IS OPEN ACCESS THE FUTURE FOR SCIENTIFIC PUBLISHING?

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 17TH JULY 2006

Competition from the World Wide Web is driven by publishers who levy page charges on the authors, and by self publication, thus removing the need for readers to pay charges for accessing scientific publications. Open Access to scientific literature and databases, guided by those with expert knowledge of relevant topics, is considered essential if the UK is to evolve from primary manufacturing to become a world class, successful and dynamic knowledge-based economy.

The Learned Society business model currently underpins much of the scientific publication and knowledge base, complemented by university-based and commercial scientific publishers. This industry is also vitally important to the economy of some regions of the UK which services an international community of scientists.

Will it be possible therefore to move to Open Access and enable scientific articles to become freely available without irretrievably damaging the present infrastructure, and what will be the consequences of not doing so? Open Access to scientific databases (often publicly funded) is also essential if progress is to be made. How can resistance to this be overcome and the primary data be made available for further scientific study and analysis for the benefit of us all and at minimum cost to the scientist?

During discussion at the meeting the following points were raised:

No change to the peer review model is anticipated with open access publishing, which can and must remain at the same standard as at present and has always been provided to journals free of charge. However the current failure to publish negative results which characterises some industry-funded research, must be addressed by open access publishers. The barrier to authorship from open access, when compared with the barrier to readership, indicates the need for an ongoing subsidy somewhere in the publishing system. There is no reason to believe that a funder-pays model should be any less sustainable than a subscription-based model. Journals are likely to evolve to lower standards due to the need to publish a larger volume of papers to provide sufficient income. Learned Societies, many of whom rely for their existence as publishers, are very concerned about their future. Web-based prepublication review of articles draws in additional reviewers, thereby increasing critical discussion prior to publication. Open access is becoming very complex while at the same time the interlibrary system is collapsing. Many of the journals that are currently most valued are new. It is relatively easy to establish a new high quality journal and Learned Societies will have to adapt, although not all Learned Societies have a journal and it is possible for them either to exist without a journal or to create a new innovative journal based on open access. Web based publishing provides an opportunity for experimentation in new ways of publishing, including peer review. It also facilitates the extraction of data by linking papers together electronically and generating increased access in Eastern Europe and India, for example, which is a desirable and positive result. The pharmaceutical industry is a major funder of research and not a free-rider with respect to open access. Free posting of articles after six months will not deter social scientists prepared to wait. The Bodeleian Library manuscript collection is being made available online. Both humanities and sciences will benefit from this new publishing model.

Is Open Access the Future for Scientific Publishing?

Professor Mark Walport, Director, The Wellcome Trust

The findings of medical research are typically communicated through specialist publications. Journal

The Wellcome Trust has a mission "to foster and promote research with the aim of improving human and animal health". As the UK's largest charitable foundation we spent over £400 million on biomedical research in the UK last year. Key to our mission is ensuring that the results of the work that we fund can be read and utilised by the widest possible audience.

publishers arrange for articles to be checked by experts in the field ("peer review"), and then publish papers in print and on the web. To access the papers, other scientists need to take out a subscription to the journal or pay a fee to access an individual article.

The major drawback of this system is that subscriptions can be very expensive and represent an obstacle to the timely sharing of information through the scientific community and more broadly with the public at large. This situation is difficult to reconcile, particularly given that more than 85% of research undertaken in the UK is funded via the public purse or by the charities.

Our experience of the human genome project has shown that there is a huge benefit in having research findings openly available in the public domain. The genome data is freely available to researchers around the globe and is already being exploited to answer important questions about health and disease.

In a recent exercise that looked at articles in which the Wellcome Trust was attributed as a funder, we found that, at the time of publication, only 6% of these articles were freely available as full text on the Internet. Researchers with access to well-funded libraries fare a little better, but access is still a problem with 10-20% of the articles in this exercise published in journals that these libraries did not have access to due to lack of subscriptions.

Another study of research funded by the NHS showed that although most of the published results are available in full text on the web via subscription services, only 30% of this material could be readily accessed by the general public and more worryingly only 40% could be accessed by NHS staff themselves.

Open access – making research outputs accessible to as many people as possible, for free, via the Internet, offers an important advance in the research process and will help scientists throughout the world make the discoveries we need to improve health and show the public what they are doing.

Open access provides the opportunity for research findings to be more easily read and cited. Providing open access to the research literature also enables these outputs to be linked and integrated with other resources. As data mining tools become more sophisticated over the next few years we will start to see new knowledge being created by the linking of research papers that hitherto had not been seen as relevant to each other. For this to happen, however, papers must be held in an open access repository and not remain hidden behind publishers' authentication systems.

