The “official” word on the role of a publisher:

(Not necessarily the official word of Longwoods Publishing Corporation, but it is good information)

An America perspective provided by U.S. National Library of Medicine

Electronic Scientific, Technical, and Medical Journal Publishing and Its Implications: Report of a Symposium.

Publication Business Models and Revenue

Scholarly publishing in any medium requires substantial resources beyond content creation costs. Publishers are providers of value-added products and services. They perform crucial functions by producing documents in different media, performing editorial and design work, marketing the material, and connecting readers to writers, and so forth. All of those functions involve costs. Even a not-for-profit **publisher** has to at least recover costs and generate a reserve.

It is useful, therefore, to examine sources and types of revenue, ways of raising revenue, and different business models, particularly in a world where digital publishing is becoming much more the norm. The business models are related to what information is being published, for what audience, and how it will be accessed. In a digital world we no longer need to have a single standard mode (i.e., the journal). We can think about presenting information in lots of different ways and repackaging it and distributing it in different combinations.

What is the **role** for government in this process? Much of what we are talking about—scientific, technical, and medical information and scholarly communication includes information that benefits the general public either directly or indirectly, far beyond the community of scientists and scholars who are using it. There is a public interest in the dissemination of knowledge, in addition to its creation.

Of course, the overriding question for this symposium is what impact the digital publishing world is going to have on science itself, that is, on the scientific enterprise. For instance, how are different business and access models going to affect the quality and productivity of science, collaboration at a distance, access for developing countries, the professional review and career process, peer review, and other aspects of scientific research?

The discussion that follows looks at the major business models from several stakeholder perspectives. It begins with an overview of trends in the commercial STM journal publishing industry, followed by a perspective from the library community, which serves as the intermediary between STM publishers and the academic user community. Two contrasting publishing paradigms are presented next: the traditional "reader-pays" model, as implemented by John Wiley & Sons, Inc. and the newer "open-access," "author-pays" model of the Public Library of Science. The section concludes with a review of issues raised in the discussion with the expert audience.

TRENDS IN COMMERCIAL (FOR-PROFIT) STM JOURNAL PUBLISHING[1]

Consolidation of Publishers

The for-profit STM publishing market is "mature," which means that there is only modest growth in revenue, and it is difficult for new players to enter that market. In a time of immense change, publishers are experimenting with new and different ways of working in this marketplace. We should expect, for example, to see consolidation among publishers continue, even as the customers (mostly libraries) continue to launch antitrust actions against buyouts or mergers between significant STM players. That said, it is highly unlikely that any scientific discipline will have more than two or three information providers in the years ahead.

Moreover, the form that consolidation will take may change. In addition to the already familiar phenomenon of big STM companies buying up smaller ones, we should look for smaller companies to link together in an attempt to provide levels of service and functionality similar to those offered by the big companies.

Bundling

A mature market should be expected to intensify downward pressure on journal prices. This is already true in academic research institutions, where the open-access movement is being created in part to put pricing pressures on STM publishers, both for-profit and not-for-profit. Publishers will likely counter such pressures by targeting the market share of other publishers, rather than looking for significant increases in library budgets. For example, Reed Elsevier is now offering libraries access to previously unsubscribed journals, not by charging for each journal separately, but simply by insisting on an increase in total expenditures over the prior year. This practice has been referred to as supersizing, or the big deal. In other contexts, it is called bundling or tying. Bundling will have the effect of greatly increasing the number of Reed publications available through particular libraries, at the expense of having less well positioned publishers lose those customers entirely.

Downstream Value Migration

We also should expect commercial publishers to seek so-called downstream value migration and to target competitors that for various reasons are thought to be vulnerable. These "competitors" may include, for example, former partners such as secondary publishers or

subscription agencies. By moving downstream, more publishers will attempt to disintermediate[2] the wholesalers and reap the wholesalers' marginal revenue. Disintermediation strategies that do not provide significant new value to end users are probably ineffective, but that does not mean publishers will not try such strategies.

