

FULFILLING THE PROMISE OF SCHOLARLY COMMUNICATION – A COMPARISON BETWEEN OLD AND NEW ACCESS MODELS

David C. Prosser

SPARC Europe, Oxford University Library Services, Osney 1, Osney Mead, Oxford OX2 0EL, UK

Telephone: +44 (0) 1865 277 614

E-mail: david.prosser@bodley.ox.ac.uk

ABSTRACT

The convergence of dissatisfaction with traditional, subscription-based business model for scholarly communications and the development of new, digital technologies allow us to look consider the claims of new models. This paper describes the requirements of a scholarly communication system and investigates which model – subscription-based access or open access – best satisfies these requirements.

Introduction

There has been a dramatic increase in interest in new models of scholarly communication over the past five years, with most attention focussing on open access. This can be seen in the number of international conferences called and papers published describing and analysing open access, the discussions initiated by funding agencies and governments, and the number of declarations and initiatives in support of open access. This interest has come about as financial pressures and technological changes converge to offer new possibilities in scholarly communication.

The ‘Serials Crisis’ in scientific, technical, and medical (STM) publishing over the last thirty years has been well-documented as the cost of subscriptions to journals has increased at a rate greatly in excess of both increases in library budgets and inflation. (Most recently, a study from Loughborough University showed that between 2000 and 2004 publishers increased their prices by anything from 27% to 94%)¹. Whatever the cause of this disparity between costs and budgets (and many explanations have been put forward – from increases in the amount of material published to publisher ‘greed’) the effect is indisputable. Libraries have found it increasingly difficult to maintain subscriptions to the wide range of journal titles that their researchers require. The

¹ White S. and Creaser C.: *Scholarly Journal Prices: Selected Trends and Comparisons* (2004), LISU Occasional Paper no. 34. Also available at <http://www.lboro.ac.uk/departments/dis/lisu/pages/publications/oup.html>

‘cancellation exercise’, where the library asks faculty which journals are least essential and should be cut, has become a distressingly familiar part of academic life.

The introduction of online licensing deals has made the financial position more complex, but has not solved the problem. Many libraries initially welcomed the ‘Big Deals’ where they could purchase electronic access to a wide range (if not the full offerings) of a publisher’s journal list rather than subscribe to a limited number of journals, at a relatively small increase in price. However, many libraries have concluded that the ‘Big Deals’ are inflexible (restricting the library’s ability to cancel titles that are underused) and restrictive in tying the library to multi-year deals. In addition, there is a fear that an increasing proportion of library budgets is going to a small number of large publishers, so squeezing out smaller, often society, publishers.²

The net result has been a growing gap between what libraries can afford to purchase (or, increasingly, license) and what researchers need to access to efficiently pursue their research interests. This financial dissatisfaction has coincided with the development over the past decade of the internet as a delivery mechanism for scholarly journals. Today, the vast majority of STM journals are available in full-text online. As we move from the world of print to new models for delivery, so thoughts have moved from subscriptions to new business models to pay for the costs of scholarly communication. The internet offers the possibility of universal access – impossible in the print world.

It is this coming together of dissatisfaction with the financial models of subscriptions and licensing, together with the possibilities of extended access offered by the internet that has driven interest in open access. The Budapest Open Access Initiative (BOAI), published in February 2002, defined the two strands of open access as follows:

Self-Archiving: First, scholars need the tools and assistance to deposit their refereed journal articles in open electronic archives, a practice commonly called, self-archiving. When these archives conform to standards created by the Open Archives Initiative, then search engines and other tools can treat the separate archives as one. Users then need not know which archives exist or where they are located in order to find and make use of their contents.