To increase open access to research findings the Wellcome Trust has modified its grant conditions, such that from October 2006 research papers partly or wholly funded by the Wellcome Trust must be made freely accessible via the open access repository PubMed Central (PMC) (or UK PubMed Central once established – see below) as soon as possible, and in any event no later that six months after publication[1].

To help realise the Trust's vision of an open access world, we are working in partnership with a group of major UK biomedical research funding bodies including the Medical Research Council, the Department of Health, Cancer Research UK and the British Heart Foundation to establish a UK version of PubMed Central (UKPMC)[2]. A tender process has been launched to identify a supplier to host, manage and develop this. Based on the US National Library of Medicine's PubMed Central, the aim of this initiative is to create a stable, permanent and free-to-access online digital archive of the full-text, peer-reviewed research publications (and datasets) that arise from the research. UKPMC will be fully searchable and provide context-sensitive links to other online resources, such as gene and chemical compound databases.

Although the open access model provides free access to the literature for the reader there are costs associated with this approach. For example, managing the peer-review process and copy editing the final manuscripts are value-added services that incur expenses. To meet these costs the Trust will provide grant holders with additional funding to cover the costs of page processing charges, levied by publishers who support open access.

In the past few weeks both the MRC[3] and the BBSRC[4] have made policy announcements that mandate their grantees to deposit their peer-reviewed papers in an OA repository. Similar initiatives are taking place at the NIH in the US[5], as well as in Germany[6] and France[7]. And, the recently published EC commissioned report also makes firm recommendations for future action, including improving access to publicly-funded research[8].

In light of these developments it really does seem that open access is the future for scientific publishing.

Making research outputs freely accessible will also help funding bodies to evaluate the research they have funded. Once all Wellcome-funded research is available in PMC (or UKPMC) it will be possible to examine the effectiveness of our funding strategy and re-align it as appropriate. Finally, by mandating our grantees to make all research outputs accessible through PMC/UKPMC, we are helping to ensure that the digital record of biomedical research can be preserved.

1. See: http://www.wellcome.ac.uk/openaccess
2. A full list of the funding organisations working to establish UKPMC can be found at: http://www.wellcome.ac.uk/assets/wtx028464.pdf
3. MRC Open Access policy: http://www.mrc.ac.uk/open_access
4. BBSRC Open Access policy: http://www.bbsrc.ac.uk/news/articles/28_june_research_access.html
5. Details of the NIH Appropriations Bill – which will mandate Open Access for NIH researchers can be found: http://www.earlham.edu/~peters/fos/2006_06_11_fosblogarchive.html
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Is Open Access the Future for Scientific Publishing?

Robert Campbell
President, Blackwell Publishing

I once attended a lecture by a French professor who started by stating that the future predicts the past. The established publishing models largely stem from developments in printing and paper technology two hundred years ago, followed by copyright. An insight into this period of change is given in the French novel, Lost Illusions, by Balzac. The backdrop to Lucien's rise and fall as an author in Paris is the emergence of magazines and newspapers enabled by the dramatic reduction in unit cost.

There was, unlike now, no established business model. Important sources of revenue were bribes from publishers and theatre managers to ensure good reviews of books and plays, or bad reviews of rival works. The business model eventually settled down to a cover price paid by readers and clearly demarked advertising thus enabling reasonably independent editorial policy.

This brings me to the three major concerns over the author-pays or pay-to-publish open access model: the potential reduction in standards; barrier to authorship which could favour the better funded; and sustainability.

Lower Standards

Some critics of the current publishing system don't seem even to acknowledge that there is a cost involved and believe in the internet environment everything can be free. Mark Walport is clear on this. Publishers do a job and there is a cost. The Wellcome Trust is prepared to pay for this.

The problem with charging authors or their employers is the potential distortion of the editorial process. I refer back to Lost Illusions. If the author pays then the publishing system is likely to evolve to suit the author rather than the reader. Standards could fall.

Barrier to Authors

Adopting the author-pays business model may achieve open access for readers but it creates a barrier to authorship. The Wellcome Trust might be able to divert research funds to cover author-pays charges but most institutions are showing no appetite for a new charge and the administrative burden that would go with it. Again we could see a distortion of the system with only the larger institutions in the Northern Hemisphere being able to publish in the most selective prestigious titles; rejecting the majority of the papers submitted is an expensive business.