Targeting Vulnerable Competitors

For-profit publishers are likely to target the not-for-profits more aggressively in the future. The reason is that the not-for-profits may be perceived to be slower to respond to technological capabilities and to be less competitive, though they often have substantial goodwill in the marketplace. There are many prospective targets among the small university presses and learned societies.

Creation of Meta-Content

Metadata are often defined as “content about content,” and they can be exploited or created as bibliographies, indexes, and, most important of all, through search engines. Publishers are keenly aware of open-access publications and are looking for ways to make money from them. Open-access publications are, by definition, available for any individual organization to use without permission or fee. Thus, one way for publishers to use open access is to create search engines for open-access content. Even more powerful is to integrate open-access content with proprietary content for search purposes. In other words, open-access publications provide publishers with lower costs for content development while enabling for-fee services. From an economic point of view, copyright transfer to publishers is unnecessary for supporting publishing profits.

The Shift to Web Services

The most significant economic response to open access is likely to be in the creation of Web services, in the form of dynamic substitutes for the publication of fixed content in hard copy. In a Web service, a **publisher** will provide online software that manipulates or processes data that are up-loaded to it by a user. The user creates the content and then pays the service provider for the online processing. Copyright is irrelevant for models like this, even as the economic potential is very great.

Diversification of Customer Base

If the academic channel is mature (i.e., lacks the potential to grow rapidly, if at all) publishers will seek new sales channels. The most likely one, because of its size and creditworthiness, is sales to businesses such as engineering, chemical, or pharmaceutical companies. Thus, publishers' capital investment may shift from pure research publications toward applied research and engineering.

In 5-10 years, open-access publications will coexist with proprietary ones, and we will witness ingenious publishing strategies designed to extract economic gain even in the absence of a proprietary distribution model.

THE LIBRARY PERSPECTIVE[3]

The scholarly journal has existed for more than three centuries. The journal provides a trusted place to document discoveries, disseminate ideas, and codify prestige. This three-century tradition will not easily change.

Responses of Libraries to Recent Cost and Marketing Trends

Research libraries are the intermediaries between two types of economies. They buy content in a market economy and make it available in the nonprofit, academic sector. Thus, libraries are often caught in the clash between the market and the gift economies. In this position, the libraries have witnessed decades of journal price increases, with average annual increases for the past 5 years being around 8 or 9 percent. It is a very inelastic market, because as the prices increase, libraries are not able easily to withdraw or cancel the costliest journal subscriptions. Data over the past 15 years show that journal prices have increased by 215 percent, yet libraries canceled only about 5.1 percent of their subscriptions. Despite the apparent lack of elasticity in this market, the ability of libraries to continue to afford all research content, in the face of escalating STM journal prices, is certainly cause for concern.

STM journal price increases and inelasticity have increased in the past 2 years as a result of two developments. The first is that the **publisher** strategy of the so-called big deal—the multiyear, all-titles packages sold by many publishers to libraries and consortia—has begun to unravel. Some research libraries intend to withdraw from journal package arrangements, because of budget reductions and the low or non-use of a significant proportion of titles in the package. Libraries are beginning to push for more finely tuned licensing models, whereby they can select only the content that their users read.

Additionally, big deals frequently are priced in a way that is hard to undo or to understand. For example, the University of Minnesota library worked with Elsevier Science to back out of its big deal and found that, because of current electronic and print pricing structures established by this **publisher**, reducing the subscription list from 750 titles to 650 titles and moving to electronic-only would result in a higher per-title cost.

A second sobering event has been the demise of some of the industry intermediaries such as the subscription agents. One major serial vendor declared bankruptcy, leaving unpaid **publisher** debts reported to be some $73 million—money that had already been collected from library customers and who ran the risk of not receiving their paid subscriptions for 2003. In the end, most publishers agreed to “grace” the libraries' subscriptions, but at a huge loss to their organizations.

The likelihood of increased revenues for libraries in the near term (particularly increases that match inflation in journal prices) is low. A recent informal survey conducted within the Association of Research Libraries suggested that nearly half of respondents expected cuts in some areas and the prospects were high for further budget reductions in the coming fiscal year. Library budgets, a major source of revenue for publishers, are obviously stressed. The volatility in the**publisher** marketplace will probably continue, as will the push from the library community for the more finely grained models that allow them to make some choices.