Open-Access Journals: Second, scholars need the means to launch a new generation of journals committed to open access, and to help existing journals that elect to make the transition to open access. Because journal articles should be disseminated as widely as possible, these new journals will no longer invoke copyright to restrict access to and use of the material they publish. Instead they will use copyright and other tools to ensure permanent open access to all the articles they publish. Because price is a

² Prosser David C.: ‘Between a rock and a hard place: the big squeeze for small publishers’. *Learned Publishing* 17(2004), pp. 17-22. (Also available at <http://eprints.rclis.org/archive/00000945/>)

barrier to access, these new journals will not charge subscription or access fees, and will turn to other methods for covering their expenses.³

This paper will look in detail at the features of an ideal scholarly communications system and ask whether open access or the current subscription model best matches the ideal.

First Order Features – Peer-to-Peer Communication

It is almost tautological to state that the primary demand on any scholarly communication system is to facilitate communication between scholars. As part of the information exchange scholars will act as both authors and readers, and their requirements from the system will change depending on which role they are playing.

Traditionally, journals have been seen to perform four functions: Registration, Certification, Awareness, and Archiving.⁴ That is,

Registration - the author wishes to ensure that she is acknowledged as the person who carried out a specific piece of research and made a specific discovery.

Certification - through the process of independent peer-review it is determined that the author's claims are reasonable.

Awareness - the research is communicated to the author's peer group.

Archiving - the research is retained for posterity.

These functions have varying importance for the researcher depending on their role as either author or reader. Registration is most important for the author as it is the means by which they can stake a claim to the research. Certification benefits both the author and reader. For the author it improves the quality of their work (by providing independent feedback) and allows it to enter the scientific record as a valid piece of work. For the readers, certification guarantees a certain level of quality and relevance to what they are to read.

Awareness ensures that the author's work is widely known (increasing the chance that their work will be read and cited) and it ensures that the reader will be able to find the work they need. As will be seen later, awareness is closely associated with access and accessibility. The guarantee of long-term archiving gives the author comfort that

³ <http://www.soros.org/openaccess/read.shtml>

⁴ Roosendaal, Hans E. and Peter A. Th. M. Geurts (1997). 'Forces and functions in scientific communication: an analysis of their interplay.' *Cooperative Research Information Systems in Physics*, August 31—September 4 1997, Oldenburg, Germany. <<http://www.physik.uni-oldenburg.de/conferences/crisp97/roosendaal.html>>.

they will forever be associated with a particular piece of work and the reader the reassurance that they will be able to find historical research in the scientific record.

An emergent function of the scholarly communication system is that it provides input into the scholarly reward structure. Researchers do not just want to publish good research, they want to publish in the highest impact journals they can, or at the least in a journal covered by ISI. There is a perceived hierarchy of journals in each field (based mainly on impact factor rating) and authors want to publish as far up this hierarchy as possible. The greater the kudos of the journal, the greater the kudos of the researcher and the greater the chance of a successful future promotion or research grant.

We will look at each of the five functions in turn in terms of the traditional subscription-based model and open access (both self-archiving and journals) to ascertain which model best meets the needs of researchers.

Registration

In the traditional model, registration takes place at the moment of publication within the journal of the final refereed, copy-edited, formatted version of the paper. However, this process introduces delays into registration that frustrate the authors. A survey of authors' attitudes to publishing showed⁵ that 88% of authors 'declared delays an obstacle to their publishing objectives'. Delays increase the chances that the research will be out of date when published or that a rival research group will publish similar results first.

Some journals have attempted to alleviate this problem by bringing forward the moment at which papers are publicly released. For example, the *Journal of Experimental Biology* (<http://www.jbc.org/>) posts online a copy of the authors' manuscript on acceptance of the paper, thus bringing the registration of the paper forward by up to eight weeks. (Interestingly, the authors' manuscripts are freely available on posting, but the formatted, paginated versions are restricted to subscribers.)

Registration can be brought even further forward. In the pre-internet era some subjects developed strong pre-print cultures where copies of papers were distributed by post before being refereed and published. This has been replicated in the electronic era with online pre-prints. Perhaps the most famous pre-print service is the high energy physics arXiv system (<http://www.arxiv.org>) which now contains over 300,000 pre-prints deposited since 1991. The vast majority of the pre-prints made freely available through arXiv are subsequently published in journals following peer review.