A complete switch to author pays would result in a net cost for the more productive universities and countries and a reduced cost to the less productive, and no cost to, for example, the pharmaceutical industry (the so-called free rider problem).

Sustainability

Is the author-pays model sustainable? A survey commissioned by ALPSP (the Association of Learned and Professional Society Publishers) indicated that most open access journals are making a loss while most subscription based journals are financially viable.

I quote from the Royal Society's position statement issued last December:

"Funders may be forcing scientific researchers to change the way they publish papers so quickly that disastrous consequences could result." The statement added that peer review journals could be forced to close, "The worst case scenario is the introduction of new journals, archives and institutional repositories that cannot be sustainable in the long run."

When the House of Commons Select Committee on Science & Technology conducted a study of scientific publishing in 2004 it interviewed the Nobel prize winner Harold Varmus as one of the parents of the open access movement and founder of PLoS (the Public Library of Science) which produces author-pays journals. PLoS should be financially viable by now according to his evidence and so it should be with at least $13M of donations. A recent report in Nature, however, suggests PLoS is still some way short of financial viability and last month PLoS raised its basic charge to authors from $1500 to $2500. This may still not be enough and one of the PLoS managers admitted that they may always depend on some philanthropy. We could never get away with such price rises. The PLoS team is top class and producing fine publications but they are also proving what any publisher (as opposed to distinguished scientist) could have told them: with quality comes cost.

The Future for Author-pays Open Access

To sum up this first part: author-pays open access will be part of the future of scientific publishing as long as some well-funded organisations are prepared to pay for it. Publishers such as Blackwell, Springer and OUP offer this option with conventional journals. The limited take up, however, suggests that it will only be a small part and sustained by riding

on the back of the more robust and proven subscription based model.

Are Other Means of Achieving Open Access Sustainable?

There are many other important aspects of open access which will make our debate more complex. There is already a great deal of material made available by subscription based publishers free of charge. So called delayed open access is one element: many STM (science, technology, medicine) articles can be accessed 12 months, some 6 months, after publication. Organisations such as HINARI, AGORA and INASP make available material at little or no charge in developing countries.

And in any case the "journal crisis" that seemed to drive the House of Commons Select Committee's study does not stand up to scrutiny. The Committee had no sense of history and were too ready to be influenced by librarians who have always complained about the cost of publications. Access to titles in British universities has approximately doubled over the last five years at a cost increase of around 50%. Surveys have shown that this improvement in access has been appreciated by researchers if not by the Select Committee.

Yet there is a demand now for public access, that is that the tax payer who has ultimately funded research should have free access to the published results. This is of course a politically attractive idea and publishers are less well organised lobbyists than, say, farmers. I keep 12 bullocks on our meadow and receive two grants for this but I am not expected to hand out free steaks. Villagers are free to roam the meadow which they do without damaging my limited efforts in animal husbandry. This seems a reasonable compromise.

A reasonable compromise seems less likely in scholarly communication. The RCUK (Research Councils UK) has picked up on the public access issue and added "dissemination" to its mission statement. Until recently is has assured publishers, including the many societies that publish, that although it would like to see RCUK-funded researchers post their articles for free access over the net as soon as possible after publication the copyright and licensing arrangements of each journal should be honoured; further policy development would be shaped by independent scientific study of the whole process of scholarly communication. This would include looking at the impact of posting articles on journal publishing. The concern, of course, is that if articles are available over the net soon after publication from an institutional repository then there will be no need for a library to subscribe.

Last month, however, the MRC (Medical Research Council) announced its own policy which included mandated posting of articles within six months of publication. Some of the other councils are taking a more measured approach and they should get the benefit of an extremely well organised programme of research into scholarly communication being conducted by RIN (Research Information Network). In marked contrast to the recently published study of the European scientific publications market commissioned by the EU and the two flawed reports from the Wellcome Trust all the evidence is being assessed rigorously with the help of an advisory group drawn from all spheres of interest; each step is in effect being peer reviewed. I cannot see why the MRC could not wait until RIN's programme is completed.

We do already have the results of a study commissioned by ALPSP which indicates some potential risk of cancellations resulting from widespread posting. An initial analysis of the results from an international survey of the impact of posting on journals carried out by Scholarly Information Strategies on behalf of the Publishing Research Consortium (PRC) also suggests such a risk. Librarians are likely to continue to acquire high quality content but with lower status journals the version posted on an institutional repository might be deemed good enough. Respondents saw little difference between having a publication available upon publication or waiting six months. Librarians are prepared to compromise between the "Final Published Article" and the "Author's copy of the copy-edited accepted article" but there is little interest in the "un-refereed manuscript". Librarians do value the publishing process, even beyond the function of refereeing, but welcomed the challenge that open access poses to publishers.

