

## Viewpoint

# Open Access to Scientific Publications

*The good, the bad, and the ugly.*

**I**N HIS JULY 2009 *Communications* editor's letter "Open, Closed, or Clopen Access?", editor-in-chief Moshe Vardi addressed the question of open access to this magazine and to ACM publications in general. Scientific publishing, like all areas of publishing, is undergoing major changes. One reason is the advent of the Internet, which fosters new types of publishing models. Another less-known factor is the exponential increase in the number of scientific publications (see the figure here), which has turned this area into a serious business. In this column, I take a look at commercial and Open Access publishing, and at the role that professional societies such as ACM can play in this evolving world.

### Commercial Publishing

Scientific publishing is a profitable business: at more than 30%, the operating profit margins of major commercial publishers are one of the highest across all businesses.<sup>a</sup> A major consequence has been a massive concentration of commercial editors of scientific, technical, and medical (STM) publications, with one giant (Elsevier) and a few big players (Springer, Thomson, Wiley). This concentration has coincided with sharp increases in subscription rates, and has generated razor-sharp business practices

<sup>a</sup> See, for example, [http://www.researchinformation.info/features/feature.php?feature\\_id=141](http://www.researchinformation.info/features/feature.php?feature_id=141)



whereby, for example, publishers sell subscriptions to a bundle of titles that typically contain one or two good journals among a set of second-tier ones.

The quality of a journal is typically measured by its impact factor—the average number of citations to articles in this journal over a unit time (typically three years). Because of the competi-

tion among publishers, impact factors can be, and are, manipulated: Commercial publishers ask their editors-in-chief to “encourage” authors of accepted papers to include references to their journals. (Since they pay their editors-in-chief, it makes them more “receptive” to such requests.) The Web-based version of EndNote, the well-known

reference searching tool, facilitates references to publications indexed by ISI Web-of-Science, the division of Thomson that computes the very impact factors mentioned previously.

Over the years, commercial STM publishing has become a cutthroat business with cutthroat practices and we, the scientific and academic community, are the naive lambs, blinded by the ideals of science for the public good—or simply in need of more publications to advance our careers.

Fortunately, a number of researchers and academic leaders woke up one day and said: “We do not need commercial publishers. We want the results of our research, which is often funded by taxpayers’ money, to be available for free to the public at large. With the Internet, the costs of publishing are almost zero, and therefore we can make this work.” And so was born the white knight of STM publishing: Open Access.

### Open-Access Publishing

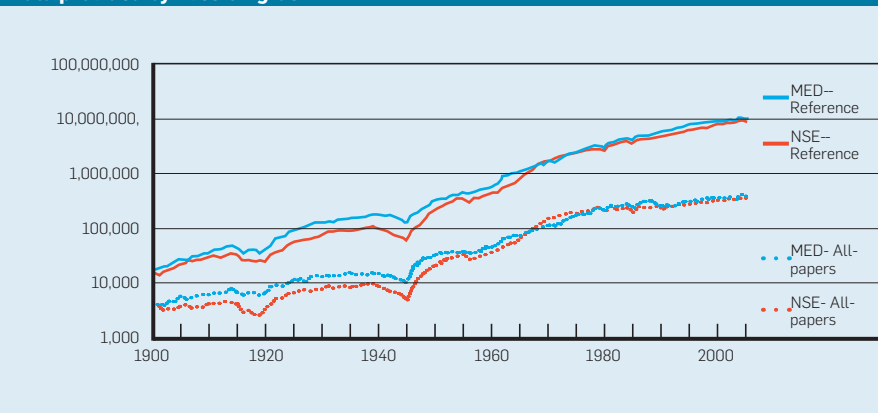
But the proponents of Open Access quickly realized that online publishing is not free, nor cheap. Management, equipment, and access costs add up quickly. For example, ACM spends several million dollars every year to support the reliable data center serving the Digital Library<sup>b</sup> and to incorporate new data, improve cross-references, and develop new services.