While the pre-print culture has so far only taken root in some subject areas, open access (though authors depositing their papers in local or subject-based repositories) gives the most rapid registration possible.

⁵ Swan, Alma and Brown, Sheridan (1999) What Authors Want
(<http://www.alpsp.org/publications/pub1.htm>)

Certification

Certification, or peer-review, is mainly carried out free of charge by members of the scholarly community who work in the area being described in the paper. As such, certification can only work effectively if it is totally independent of the business model underpinning the journal.

One of the criticisms levelled at open access is that if a journal moved from a subscription-based model to a system where payments were received per paper published there would be a temptation to undermine the independence of peer-review and sacrifice quality for increased revenue. This criticism was articulated by Crispin Davis, CEO of Reed Elsevier, in his evidence to the UK House of Commons Science and Technology Committee 2004 inquiry into scientific publications:

‘If you are receiving potential payment for every article submitted there is an inherent conflict of interest that could threaten the quality of the peer review system and so on.’⁶

This objection ignores one of the basic drivers of authors when they submit their papers – prestige. Two author surveys showed that the impact factor of a journal ranks highly in influencing an author’s decision of where to publish. (Impact factor was ranked 3rd out of 10 factors in one survey⁷ and 2nd of six (behind ‘reputation’) in another⁸). If an open access journal were to lower its quality threshold to accept more papers in an attempt to increase revenue the impact factor and reputation would fall. This would make the journal less attractive to authors and result in fewer submissions (and therefore, lower revenues). By accepting more papers in the short term, the journal would jeopardise its long-term future by becoming a place where authors would not want to send their papers – the journal’s raw material (papers) would dry-up, as would the journal’s revenue stream.

Awareness

For some authors it is enough that they are published. They may have required publication as a condition of receiving a grant to attend a conference or as an end-point of a research project. However, for most authors being published is just the beginning. They want their peers to read their work and to build upon it. They want their discoveries to be integrated into the body of scientific knowledge. For this to happen readers must not only know about their papers, but they must be able to read them. Thus, awareness and accessibility are closely interrelated.

⁶ *Scientific Publications: Free for All?* 2004, London, The Stationery Office Limited. Minutes of Evidence (<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/4030106.htm>)

⁷ Rowlands, Ian, Nicholas, Dave, and Huntingdon, Paul (2004), *Scholarly Communication in the Digital Environment: What do Authors Want?* (<http://ciber.soi.city.ac.uk/ciber-pa-report.pdf>)

⁸ Swan and Brown, *ibid*

Readers become aware of papers through a variety of routes – journal table-of-contents alerts, browsing, abstracting and indexing services, references in other articles, recommendations from colleagues, etc. There is no reason to believe that one journal business model – subscriptions or open access – will have an advantage over the other in awareness. Open access journals are increasingly being covered by the major abstracting and indexing services, they produce table-of-contents alerting, etc. Awareness of papers in institutional repositories is also increasing as search engines take advantage of the standards to which repositories are built (Open Archives Initiatives standards). This makes it possible to perform cross-repository searches without needing to know which repository contains a specific paper.

It is in the area of accessibility that open access shows a clear advantage over subscription access. Once a paper of interest has been identified (through the title, authors, or abstract) the reader will want to see the full-text. If they are a subscriber (either personally or through their institution) they will be able to access the paper. Some journals make their archives freely available (after an embargo period) and so if it is an older paper the reader may be lucky. However, if it is a recent paper and the reader or their institution does not have a subscription they will not have access. At this stage they could ask for an interlibrary loan or, with some journals, pay up to \$30 for pay-per-view. However, adopting either of these options will cost the reader either time, money, or both.