Implications of Changes in Journal Format and Content

Early usage data indicate that much more use results from electronic content, which is available to licensed users anytime and anywhere. Recent studies of university users nationwide have revealed an overwhelming preference for electronic format. In such surveys, nearly half of all faculty in most disciplines reported they use online materials for the majority of their work.

Yet interestingly, despite that preference, other studies of perceptions of convenience and ease of use show a dramatic gap in how the library performs in delivering electronic content. Users cite evidence of their inability to manage such content, to navigate it well, or to deal with the myriad different distribution platforms and channels.

In addition, there is a subtle shift from our concept of publication as product to the notion of publication as process.[4]There are a number of examples where online discussions really have the form of being an actual publication. For libraries, which are in the business of managing copyrighted, fixed works, that presents a real challenge. Dynamic “publications” pose a challenge, too, to the STM publishing sector in terms of pricing. How should a **publisher**develop models that support publications that are not fixed or well bounded?

The Changing Role and Influence of Libraries

A recent Morgan Stanley report[5] suggests the potential for reduced operating costs for libraries—no periodical check-in, no binding, no claiming. However, the necessary infrastructure to support the investment in electronic content, to federate it appropriately, to ensure its longevity, and to archive it, requires greatly increased expenditures on the library side. Any subscription savings will be needed to support additional electronic infrastructure. It is critical to focus community attention on issues of infrastructure, interoperability, and the kinds of protocols that will allow that federation to happen.

Libraries have a **role** in seeding and supporting alternative, competitive approaches to electronic publishing. Librarians understand content, its use, and the users. There are many examples of libraries actively engaging with new types of STM journal publishing. A growing number of institutional libraries, such as Cornell and Michigan, are starting incubator and production services to help small publishers move to electronic publishing. These projects represent a move away from libraries' traditional **role** of providing access to information toward facilitating production of information, and it may help libraries reconceive the relative position they have long held in the STM information sector.

Go to:

THE COMMERCIAL SUBSCRIPTION-BASED MODEL[6]

One fairly typical example of a commercial STM **publisher** based on a reader-pays model is John Wiley & Sons, Inc., which is a global, independent **publisher** established in 1807. Wiley's three major areas of publishing today include STM journals, higher education materials, and professional and trade information. Theirs is a fairly diversified publishing portfolio, with about $1 billion in annual revenues. Wiley publishes 400 STM journals online

on its*InterScience* platform, which was established in 1997. This resource now contains about 2 million pages of information.

Because Wiley uses a customer- or reader-pays model of delivering STM journal content, the **publisher** places a great emphasis on sales staff worldwide—staff that it did not use in the conventional print environment, where it was marketing via direct promotion to scientists and libraries. As Wiley embarked upon the development of licenses for its electronic journals, it did so very much in consultation with its major institutional customers. This resulted in flexible sales options. The company did not want to make an early commitment to one preferred option early in its electronic publishing, so it provided a menu of print and online options.

Many not-for-profit organizations are still in the early stages of developing bundled journal licenses for their institutional customers, whereas for-profit publishers have undertaken much more aggressive licensing in recent years, as noted above. Wiley currently uses what it calls “Basic Access” and “Enhanced Access” licenses. The basic access license offers title-by-title access, with some concurrent user restrictions. The basic access option is most often suitable for the smaller institution or department. The enhanced access license does not require that an institution subscribe to all Wiley titles that are available electronically. The institution can choose, but it is establishing a license for a larger body of work, with no concurrent user restrictions and with additional benefits such as negotiated price caps. Wiley's business model also emphasizes direct relationships with its customers.

Finally, Wiley constantly invests in new features and enhancements for its electronic publications. Some of the most recent ones include content alerts to apprise its audience of what is being published, delivery of content to mobile edition platforms, and publishing online in advance of print publication.

Reasons That Wiley Will Not Use the Author-Pays, Open-Access Model

There are several reasons why Wiley has not elected to use the author-pays, open-access route. Most of Wiley's professional society partners are quite wary of any economic system that tends to favor author payment for publication. Given that the bedrock of scientific communication is peer-reviewed journal literature, Wiley's view is that any system that charges the author or a sponsor of the author in order for that author to be published is going to favor the author's desire to become published.