Since Open Access needs funding, where can it come from?<sup>c</sup> An obvious answer is advertising, but it is not a sustainable option at least for now. A less obvious answer, but one that is quickly gaining momentum, is called *author charges* (or *publication fees*): since Open Access does not charge readers, authors will pay to publish their works. This should be painless for authors because they are also readers: it simply transfers charges from subscriptions to authorship. In fact, the proponents of this model explicitly encourage researchers to include author charges in their budgets when they apply for grants. The NIH explicitly supports

<sup>b</sup> As an example, on Sept. 11, 2001, ACM was prepared to switch to a backup database in another location in the country to provide uninterrupted access to the Digital Library.

<sup>c</sup> See <http://www.arl.org/sparc/publisher/incomemodels/> for a fairly complete list.

**Exponential increase in the scientific production in the medical (MED) and natural sciences and engineering (NSE) fields. The vertical scale is logarithmic. The number of published articles for 2004 is about 500,000 and the number of references is about 10 million. Data provided by Yves Gingras.**



Open Access and accepts such costs.

But how much are authors ready to pay to publish an article? A few hundred dollars? The most prominent Open Access publisher, the Public Library of Science (PLOS), is a nonprofit organization that has received several million dollars in donations. Yet it charges between \$1,350 and \$2,900 per paper, depending on the journal.<sup>d</sup> In fact, many in the profession estimate that to be sustainable, the author-pay model will need to charge up to \$5,000–\$8,000 per publication.

Consider what this means. For example, I am the head of the Laboratory for Computer Science at Université Paris-Sud in France. We publish over 100 journal articles annually. At the conservative estimate of \$2,500 per article, the author fees would cost us \$250,000 per year. This is more than four times our current budget for journal subscriptions. And, of course, since not every publisher is going to turn to that model overnight, we would have to keep traditional subscriptions. At \$5,000 per publication, my lab is broke.

Funding agencies are unlikely to cover these extra costs. If they do, it will be within the same overall budget, meaning less money for manpower, equipment, and travel. Also, how would funding agencies pay for papers published after the end of a grant, as is often the case with journal publications? How would researchers decide between two papers when budgets are tight? More than ever, the rich will be

<sup>d</sup> See <http://www.plos.org/journals/pubfees.html>

able to publish more and more easily than the poor. And even though Open Access publishers do have policies to lower or waive the fees for those who cannot pay, it is embarrassing just to have to ask.

In fact, those who benefit the most from this model are neither the scientific community nor the general public. They are the big pharmaceutical labs and the tech firms who publish very little but rely on the publication of scientific results for their businesses.<sup>e</sup> With author-pay, research will pay so that industry can get their results for free. Is this moral? The only other area in publishing where authors pay to get published is called the vanity press. Do we really want to enter that model?

Not surprisingly, commercial publishers have considered Open Access a potential threat. But they quickly realized that the author-pay model could work for them, too. Many publishers are already testing a dual-model: authors can publish an article without charge, in which case it is available to subscribers only, or with an author-charge, in which case it is available for free. This is the best of both worlds: charging *both* readers and authors!

So while Open Access was designed to provide an alternative to commercial publishing, it may well be consumed by it. Now, authors, not just readers, are the publishers’ market.

<sup>e</sup> Elsevier has admitted to creating fake journals sponsored by pharmaceutical labs (see, for example, <http://www.the-scientist.com/blog/display/55679/>)

For example, I can easily imagine these publishers soon offering universities special deals with reduced author fees in exchange for exclusive rights to the publications of that university, jeopardizing academic freedom.

### The Role of Professional Societies

Can we get out of this situation? Can we escape both the escalating subscription fees of commercial editors and the dangerous author fees of prominent Open Access publishers? It is important to understand that the scientific community is largely at fault: we sit on the editorial boards of the very journals published at exorbitant prices by commercial publishers,<sup>f</sup> and we submit our best articles to these journals.