If the paper is open access then the reader will not have to worry about subscriptions, loans, or pay-per-view. There will be no delay and no cost. The reader's information needs will be met immediately with unrestricted access to the full-text, rather than being frustrated or delayed. The author of an open access paper knows that every interested (and indeed casual) reader will be able to view the full-text of their paper, not just those lucky enough to be at an institution with a subscription.

Archiving

The long-term archiving of electronic articles is a problem that is independent of business model – it will affect subscription-based journals as much as open access journals. While the problem has not been solved there appears to be an interesting shift in attitudes to archiving. Over the past five to ten years publishers have retro-digitised increasing volumes of the journal back-runs and offered these to the scholarly community – either for free as a service to the community (mainly offered by society publishers) or at a price (normal practice for commercial publishers). As back-runs are digitised and the archive of 'born digital' content increases, it is to the publishers' sites that users are being directed to for the archive. This is a major shift as for the entire history of the scholarly journal the archive was maintained by the library community. (So much so that when digitising back-runs of their titles, many publishers have had to borrow copies of their own journals from libraries as there was no business case for them to keep complete sets of back issues.) Of course, one reason why some publishers maintain the online back-run is that they have, through copyright, controlled digitization rights so that libraries could

not digitize old material and make it freely available even if they wanted to. This control allows some publishers to ensure that the archive remains a source of revenue.

Some publishers are using the cost of maintaining the archive as a reason to increase prices and also as an argument against the publication-charge model of open access. They ask where the money will come from for archiving open access papers if there are no subscription fees. An intuitive answer may be ‘from the library, where archiving costs have always come from’! The cost of continued access and archiving has never been part of the traditional subscription-based business model. It should not be assumed that it should be part of the open access business model.

The apparent shift in archiving responsibility should be studied with care. Is the library community happy to see this important function shift to the publishers? What happens when a publisher decides that there is no longer a business case for maintaining the online archive (as they did with the print archive)?

In an open access environment archiving can become less centralised. Institutions will be responsible for archiving material deposited within their own repositories. Also, individual libraries may decide to archive open access journals. Working collaboratively, libraries would be able to ensure redundancy by keeping multiple electronic copies of open access journals at multiple sites – in the same way that multiple copies of print journals are maintained. In open access this activity does not need the publisher’s permission or for the library to enter into restrictive usage agreements.

So, while archiving is a long-term problem whatever the business model, open access may give more possibilities for a solution (or multiple solutions).

Academic Reward Structure

Many academic employers and funding agencies look to the publication record of researchers to assess the value of the researchers and their research. There are many ways in which the record can be used. The crudest way is to count the number of peer-reviewed papers published in a given time-frame. A slightly less crude measure is to study the impact factors of the journals a researcher has published in. The method, although common, has been widely criticised, not least by Eugene Garfield, the inventor of impact factors, who has said:

‘In many countries in Europe, I have found that in order to shortcut the work of looking up actual (real) citation counts for investigators the journal impact factor is used as a surrogate to estimate the count. I have always warned against this use.’⁹

⁹ [http://www.garfield.library.upenn.edu/papers/derunfallchirurg_v101\(6\)p413y1998english.html](http://www.garfield.library.upenn.edu/papers/derunfallchirurg_v101(6)p413y1998english.html)

The impact factor of a journal is an average measure of the impact of all the papers in the journal. Even highly prestigious journals publish papers with few or no citations (as well as some 'star' papers that attract many more citations than average). So the journal impact factor tells us nothing about the quality of an individual paper.

A much better measure is the impact of the individual paper itself. This can be calculated and is used by some granting agencies. Again, however, there are problems. What is the time-scale over which impact is measured? Some papers have immediate impact, for others their importance may not become apparent for many years (or even decades) after publication. Is quality related to impact? Actually, impact and quality are not uniquely related and some highly cited papers are cited exactly because they are considered to be wrong. (The classic example of this is Fleischmann and Pons' 1989 cold fusion paper which has been cited almost 700 times since publication.)¹⁰

Again, many of the issues of the use and abuse of quality indicators and their surrogates are independent of business models. What is becoming clear, however, is that open access dissemination of research does not discriminate against authors in terms of impact and may, in fact, increase the impact and dissemination of their research.