What has evolved in scientific communication, for the most part, is a system where the reader pays, or an agent for the reader is paying, because that naturally introduces an objective filter for the validity and the value of the work. One should not assess the value of information on the basis of the cost to produce it. Instead, the value of the information is its value as a tool, as a productivity multiplier in society. Wiley, therefore, has very much supported a customer-pays model for the business, because the company believes it ultimately enhances the value of scientific information for those who should value it most.

Nevertheless, Wiley does offer free access, from the time of publication, to developing countries. For its biomedical journals, it provides free or inexpensive access through the

Health InterNetwork Access to Research Initiative (HINARI) of the World Health Organization (WHO). HINARI puts content into the hands of investigators in parts of the world who truly cannot afford such information.

Go to:

THE OPEN-ACCESS, AUTHOR-PAYS MODEL[7]

The Public Library of Science (PLoS) is a new scientific **publisher** with an open-access business model, which has also been called a midwife model.

Reconceptualizing the STM Publishing Business Model on the Internet

Before the Internet, there was no choice but to charge users of scientific publications, because the most efficient way of making them available was by distribution in the print format. In the print environment, every potential user represented an incremental expense for the **publisher**, and any business model that did not take that into account was doomed to economic failure. The print system thus had the consequence of limiting distribution only to individuals and institutions that were willing and able to pay, and this system was accepted as a necessary evil. With the advent of the Internet, however, that model is no longer necessary.

The traditional business model has also had another indirect consequence that has been subtle but equally unfortunate: It is based on selling research articles. Some scientific publishers can assert that the content of their journals is valuable property that they own, control, and sell for a profit. This is a barrier to open scientific communication that now needs to be reconsidered.

The worldwide spread of the Internet now leads to fundamental and positive change in the economics of scientific publication, as well as the technical means of distribution. The change makes possible the realization of Jefferson's ideal of the infinite, free dissemination of scientific ideas and discoveries. What had been an impossible ideal in the pre-Internet era—to make the published information an open public resource—is now possible, because the cost to the**publisher** no longer scales with the number of copies produced or with the number of potential readers of a publication. Accordingly, users are not restricted to a business model that charges per access or per copy. In fact, we see that a business model that restricts the distribution and use of the published work is working against the interest of science and society. The economic model of print has become unnecessary, anachronistic, and inefficient and now stands in the way of the ideal of open and free dissemination. If we do not need to charge readers for access, then we should not charge for it.

“Open Access” Defined

An open-access publication is one that meets two conditions. The first is that the copyright holder (either the author or the **publisher**, if the copyright has been transferred to the **publisher**) grants to the public a free, irrevocable, perpetual right of access to, and a license

to copy, distribute, perform, and display the work, and to make and distribute derivative works in any medium for any purpose.

The second condition is providing readers with open access to the work. Authors or publishers achieve open access by making a complete version of the article and all supplemental materials available in some suitable standard electronic format, deposited immediately upon publication in at least one internationally recognized, independent online repository that is committed to open access. One well-known example of such an open access archive is PubMed Central, maintained by the National Library of Medicine.

Advantages of the Open-Access Approach for Science

The practical advantages of true open access are already very familiar to many researchers in the life sciences through two longstanding, amazingly successful open-access experiments—GenBank and the Protein Data Bank. The success of the genome project, which is generally considered to be one of the great scientific achievements of recent times, is due in no small part to the fact that the world's entire library of published DNA sequences has been an open-access public resource for the past 20 years. If the sequences could be obtained only in the way that traditionally published work can be obtained, that is, one article at a time under conditions set by the **publisher**, there would be no genome project. The great value of genome sequences would be enormously diminished.

More significant is the fact that open access is available for every new sequence, which can then be compared to every other sequence that has ever been published. The fact that the entire body of sequences can be downloaded, manipulated by anyone, and used as a raw material for a creative work has led thousands of individual investigators to take up the challenge of developing new data-mining tools. It is such tools and the new databases that incorporate sequences, enriched by linking them to other information, that have made the genome project the success that it is today. By adapting the genome model of open access to the publication of scientific literature, we could see a similar flowering of new, investigator-initiated research and creative, value-adding work.

