page . He was recently appointed Director, Digital Technology Center, University of Minnesota