ISI have published two studies comparing the open access journals they cover in the *Journal Citation Reports* with subscription-based journals. Despite the open access journals being on average younger and less well-established than their subscription counterparts, ISI found that the impact factors of the open access journals compared well.¹¹

Interestingly, evidence of increased dissemination and impact resulting from making papers available in open access is beginning to grow. This might be considered in many ways unsurprising. It is intuitively obvious that if more people have access to a paper (through open access), it will be read and subsequently cited more. The journal *Limnology and Oceanography* publishes in a hybrid model where authors have a choice whether to pay a publication charge to make their paper open access or to not pay the charge and have their papers made available to subscribers only in the usual way. For papers published in 2002 and 2003 open access papers have been downloaded approximately three times as often as those available only to subscribers. It will be interesting to observe whether this increase in dissemination corresponds in time to an increase in citations.¹²

Data are also becoming available to show that depositing copies of papers in discipline-based institutional repositories also give authors a benefit in terms of increased dissemination and impact. Tim Brodey of the University of Southampton is undertaking a large study comparing the citations to papers that have been self-archived with those

¹⁰ Fleischmann M, Pons S.: Electrochemically induced nuclear-fusion of deuterium, *J Electroanal Chem* 261 (2A), 301-308, 1989

¹¹ <http://www.isinet.com/media/presentrep/essayspdf/openaccesscitations2.pdf>

¹² <http://aslo.org/lo/information/freeaccess.html>

that are only available through subscriptions. Already, he has shown in physics that the self-archived papers receive up to three times the number of citations as subscription-only papers.¹³

ISI has already shown that open access journals can give authors at least the same level of impact as subscription-based journals. It is a reasonable assumption that as discovery tools for papers in repositories and open access journals improve then the dissemination and impact of these papers will continue to increase, so giving authors enhanced possibilities to take advantage of the current reward structures.

Second Order Features – Dissemination beyond the Scholarly Community

While the primary purpose of a scholarly communication system is to facilitate peer-to-peer communication, there are a number of other groups who may be interested in and benefit from accessing scholarly research. These include, but are not limited to, medical practitioners, patient groups, subjects in medical trials, students, funding bodies, legislators, the media, and the interested public. How do subscription journals compare with open access in meeting the information needs of these groups?

Before answering this, we must first address a more fundamental question: Do these groups have legitimate information needs? Some who gave evidence at the UK House of Commons Science and Technology inquiry do not think so. John Jarvis, Managing Director of Wiley (Europe), raised the spectre of well-informed patients:

‘Without being pejorative or elitist, I think that is an issue that we should think about very, very carefully, because there are very few members of the public, and very few people in this room, who would want to read this type of scientific information, and in fact draw wrong conclusions from it. ...I will say again; let us be careful because this rather enticing statement that everybody should be able to see everything could lead to chaos. Speak to people in the medical profession, and they will say the last thing they want are people who may have illnesses reading this information, marching into surgeries and asking things. We need to be careful with this very, very high-level information.’¹⁴

Professor David Williams, an academic from the University of Liverpool and Editor of the Elsevier-owned journal *Biomaterials* went further, suggesting:

‘... there is no reason at all why all Higher Education Institutions should have the same access to scientific publications. Not all institutions work at the cutting edge

¹³ Brody, T. (2004) Citation Analysis in the Open Access World. *Interactive Media International*. (Available at http://eprints.ecs.soton.ac.uk/10000/01/tim_oa.pdf)

¹⁴ <http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/4030102.htm>

of science, technology and medicine, and many do not need access to the highest quality science publications’¹⁵

This is probably an extreme view. There is a growing body of opinion that believes that the results of publicly funded research should be made available publicly as a public good. As Sharon Terry of the Genetic Alliance put it, in relation to the US National Institutes for Health initiative to make all NIH-funded research publicly available:

‘This consumer-centered measure is a long over-due means by which to enhance public health education, speed the translation of genetic advances into quality, affordable health care, and inform and empower patients in their health care decisions. Ensuring the widespread dissemination of research knowledge is an essential and inseparable component of our nation's investment in research itself.’¹⁶

So, assuming that the wider audience should have access to the literature, which model best gives it that access. Under the current subscription model there are a number of ways to gain access. Readers can walk into a local university library, and assuming that the library really is local and walk-in rights are allowed, gain access. Public libraries can also help provided the reader is happy to wait (perhaps for a couple of weeks). Alternatively, the reader can take advantage of the pay-per-view option offered by some publishers (at up to \$30 per paper).

However, the alternative in the open access environment is that the reader can have free, immediate, and unrestricted access to the papers in which they are interested. No delay, no inconvenience, and no cost. The secondary audience to the scholarly literature is clearly better served by open access.

Of course, high level research papers are never going to have a huge readership amongst this secondary audience (they will not supplant soap operas and reality TV!). However, for a parent researching a child’s medical condition, a parliamentarian wanting to discover more about stem cell research, or a journalist writing an article on GM foods, it is surly better that they have access to the literature so that they can make better-informed decisions. In the medical field it is especially ironic that there is no end of freely available quack claims on the internet, but the peer-reviewed literature (often describing research that has been funded by the tax-payer) is hidden behind subscription barriers. Societies interested in public literacy in science, in education, the knowledge economy, and technology transfer should support open access and the public good that results from it.

Open access also allows funding agencies to better direct their research programmes. A funding agency that can access all of the papers reporting papers it has funded will be able to assess the research and make more informed choices on future research directions. Dr Elias Zerhouni, Director of the US NIH, has stated that one of the reasons for NIH

¹⁵ <http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/4042109.htm>

¹⁶ http://www.geneticalliance.org/ws_display.asp?filter=open_access

generating a central open access repository of all NIH-funded researcher is ‘...to manage more efficiently and to understand better its research portfolio, to monitor its scientific productivity, and to help set research priorities.’¹⁷ This model could be extended to all funding bodies and institutions.

Third Order Features – Profits and Surpluses

It has often been noted that scholarly journal publishing can be an extremely profitable business, with some publishers making profits in excess of 30%. Many society publishers use the surpluses they generate from their journal publishing programmes to support a wide range of activities that fit their mission statements. These activities are clearly hugely commendable and to be welcomed. However, the suggestion that we should retain the current publishing system so as to enable societies to maintain the surpluses raises some interesting questions.

The first, most fundamental question is whether societies should be supported through library budgets? The primary aim of the library is to enable access to the relevant literature for its users. The current system does not give the maximum access possible in the online environment and it could be argued that the library should not support a sub-optimal publishing system just to support learned societies.

The second question relates to the size of the surpluses made by the societies. A survey of April 2004 from the Association of Learned Professional and Society Publishers (ALPSP) and Blackwell showed that for the societies surveyed approximately 1/3 made no surplus from their publishing activities. For the rest, publishing revenues generally made a median of between 20 and 30% of the societies’ total revenue.¹⁸ So, while publishing revenue is important, for these societies it is generally not the main source of their income.

The American Physical Society provides an example of a society which makes no surplus, deliberately setting its prices to cover only costs and funds for investment in publishing. The APS manages to run a full programme without a publishing surplus. A further example is given by the Royal Society. The Royal Society has expressed concern at the thought of a move to open access and reduced surpluses, stating in their written evidence to the UK Science and Technology Committee that:

‘...the larger Societies (such as the Royal Society) would be forced to reduce the scale of their activities. The Royal Society's publishing income enables us to undertake a variety of activities for the benefit of science that would otherwise be impossible.’¹⁹

¹⁷ Zerhouni, EA.: NIH Public Access Policy, *Science*, 306, p. 1895, 2004

¹⁸ Baldwin, C.: What do societies do with their publishing surpluses? Available at <http://www.alpssp.org/news/NFPsurvey-summaryofresults.pdf>

¹⁹ <http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/399we77.htm>

However, ‘publishing and services’, of which journal publishing make up only a part, accounted for less than 8% of the Royal Society’s total income in 2003-2004.²⁰ For some societies, therefore, it would appear that the suggestion that their activities would be significantly curtailed if there was a change of publishing model is exaggerated.