Open Access Supported by the Author-Pays Business Model

Unlike the subscription-based model, the PLoS plans to charge the costs of publication to authors and their sponsors. From the standpoint of business logic, this is by far the simplest and most natural model. It is natural, because the cost of online publication is scaled to the number of articles, not the number of readers. It also makes sense from the standpoint of institutions that pay for research. Their mission is to promote the production and dissemination of useful knowledge. From that perspective, publication is inseparable from the research that they fund. The PLoS initially plans to charge about $1,500 per published article, with no charge to authors who cannot afford to pay.

Research sponsors should welcome this model, because for a fraction of 1 percent of the cost of the research itself, the results can be made available to all readers, not just to the fortunate few who are at the lead research institutions (i.e., institutions that can afford to pay for site licenses).

In the short term, of course, open access will generate an incremental expense, but in the long term, once the scientific community has made the transition to open-access publication, there will actually be savings to the major research sponsors because, after all, they are ultimately the ones who pay for library and even individual subscriptions. The Howard Hughes Medical Institute (HHMI) is one of the largest funders of scientific research in the life sciences, and it has already endorsed this model. The HHMI has agreed to provide budget supplements to its investigators, specifically to cover author charges for open-access publications.

The PLoS will also produce printed editions of its journals for sale to institutions or individual subscribers at a price intended to recover only the cost of printing and distribution, everything downstream of producing the published digital document. The print subscription is estimated to cost approximately $160 a year. There will be no cross-subsidies between the open-access online publication and the break-even print publication operation.

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ISSUES RAISED IN THE DISCUSSION

Relative Merits of the User-Pays and Author-Pays Models

A number of points and counterpoints were made in favor of both types of models, in addition to those raised during the speaker presentations, summarized above. The following arguments were presented in favor of the user-pays model and against the open-access model, in which the author or the institution funding the research pays.

Devaluing the overall utility of the information. There is an inherent bias in a system where the author pays, which ultimately would devalue that information in terms of its overall utility as a productivity multiplier. There are two reasons for this: The first is that a less selective filter would be imposed. And second, is that an economic system where the author pays is naturally going to favor the author. That means that any entity wanting to make decisions about that work needs to impose yet another filter, at some cost, in order to determine how that work stacks up against others. Most scientific publishers would say that selectivity is probably not exercised all that often by authors, because they seek to get their work out. It is necessary to optimize two variables. One variable is the dissemination, and the other is the filtering. The author-pays model moves the filter boundary, whereas publishers also have an interest in disseminating the work as broadly as possible. It is a matter of getting the balance right between those two considerations.

The difficulty of convincing research funders to subsidize authors' page charges. According to statistics presented by Donald King of University of Pittsburgh, roughly one-third of STM journal articles are funded by the federal agencies, about a third of them are funded exclusively within the universities, and the rest by industry. How will the funders of these authors be convinced that they need to pay an additional page-charge fee of $1,500 above the money that they are already paying the authors to prepare those articles? It is necessary to have different kinds of arguments for those three different constituencies. In doing that, it

also may be necessary to go further in trying to understand the funding priorities and budget profiles in each sector.

Organizational missions and market forces as determining factors for business models. One aspect about the discussion of business models that has not been adequately discussed is the question of the mission of the organization that is doing the publishing. That does have a significant effect on the business model that is selected. For example, various societies make use of the page charges as a way of supporting their member subscriptions, keeping the member rates low, so that they can provide more benefits to their members. A commercial **publisher** or a university press cannot really charge page charges, unless it is a journal they are publishing on behalf of a society, because that is not viewed as appropriate. It would be seen as gouging. Color page charges might be acceptable, because color printing constitutes an additional direct cost for the **publisher**.

One should not look at the customer-pays model, as opposed to the open-access model that has been proposed as an author-supported model, in absolute terms. Indeed, many professional societies have had a hybrid model, where they have benefited from subscriptions at the same time that they have used author page charges and other subventions to help support their publishing programs and to keep the costs to the customer down. That kind of hybrid model has been determined over time by market forces.