The PRC will be publishing the full report next month. There is some indication at this stage, however, that posting at six months could damage smaller journals and many of these come from societies. This was the very reason that the NIH (National Institutes for Health) gave for keeping to mandated posting within 12 months. The MRC does not seem to appreciate the vital role societies play in the dissemination and development of information, indeed knowledge.

The attack on the publishing system at this time is ill-judged. It has evolved radically in the last decade and has the capacity to deliver on the enormous challenge ahead. Currently we publish about 1.5M peer-reviewed articles per annum and say 2.5M in total including proceedings of meetings etc. Increased investment in R&D has become fashionable world-wide and there is a direct relationship between the number of researchers and articles produced. In the last two months for example significant increases in R&D funding have been announced from Australia and Singapore. India and China are well known stories. In the EU we have all signed up to taking the R&D spend up to 3% of GDP. If we all achieved this it would result in 700,000 more researchers which equates to say an extra 600,000 articles per annum.

Linked to the public access to articles lobby there is also the demand for open access to the original research data. Publishers are working on ways of linking journals not just to each other (already achieved through its own co-operative venture CrossRef) but to databases. Our efforts to develop new functionality and handle, say, 2.5M peer-reviewed articles per annum in ten years' time should not be undermined by politically motivated publisher bashing.

Ill-thought-out public policy could seriously disrupt the development of journal publishing where British companies and indeed societies have dominated the international market. If our aim is to be a successful knowledge based economy the lack of support from some quarters is unhelpful. Achieving universal access, which includes many of the elements of open access, to a much greater amount and range of information is our future. Britain leads in this at present and can go further if we work together.

Open access riding on the subscription-based model by forcing researchers to post articles and thus undermine the system is not sustainable and cannot therefore be the future.

IS OPEN ACCESS THE FUTURE FOR SCIENTIFIC PUBLISHING?

Towards evidence-based open access publishing

Professor David Nicholas and Dr Ian Rowlands
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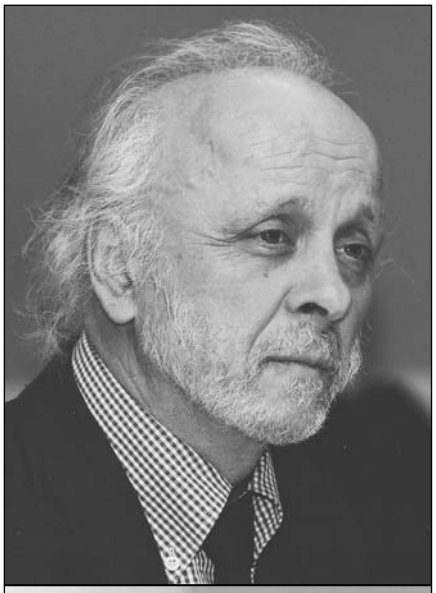

There is a story of a famous architect who, having designed and built a new university campus, walked off the site without finishing the landscaping. The grounds became wild with weeds and long grass. A year passed, and the architect returned, to find a particularly difficult and challenging part of his work had been done for him. Paths were clearly evident as the result of thousands of student and faculty feet making their way from one lecture hall to another, from lecture theatre to bookshop, and so on. The architect had effectively invented "evidence-based landscape gardening", and was able to lay down his flagstones in the full confidence that these were indeed the preferred routes for academic users.

In the fevered atmosphere of the open access revolution, we sometimes seem to be in danger of losing the essence of that simple story as attitudes harden on both sides of an increasingly and surprisingly bitter argument. What we need is an evidence base to help us chart our way through what may well become very choppy waters as pride, cherished business models, and possibly even some publishing companies get thrown out with the bath water.

CIBER, now a part of the new Centre for Publishing at UCL, was established right at the beginning of the open access movement as a non-partisan think tank charged with the mission of creating the kinds of robust evidence that librarians, publishers, research funders and government need to make some sense (and take advantage) of the turbulence around them. Our work has mainly run along two parallel tracks: understanding the views of authors, an obviously critical stakeholder group by means of large-scale opinion profiling, and by analysing the behaviour of an even more critical group, readers, by analysing the transactional web log trails that they leave behind them each time they navigate a digital library, be that a publisher's web site or an open access journal.