The problem with the subscription model is not the model but the fees. Rob Kirby, of the UC Berkeley Math Department, has compared the cost-per-page of various mathematics journals, computed as the subscription price divided by the number of pages published annually.<sup>g</sup> In 1997, they ranged from \$0.07 to \$1.53. The cost per 10,000 characters, which better accounts for differences among journal formats, ranged from 30 cents to \$3. Consistently, the cheaper journals are published by universities and societies; the most expensive ones by commercial publishers. In 2003, Donald Knuth, editor of *Journal of Algorithms*, wrote a long letter<sup>h</sup> to his editorial board explaining that the price per page of the journal had more than doubled since it had been acquired by Elsevier, while it had stayed stable over the previous period, when it was published by Academic Press. This led to a mass resignation of the board and the rebirth of the journal as *ACM Transactions on Algorithms*. Another well-known example is the *Journal of Machine Learning Research*, which became its own Open Access publisher for similar reasons. A number of journals have joined this trend,<sup>i</sup> but

f I am an associate editor of an Elsevier-published journal.

g See <http://math.berkeley.edu/~kirby/journals.html>

h See <http://www-cs-faculty.stanford.edu/~knuth/joalet.pdf>

i For a list, see [http://oad.simmons.edu/oadwiki/Journal\\_declarations\\_of\\_independence](http://oad.simmons.edu/oadwiki/Journal_declarations_of_independence)

## Open Access is a valuable goal, but the scientific community is overly naive about the whole business of scientific publishing.

few have turned to Open Access.

So, am I against Open Access? No. I think it is a noble goal, an achievable goal. But this goal should not blind us to the point of making a bad system even worse, of hurting research in the name of making its results freely available to everyone.

First, scientific publications can be affordable. The pricing of the ACM Digital Library is extremely low, even compared to other societies and nonprofit organizations. This is still not enough. The pricing model is adequate for the academic and industry audience but not for dissemination toward the public at large. As shown by the success of online stores such as iTunes, low-pricing can translate into large volumes. Commercial publishers charge non-subscribers up to \$30 to download a single paper; ACM charges \$15. What if it were 99 cents? While I am not saying that scientific publishing is a mass market like music, I do believe this would dramatically reduce the barrier to non-subscribers, in particular the general public, without significantly affecting the revenues from subscriptions.

Second, much of this debate has focused on cost. But free access is, to paraphrase the Free Software Movement, as much about free beer as it is about free speech. Many publishers, including ACM, allow their authors to publish copies of their articles on their personal Web page or on their institutional repository.<sup>j</sup> But the transfer of

j See section 2.5 of the ACM copyright policy, [http://www.acm.org/publications/policies/copyright\\_policy](http://www.acm.org/publications/policies/copyright_policy), and the SHERPA/ROMEo list of publishers' copyright and self-archiving policies, <http://www.sherpa.ac.uk/romeo/>

copyright is seen by some as a serious hindrance to open access, as it deprives authors from distribution rights. While copyright transfer offers authors protection (such as against plagiarism) and services (such as authorization to reprint), I believe switching to a licensing model such as Creative Commons could be beneficial.

The added value provided by publishers is twofold: reputation (the value of the imprimatur), and archiving (the guarantee that the work will be available forever). These allow publishers to provide services that self-publishing and even institutional repositories cannot provide, such as the author pages that were recently added to the ACM Digital Library. Little if any of this relies on the actual transfer of copyright. While publishers value the exclusivity granted by copyright transfer, users (authors and readers alike) value the services that make articles easier to find: indexing, cross-referencing, searching, and so forth. A proper licensing model could foster novel services for scientific dissemination, including by third parties, without challenging the primary values and revenue streams of publishers, in particular non-profit ones.

### Conclusion

Open Access is a valuable goal, but the scientific community is overly naive about the whole business of scientific publishing. Societies and nonprofit organizations need to continue to lead the way to improve the dissemination of research results, but the scientific community at large must support them against the business-centric views of commercial publishers. Author fees are not a solution. Worse, they jeopardize the ecological balance of the research incentive structure. Finally, nonprofit publishers should take advantage of their unique position to experiment with sustainable evolutions of their publishing models. ■

Michel Beaudouin-Lafon (mbl@lri.fr) is a professor of computer science at Université Paris-Sud (France) and head of the Laboratory for Computer Science (LRI). He is also a former member of the ACM Council and the ACM Publications Board.

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