The subvention of publishing costs by the payment of page charges and subvention for carrying color reproduction charges are examples of how some organizations have found an effective balance. They have done this even in a user-pays model, implementing certain charges that are passed on to the author, where the needs of the author are seen as unique, and something that the author would want to pay in order to benefit from a service. Most organizations, however, do not make that a criterion for a decision of acceptance or rejection; it is merely a matter of presentation of the work.

The factor of author selectivity favors a reader-pays model. Finally, the value and the future of any publication are going to be determined mainly by what authors want to do, where authors want to publish. For example, the *New England Journal of Medicine* is open to all authors; 4,000 scientific articles are submitted to the journal each year, with no charge for submissions and no page charges if the paper is accepted. The **role** of a biomedical or scientific journal is to be critical and selective. That is in part why authors want to publish there. If authors or their sponsors have to pay, is this selectivity going to be compromised? How is the PLoS going to exercise the functions of peer review and of being selective? Is that part of the PLoS model?

Arguments in favor of the author-pays, open-access model and against the reader-pays model included the following:

No correlation between a reader-pays model and the maintenance of high-quality standards. There have been a number of studies that have looked at the relationship between the price and measures of quality of scientific journals—citations, their assessment by peers in the field, and so forth. They have found, overall, a dramatic negative correlation between price

and quality. The notion that users' paying for journals somehow upholds high-quality standards is not supported by the data.

Every scientist, at least in the life sciences, knows that most of the journals that are regarded as third-tier journals of last resort, but that publish 99 percent of the articles, have no author charges but very high subscription costs, whereas the premier journals typically wind up charging authors in color charges and page charges something on the order of $1,000 or more.

The authors' overriding interest to be read and to enhance their professional reputation benefits from open access. The factor that serves to maintain the quality of the work that authors submit for publication is not that they think it is extremely difficult to get a paper published. One can always find a mediocre journal that will accept just about anything. Rather, it is that the authors know that sooner or later their peers are going to read what they write, and their reputation depends on it being good. That is ultimately what determines their career advancement, their status in the field, and so forth.

The point that publishers would favor the author by charging the author is absolutely right. The public good that is produced by scientific research is very special. In contrast with other public goods, the value of scientific public goods increases with use, and it is specifically in the author's interest. It is very much a part of the motivation of the author of a scientific paper to have access to that paper as widespread as possible, more and more used, thereby enhancing the value to the community, as well as the interests of the author.

The motivations and interest of all sectors in scientific research should be supportive of an author-pays, open-access approach. The interests are similar for government, academia, and industry, namely, the motivation to support the research and to encourage the authors to publish it. The motivation to pay an increment of less than 1 percent of the total research cost to make it much more valuable to the people who are supposed to be served by it is presumably the same for all three sectors that sponsor research.

Author selectivity not dependent on a reader-pays model. The journals most attractive to authors tend to be the ones in which they have the least chance of having their papers accepted. The PLoS certainly has factored that into its development strategy. It intends to be very selective from the beginning; it is selective not just on the basis of whether the article is good enough to be published somewhere else, but in selecting papers that are likely to be of interest to a very wide audience, precisely because the PLoS considers that this is going to be important in terms of developing the journal identity and as a magnet for submissions.

Page charges not a disincentive to authors. If we go to a model where the institutions are covering page charges as an essential part of research, it will make it even less of a disincentive to authors. Established publications may not need to worry about converting to a system based on author page charges, and the resulting open access would be better for the community they are supposed to be serving.

The Effect of Different Publishing Business Models on the Long-Term Preservation of Digital Journals

The focus of publishers in electronic publishing is mainly on the actual production of the work and its dissemination on the Web. They generally have not addressed the important issues that deal with long-term preservation, including the integrity of the information and its migration to new platforms. Reed Elsevier has begun an innovative project with the Royal Library in the Netherlands, where they are looking at how to address those kinds of long-term preservation problems. The solutions will be costly, and the costs will need to be shared between publishers and libraries, ideally with support from governments and other institutions.