The views and attitudes of authors towards open access publishing are largely unformed: despite the intensity with which these issues are debated at library conferences and in select committee, there is widespread ignorance on the part of many researchers. This is slowly changing and will continue to as news of major changes to their publishing practices filters through. Journal authors are a funny breed, though. Our surveys reveal that while they very largely agree with the proposition that high journal prices are a barrier to access, few translate this into action by actively considering the issue of affordability to readers when they decide where to submit their manuscripts. They feel that far too much academic material is being published – by others, of course, since they do not feel they are personally publishing enough. These are classic consumer traits, we all feel a moral obligation to act in an environmentally responsible fashion as householders, yet often we don't get around to recycling our plastic bottles!

The point, of course, is that the publishing system is offering authors and readers a fundamentally different proposition. The key outcomes for journal authors are not necessarily the widest possible readership, but a set of rather narrower and more immediate concerns: making sure they get their ideas date stamped, recognised and lodged for posterity in the highest impact titles. Of course, with their reader hats on, authors are much more focused on the dissemination functions of journals.

Perhaps the key message to emerge from our work with authors is the fact that it is impossible to draw valid generalisations about which policy measures will be most effective in delivering open access. In fact, we would go so far as to say that pushing too hard too soon with

open access policies is likely to be highly disruptive in some, but not all areas. The factors that seem to pre-dispose authors to a positive attitude towards open access (and the reform of the traditional journals system that this represents) are subject discipline, age, availability of funding and geographical region, in that order. There is considerable enthusiasm for open access publishing in physics and the computer sciences, much less so in the social sciences or in the arts and humanities. Age is a critical factor, with younger authors appearing to be much hungrier for change. Geographically, the main drivers for open access seem to be coming from Asia (especially) and from Africa and the former Eastern bloc.

While listening to the views of authors is of course crucial, it is surprising that so little research has been carried out on the readers of open access (or indeed traditional) journals. In fact, there is remarkably little documented evidence of market pull for open access, either from authors or other types of reader, and there is a danger that policy may somehow become detached from reality at some point. One of the key tenets of open access is surely the potential it has for reaching great swathes of readers outside the subscription walls of organisations such as UCL or the House of Commons. This is surely the nub of the success or failure of opening up access to the riches of the scientific literature for people in small businesses, GPs, university alumni, the uninformed patient.

This lack of research is all the more surprising given that the data on online readership already exist in the form of the transactional web logs that provide the digital fingerprints of millions of users. CIBER has developed unique insights into these fingerprints using a technique called deep log analysis. Unlike surveys, there is no hiding place for self-delusion in deep logs, they simply report what happens when millions of users are let loose in cyberspace.

Perhaps the most exciting line of current CIBER research is the real time experimentation we are conducting on behalf of Oxford University Press. Trying to get answers to such deceptively simple questions as Does open access in fact deliver more readers? Are open access articles more likely to be cited than those hidden behind subscription barriers? is very difficult. There are so many uncontrolled variables that we end up comparing apples and oranges. What we really need is a detailed case study of a journal that has made the transition to fully open access and this is precisely what we have in the case of Nucleic Acids Research, a flagship journal of Oxford University Press. By any standards, NAR is a success story for British publishing. Even before going fully open access, it was attracting vast numbers of hits (from 1.5 million different IP addresses over the period January 2003 to June 2005). The decision to move to a full and immediate open access, funded by research sponsors, has resulted in further increases in usage, fuelled mainly by opening up the content to Google so that existing subscribers had another route in. Open access ***per se*** probably accounts for only an additional 7-8% of traffic, much of that coming from the former Eastern bloc. These are very early days, and who knows what open access will really deliver over the longer haul. In the mean time, publishers brave enough and honest enough to try these experiments will be able to see for themselves what actually happens and be able to take a commercial view as to whether author-side payments are the best or only mechanism (among many) of meeting consumer demands for immediate information gratification.

In conclusion, continuing independent research is vital in this area. Claims and counterclaims from both sides of the debate need to be evaluated and put into their wider context. Much of what passes for evidence is in fact highly selective, anecdotal and simply hardens the concrete bunkers in which ideologues on both sides reside. Not to use the huge evidence base we have accrued to help pilot our policies and decision making makes no sense at all.

Publishers have made enormous contributions to making the scientific literature accessible and easier to use through their investments in digital libraries, linking services and rolling out new business models such as the Big Deal, un-embargoing content which becomes open access after as little as six months and opening their sites to search engines and so encouraging in the "disenfranchised" user. Their services are hugely popular and have to be recognised for the success that they are, and there is a danger this is being lost in the heat of the argument. The problem is their very success, and the consumer expectations of the internet fuelled by Google, Amazon and the rest mean that they cannot rest easy.

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