The final question raised is whether a change in business model would actually result in an end to publisher profits or surpluses. For some publishers (especially societies) it may be that a new model will allow greater profits. These publishers are currently being squeezed on the subscription model as a greater proportion of library budgets go on big deals from large publishers. In the new model the small publishers will compete for authors – a constituency they have traditionally served well. For the larger publishers – the commercial publishers and the pseudo-commercial societies – there may be an end to the high profit levels currently enjoyed. It has been noted that the current subscription model leads to a dysfunctional market in which traditional competition fails to work correctly. A move to a new model should introduce greater competition and may result in a greater cap on price rises and a reduction in profits. However, even if they are reduced, there will still be profits to be made and we should not consider the retention of a sub-optimal system as a fair price to pay to maintain high profit levels for a small number of publishers.

Conclusion

In this paper we have looked at open access as a model for scholarly communications and compared it to the current subscription-based system from the viewpoint of a number of stakeholders. We have looked at how the system serves researchers (as both authors and readers), the wider readership, and publishers (both societies and commercial publishers). Table 1 summarises the differences between the two systems.

Table 1: Comparison of how subscription-based and open access models fulfil the needs of a scholarly communication system

		Subscription-based, closed access	Open Access
First Order	Registration	Traditional, on publication of peer- review paper	On completion of article, by depositing in repository ✓
	Certification	By independent scholars =	By independent scholars =
	Awareness and	Abstracting and	As for subscription-

²⁰ <http://www.royalsociety.ac.uk/publication.asp?id=2707>

	Accessibility	indexing services, table of contents alerts, etc.	based journals, but with additional tools as articles available through additional routes with greater accessibility ✓
	Archiving	At publisher	Distributed – publisher, local and national libraries, etc. ✓
	Reward Structure	Dependant on reputation of journal	Dependant on reputation of journal – with open access possibly leading to greater impact, therefore greater citation and journal reputation ✓
Second Order	Access to wider readership	Limited – university walk-in, document delivery, pay-per- view	Unlimited – access for anybody with internet connection ✓
	Ability of funding bodies and institutions to manage research programmes	Limited to what funding body or institution can subscribe to	Unlimited access ✓
Third Order	Profits and Surplus	Large for some commercial and society publishers ✓	Potentially smaller (although not necessarily for all publishers)

It can be seen that with the exception of certification through peer-review (which is independent of business model) and the generation of large profits the open access model better meets the information needs of researchers and the wider readership. It is for this reason that an increasing number of researchers, librarians, academic institutions, research funding bodies, societies, and governments are looking to open access as a future model of scholarly communication.

All of the stakeholders in the system will need to adapt to the new model and the changing environment. This is especially true of those who have traditionally mediated between the authors and the readers: publishers, subscription agents, and librarians. The library community has proven most welcoming of open access as it allows it to better meet the needs of their users. They have fewer vested interests in retaining the current system and are much more willing to experiment. This can be seen in the libraries that are digitising older (out of copyright) material and making it freely available, setting up open access institutional repositories, working with academics in their institutions to launch new open access journals, and incorporating open access journals in their local catalogues.

The academic library of the 21st Century will be less concerned with *collecting* the primary literature than with helping readers to *navigate* through the literature and *disseminating* research results that are generated within its own institution. The challenges are great, but so too are the benefits to research, the academic and library communities, and society in general.