

The Freedom of the Internet

*For a century, printed professional journals have been the standard forum for the publishing of scientific results. But the system is in a state of dilemma. A small number of large publishing houses dominate the market, and researchers are being subjected to ever greater "pressure to publish." In short: the scientific community has increasingly come under the dominion of commercial special interests. **ROBERT SCHLÖGL** and **THERESA VELDEN** offer a way, via the Internet, to lead publishing out of the crisis – and knowledge into the realms of freedom.*

The dissemination of observations, results and ideas is a central element of scientific endeavor, and over time, two main forms of publishing have developed: the book and the journal article. Today, publishing in scientific journals – especially for natural sciences – is the most important form of communication. The system works like this: the scientist obtains funding for research, produces the content, writes the text and cooperates in the review process; the publisher organizes production and distribution, as well as peer review for quality control; and the library procures the funds to purchase the journals, catalogs and archives them, and gives scientists access to the printed matter on a lending basis.

This division of labor worked very well for about a century. Few researchers thought twice about the expense and the truly unacceptable personal price paid in surrendering to the publisher the exclusive rights to their work. The "publish or perish" paradigm in the funding of scientific research has not only led to an enormously inflated publishing volume, but has also contributed significantly to the watering down of content, further deepening the publishing crisis. Consequently, the evaluation of projects, scientists and institutions based on direct examination of content has been rendered more difficult – giving rise to the use of strictly formal criteria for evaluation, such as the *impact factor* and *citation index*. At present, these instruments are standing firmly in the way of spreading new forms of scientific communication.

Because scientists are usually required to yield the exclusive distribution rights for a scientific article to the publishing house, and since researchers in need of the information have no choice but to use what has been published on the subject in question, there are no structural market mechanisms in place that would allow the con-

sumer to choose between various providers. This allows the publishers to price-gouge and profiteer – and promotes the development of an oligopoly of large publishing firms. The inflexibility of these companies when it comes to using the possibilities of the Internet as a platform for scientific communication and working procedures outside of the usual scope of "printable" publications, along with a condescension in the establishment of scientific evaluation criteria, have led to the so-called journal crisis.

Alliances between libraries and organizations have tried to negotiate solutions to the material and content problems with the oligopoly – without success. The inability of the current system of scientific communication to react to the prevailing substantive and economic challenges has led to a worldwide intensification of efforts to change the scientific research process.

Paper warfare – the sign of a new age

Boycotts, rapidly spiraling prices, the barring of many colleagues from broad access to scientific information and the creation of innumerable "self-help" structures on the Internet are all evidence of the crisis. A great deal of awareness about the problem, coupled with long-term strategic planning and determination by renowned scientists in each field will be required in order to escape the current conundrum – for example, by founding a competing journal that operates on a cost-neutral basis and with a paradigm that emphasizes the broadest possible distribution of scientific results (and not the maximization of profits). This strategy, advanced by the Scholarly Publishing & Academic Resources Coalition (SPARC), has led to the creation of a number of successful alternative journals. ▶

At the same time, information technologists and scientific organizations have also long been experimenting with new forms of communication beyond the established platform of journal publishing, and demonstrating the enormous performance potential that new media can have for research. The fast growth of the Internet as a medium for access to primary sources (publications) and secondary information (databases) clearly illustrates its usefulness as an effective platform for scientific communication and publication. The Max Planck Society, for instance, has discontinued subscriptions to old-fashioned paper journals and uses exclusively electronic information in broad areas. The assembly of a central digital library with electronic resources is meant to create a dependable foundation for providing information to researchers.

Efforts to make use of new publishing routes have given rise to the Open Access movement. Several parallel supranational projects – to be seen in the Budapest initiative and the Bethesda and Berlin declarations – are aimed at changing the organization of scientific publishing. The first aim is to refuse the oligopoly its illegitimate basis (intellectual property rights to research results). Next is the goal of fundamentally improving the information content of scientific publications while continuing to use the standard procedure of quality assurance through peer review.

and evaluation services, promoting innovative value-added service for science. Nonetheless, it is not the primary aim of Open Access to do away with existing publishing routes. If the current intransigence and the unacceptable access and pricing models of commercial providers can be pushed closer to the Open Access concept through the exercise of alternative strategies, this would be considered as much a success as the institution of new forms of communication. All of these systems, which can co-exist in competition, are tools for science and not simply an end in themselves.

All the same, the provision of comprehensive access to research results is not, contrary to popular belief, less expensive than the current system of paper journals. Though it is true that some costs are removed (paper, printing, mailing, binding and storage), new costs arise in place of these (server, software, maintenance, data storage and data archiving). Expenditures for production and quality control are similar in both systems. Open Access requires a new paradigm, in which the cost of publication must be viewed as an inherent component of research costs. For publishing, the author enlists the services of a publishing house in a manner appropriate to the specific field. Thus, the market will no longer be defined by publishing firms' secure ownership of research results based on the exclusivity of use and distribution rights, but rather by the competition of services.

In order to ensure the availability of scientific information over the long term, networks of non-commercial, nationally or internationally controlled institutions should take over responsibility for long-term archiving and standardization of data formats and interfaces, and should provide open source-based access software. In contrast to general public use of the Internet, the sustained rendering of the sum of scientific discovery in this medium as a knowledge-base for mankind requires a potent regulatory foundation.