The PLoS definition of open access includes the immediate deposition of the publication with some organization that is committed to long-term access. There is no certainty, however, that organizations will actually follow through on this commitment. One of the advantages of print publication is that with enough copies produced, very long-term preservation is more or less guaranteed, which is not always the case with electronic publications.

The PLoS nonetheless does have plans for providing archival stability for its information. What is important, however, is not only that somewhere there exists a permanently preserved copy of the information, but that it is permanently openly available to everyone. Of course, one would be hard put to find a more trusted and trustworthy archival repository than the National Library of Medicine, which has agreed to archive PLoS publications, but the fact that the information is also going to be freely and widely distributed, and that it will exist in many institutional servers, provides another measure of reassurance. In the view of some observers, it would be a mistake for institutional repositories to agree to take on the job of archiving information without requiring the publishers to grant unrestricted open-access rights.

One example of a professional society's approach to the archiving problem is the American Physical Society (APS), which has put all of its content going back to 1893 online. It is all linked and searchable, and PDFs are also available. Current content is added as it becomes available. There will be costs in changing the format of this in the future. The society also recognizes the concerns of libraries and of the entire scientific community that this historical record might be lost.

What would happen if the APS were to go under? There is a full mirror site of the entire archive that is already accessible and tried at Cornell University, which is where *The Physical Review* originated back in 1893. The journals are also deposited at the Library of Congress. If the society is terminated, it has an agreement with the library that these holdings will be put in the public domain, freely available to anyone. This is the society's primary effort for ensuring continued availability of its archived publications.

There appears to be a clear distinction between the perspective of the professional society as a **publisher** and the private commercial **publisher**. The professional society has a very strong vested interested in archiving, whereas the private **publisher** really has none.

Issues in Transitioning to the Open-Access Model

The APS also has an open-access model for one of its journals that it started 5 years ago—*Physical Review Special Topics, Accelerators and Beams*. It is a small journal, but it is available completely without access barriers. It is not, in fact, free because it does cost something to publish it. The costs are recovered through the sponsorship of 10 large particle accelerator laboratories around the world. It is also cosponsored by the European Physical Society's Interdisciplinary Group on Accelerators. At this point it is only a limited experiment, however, because the APS has other expenses that it must recover, and it has to see whether these things work or not. The society cannot afford to bet its entire future on the open-access approach, because it still needs to recover its costs.

The APS did propose that the society would like to put everything online without access barriers. It could do this right now if every organization that now subscribes to its journals would make those subscriptions sponsorships, providing enough to recover its costs. Then it could be opened to everyone else. The risk would be that institutions might be tempted to decide that since all journals are available, they no longer have to pay anymore. The libraries would love that, but then the **publisher** would go under.

The question thus arises as to whether there are any paths or way stations between full open access and the current subscription-based model. One possible approach might be for a **publisher** to give the author an option for a surcharge. The author could pay extra to have immediate open access to his or her article, whereas all the other articles of authors who did not pay the surcharge would be free after 6 months. The amount of the surcharge, however, must not be so high as to be a disincentive. Nonetheless, there is clearly difficulty making that transition. The PLoS had to get a large grant from the Moore Foundation to buffer the financial risk for its experiment. Without the grant, the PLoS could not have been started.

Publishers also could ask the institutional subscribers that now provide most of the revenues—mostly academic institutions that probably accept the philosophy that journals serve the public interest—to continue to pay their subscription fees at the current rate for some interval of years to be specified, during which time the **publisher** would make the transition to open access. With such a multiyear commitment of support, the **publisher** would have a stable revenue source that is not put at risk by making that transition. It can try to make the transition, at the end of which time it can determine whether it looks like it is going to be a self-sustaining model. One would hope that the current subscribing institutions would not take the low road and try to undermine the process by free riding and saving themselves a little money. They should see that it is in their own best interest in the long run to encourage the open-access approach.

Such an arrangement is not unlike what Ohio Link does, but that initiative came up with some extra money that enabled the organization to open its journals to the institutions in the entire state of Ohio. That is the kind of catalyst that may be needed: a bit of extra money.

It might be best to view this approach as transitional, because ultimately the sensible thing would be for the research sponsors to cover the publication costs as an essential part of their

mission of promoting and disseminating research. In the short term, it is probably necessary to catalyze the process.

The problem with the temporary approach, however, is what happens if it does not work? It is very hard to get people to resubscribe. Once a library has given up the subscription and used the money somewhere else, resubscribing becomes viewed as a new acquisition.

To counter this problem, the sponsoring institutions could be provided an incentive to maintain support. For example, if a university provides $5,000, or whatever the amount may be, then everyone from that university has open-access publishing rights in the journal. This would make it a competitive advantage for the university to offer this. If you treat it as kind of a credit pool that could be drawn on by authors from the subscribing institution, then even in the open-access model, they are getting some special benefits beyond what the nonpaying institutions are getting. It becomes an added incentive.

Advertising Revenues in Electronic Publishing

Nearly 50 percent of one **publisher**'s total costs are attributable to editorial, peer-review, and production processes, items other than printing, paper, and distribution. Although many STM journal publishers have no advertising revenues, advertising for some print journals underwrites more than 50 percent of the total cost of operation. For such journals, the electronic-only model, assuming it had less advertising, might save on some costs, but would actually result in a major lost source of revenue.

For journals with broad member or individual circulation, most advertisers still seek print as their means of reaching that audience. They are not yet ready to move away from print advertising to online-only in scholarly publications, although this may not be the case with other consumer-oriented publications. It would be very risky to go to an online-only strategy for STM publications if the **publisher** currently relies on such advertising revenue.

Sponsor-Supported Open-Access Model

Many researchers like the open-access model because it is the sponsor of the research who shares with the author the interest in having the product disseminated as widely as possible.

For example, when the National Institutes of Health (NIH) supports most of its research, it is because it will be published and made into a public good. To fulfill the goals of supporting the research at all, the sponsor generally carries a responsibility to see that the material gets published. For this reason, the HHMI model that supports the PLoS is a very good one, and many scientists who publish research would like to see that kind of approach propagate. The question that was raised earlier in this regard still remains, however: Is there a way to persuade the less well funded science agencies to take on the responsibility to pay extra for publication costs? This would be in contrast to the present model, which puts the author payment responsibility into a grant in which the author has discretion whether to spend that money for publication, or to spend it for support of another graduate student or some other research cost.

One can make a strong argument that the publication costs amount to less than 1 percent of the research costs (in biomedical research, at least). If that is true more broadly across the different disciplines, if you had to take a 1 percent cut from other aspects of the budget to do it, it is a plausible argument that the return on that investment would be extremely high, as opposed to the 1 percent cut from other areas, because all the grantees and all the research that an agency is funding would be providing much freer access to a more extensive body of information. The purpose of funding of research is not just to serve the immediate community of the grantees, it is the wider scientific community and the general public that should be much better served by the information.

At the same time, according to Patrick Brown, when this issue has been raised with respect to NIH funding, many NIH grantees have objected if this were to come at the expense of a 1 percent cut in research funding. They argue that there is not enough research funding to go around already. So clearly it is a controversial proposal.

Go to:

Footnotes

1 The information in this section is based on the remarks of Joseph Esposito, president and chief executive officer of SRI Consulting.

2 "Disintermediation" is the process by which new Internet-based products and services replace products or services that existed in the pre-Internet era, particularly ones that serve as intermediaries between the provider of a product or service and the end user.

3 The information in this section is based on the remarks of Wendy Lougee, director of the University of Minnesota Library.

4 See discussion in the chapter on "What Constitutes a Publication in the Digital Environment?"

5 Morgan Stanley Industry Report. 2002. Scientific Publishing: Knowledge Is Power.

6 This section is based on the remarks of panel participant Brian Crawford, vice president and general manager, Life and Medical Sciences, John Wiley & Sons, Inc.

7 This section is based on the remarks of panel participant Patrick Brown, professor of biochemistry at Stanford University and a cofounder of the Public Library of Science (PLoS). For additional information about the PLoS, see http://www.plos.org/index.html.

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- THE OPEN-ACCESS, AUTHOR-PAYS MODEL
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