In a broad sense, the establishment of Open Access allows research organizations and scientific communities to form so-called Open Access Platforms. These are publication environments that utilize a common framework and conform to the requirements of a typical scientific organization or a specific discipline. Such a platform supports researchers in fundamental research operations, such as information gathering, commentary, evaluation, exchange of views, and publication. The platforms permit access to traditional publishing services and the bibliographic resources of organizations like the Max Planck Society, and provide up-to-date scientific information in a network-linked work environment.

The new electronic platforms comprise complete documentation of the scientific material, making use of multimedia tools, archiving original data and enabling online-networking of the sources used. "Editing modules" that incorporate tools for editing by the authors contain collections of primary sources for science and the humanities.

The Max Planck Society is currently developing such a system. When the first components are introduced, which is expected to take place in 2006, the Society will be moving forward into a new era of scientific publishing, while at the same time continuing the ongoing efforts that have led to the launching of a virtual library and the eDoc server. Together with partners from around the country, the Max Planck Society will develop and secure the system and internationalize the content as part of the Open Archive Initiative. In this way, the scientific organization will take the lead both nationally and internationally, following through on the Berlin declaration on Open Access (MAXPLANCKRESEARCH 4/2003, page 4).

Internally, the Max Planck Society provides employees with free access to all scientifically relevant information. It furthers the idea of Open Access and offers advice on and assistance in publishing digital scientific information outside of conventional journals. Outwardly, the Society is a model for the institutional provision of support for Open Access publications, adhering to strict quality guidelines and demonstrating responsible use of the Internet for cultural purposes.

In creating a permanent, institutionally-backed Internet platform for science, the Max Planck Society is guaranteeing the continued development of new forms of sustainable and diverse network-linked science. The German government is also working toward similar goals with its e-science initiative, which plans to make scientific results freely accessible to the public on a global scale.

On the face of it, one might get the impression that, in the age of e-science and Open Access, conventional libraries no longer have a role to play. Journals are no longer compiled, bound and cataloged. Periodicals cannot be taken out of the library. Researchers have access to all available information from their own desks. Indeed, the traditional scientific library- and with it, the librarian's profession – are in for a change.

In the area of monographs, the conventional library will not be affected. These are actually more likely to increase in importance as the basis for education and training, and a medium for creative work outside of a scientist's own field of expertise. The procurement of monographs is a key responsibility of the library. Other responsibilities include, as before, the administration and transference of the entire collection to digital formats, through metadata and as primary information. Libraries are also irreplaceable as a natural space for local contact between scientists and the functional units of the new communication forms – so-called competence centers of the scientific organization. The library is charged with a number of functions as part of this intermediary role:



- Continuing education of users and introductory training in the use of electronic media and information services
- Advancing the idea of Open Access and disseminating information about the structure and functional units of the Open Access networks
- Compiling and performing technical quality control of the local content produced by their institute for Open Access publications
- Advising researchers in the preparation of scientific information
- Assisting in the procurement of external services to create Internet-suitable content
- Preparing the metadata pertaining to local research results for reports and yearbooks
- Forwarding the requests and needs of local users to the competence center of the scientific organization
- Collaborating on user surveys
- Acting as the contact point between local Open Access projects and a central competence center

In some cases, libraries can become production centers for Open Access subject matter. This makes particular sense in situations when close cooperation with the scientist is essential for the preparation of the content, as is the case with an editing project, interactive and multimedia content, or "living" content that requires constant updating. The broad assumption of "publishing functions," on the other hand, would not seem to be an effective use of the potential offered by today's libraries. All the same, the look of the library will change as well: computer work stations, along with areas for private conversation and discussion, will be installed in what are now general use and reading areas.

The Max Planck Society recognizes the structural changes that need to be made in decentralized libraries, and the subject is being discussed by the steering committees. The goal is the foundation of a centralized digital "Max Planck Library." In the medium term, this competence center could conceivably replace some of the smaller research libraries in the area of natural sciences, which can be concentrated by consolidating their printed collections. Most libraries, however, will remain as local centers for electronic scientific inquiries, and the large libraries dedicated to the humanities will certainly be augmented with electronic sections. In addition, programs for comprehensively training library staff and adapting the structures of the spatial and technical facilities will be required. Despite the substantial changes that lie ahead, one fact remains unchanged: libraries will by no means become redundant. ●

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The Max Planck Society at the fore

The Max Planck Society supports this process and is leading the charge of the Open Access movement by initiating the Berlin declaration. The Society is convinced that the improved quality of scientific communication has a direct impact on the quality of scientific results, systematically improving the quality of research. This is a key priority for an organization whose reputation is built on the excellence of its basic research.

The essence of Open Access is the direct, immediate and unlimited accessibility of all primary scientific information – that is all data, observations, sources and publications on a given subject. Publicly funded science should also make results available to the public, without restriction. And the barriers resulting from the granting of exclusive use rights to publishers should be overcome. The possibility of securing exclusive use rights by obtaining patents prior to publishing remains the sole prerogative of the scientist. An exclusive right to the use of secondary publications, patents and products is also desirable, as these benefit the funding public and promote international competition. An important demand of Open Access is that access be free of charge, and that the scientific information be provided using open, standardized formats and systems with easy-to-use interfaces.

The technical accessibility of systems allows the broadest possible dissemination and usage of the information and paves the way for a number of information