International Spring School on the Digital Library and E-publishing for Science and Technology
CERN, Geneva, Switzerland, 3 – 8 March 2002

Electronic Publishing of Scholarly Scientific Information: An Overview of Developments and Key Issues

Hans Geleijnse
Director of Information Service and Systems, European University Institute, Library, Italy

ABSTRACT

An overview is provided of various issues in the area of scholarly scientific publishing. The important role of the current system of journal publishing, the move to licenses and the consequences of the development of consortia are discussed. The paper also gives a summary of initiatives in order to escape from the journals' crisis, to facilitate self-publishing and self-archiving by authors and to develop new business models. The role of all players in the information chain is undergoing significant changes, which will be illustrated with various examples. A number of key issues and questions for the future will be identified.

INTRODUCTION

In this paper I wish to give a brief overview of a variety of developments and questions in the area of scholarly scientific publishing. The lecturers at this course will elaborate various issues I would like to discuss briefly in more detail.

CONTENTS

I would like to discuss the following issues:

- the importance of journal publishing;
- the Journals' Crisis;
- electronic publishing as a solution?;
- alternatives and new routes;
- licensing: From ownership to access;
- pros and Cons of Consortium building;
- the Dutch University Libraries: a different approach;
- e-books;
- changing roles of the different players: libraries, publishers and intermediaries;
- critical issues and questions.

THE IMPORTANCE OF JOURNAL PUBLISHING

Journals play a very important role in libraries. They arrive regularly, users request them, they have a prominent location in the print library close to copying machines and they absorb 70 – 80 % of the acquisitions budget. Libraries subscribe only to a limited number of the journals that are being published.

Tenopir and King (1) provided a well-documented overview of US-based scholarly scientific journals, which clearly shows the differences in numbers of journals in the various subjects' areas, in prices and in circulation. Although many important journals and publishers are missing from their overview, it provides a good idea of the market's importance and the differences between various subject areas:

Number of US Scholarly Scientific Journals by Type of Publisher (1995, T en K)

	Number of Journals
Commercial	2679
Society	1557
Educational	1106
Other	1429
All publishers	6771

Numbers of US Scholarly Scientific journals, Average price, Average no. of articles per journal and Average circulation (1995,T & K)

	Journals	Price	Articles	Circulation
Physical Sciences	432	$ 616	306	4,700
Mathematics, Statistics	206	$ 527	127	6,200
Computer science	126	$ 328	165	13,700
Environmental sciences	322	$ 458	117	4,900
Engineering	828	$ 268	163	10,000
Life sciences	2104	$ 344	130	4,000
Psychology	342	$ 166	49	3,000
Social Sciences	2140	$ 80	38	3,200
Other fields/multi-fields				
All fields	**6771**	**$ 255**	**123**	**5,800**

We know that much will change and is already changing in this area as we move towards an information environment where 'electronic' is becoming dominant. We also know that the changes will have a major impact on the role and activities of all players in the information chain, the authors, the publishers, the subscription agents, the aggregators, the libraries and the end-users.

Currently, the following important roles of the scholarly journal system can be identified:

- communication of new ideas and new scientific information within a specific, targeted user group;
- dissemination of new information to a large audience;

- selection, validation and certification through a system of editing and peer-reviews;
- registration;
- copyright protection;
- archiving.

An important question is what will remain of these functions of the scholarly journal system in the electronic environment. These questions will certainly recur several times during this course. Various lecturers will look at the issue from different angles, but many will certainly identify the system of certification and peer review as one of its key components.

Tenopir and King stressed that "when it works as it should, peer review is an essential ingredient of ensuring that only the best quality papers get published. It provides decision-makers at universities with criteria for quality that they can accept without question. It thus serves the academic author's primary motivation". For authors, especially those working in an academic environment and publishing a journal article in a well-established journal where a high impact factor is essential for their career, for obtaining tenure or promotion and for being recognised by their colleagues.

In his "Ten Commandments: Principles for Successful Research", Assar Lindbeck (2), the former director of the Institute for International Economic Studies in Stockholm stressed that "it is important to publish internationally, especially in prestigious academic journals, so that the research is evaluated by the international research community. Otherwise there is a severe risk that the ambitions of the researchers become constrained by a domestic, and hence lower level of aspiration. It is very difficult for the leaders of a research institute to hold back publishing of mediocre work if it has its own publication outlet. The IIES has, for this reason, abstained from having its own printed publication".

THE JOURNALS' CRISIS

Although most of the functions of the scholarly scientific journals systems are recognised, it is obvious that the current system is not undisputed. Libraries all over the world have been criticising the skyrocketing prices of scholarly scientific journals for many years.

In 1989, The Association of Research Libraries released a report on Serials Prices (3): "The serials prices problem is not new – it has recurred throughout the twentieth century. During the last five years, however, it has spiralled out of control. One critical factor is that the publications of certain key STM serials is concentrated increasingly in the hands of a small group of publishers. More of the money spent on academic library subscriptions is going to fewer publishers and the cost of these serials is soaring".

In 1999, ten years later, the Dutch Academic Libraries (4) analysed the situation at that moment in a concise and clear statement: "The increase in the price of scholarly journals, notably those of some of the commercial publishers, has for years exceeded that which might be expected on the basis of price increases in general, currency rates and the expansion of the market. As elsewhere in the world, the majority of subscriptions to these journals are attributable to university libraries. The budgets of universities and their libraries fall far short of the price increases of scholarly journals. As a result libraries are continuously cancelling

subscriptions and hence they are hampered in the fulfilment of their prime task, namely providing their users with a broad and varied supply of scientific information.

Academic libraries acknowledge the importance of publishers for the selection and dissemination of scientific information and for the development of science in general. The libraries are however of the opinion that - where there used to be a certain balance between the various parties in the information chain - this balance has been irresponsibly disturbed by the price policies of a number of publishers. This is detrimental to the services of libraries to their users, and hence to the development of science.

This problem, often referred to as the serials crisis, is too big for a single institute to tackle; the best approach is to look for solutions at a national or even international level".

Tenopir and King gave an overview of the price increases of the 6771 U.S. based journals they examined:

Price Increase

	Average Price 1975	**Average Price 1995**
Commercial	$ 55	$ 487
Society	$ 28	$ 229
Educational	$ 15	$ 81

In general, the prices of journals increased "since the 1970s astronomically and average circulation has decreased substantially".

In various publications the reasons for the dramatic price increases have been analysed. It is true that:

- there has been an increase in volume;
- exchange rates and inflation have partly caused the price increases;
- the decrease in circulation has been substantial and has become a major driving force for continuous price increases.

but

It is also true that:

- publishers have tried to realise very substantial profit rates;
  and that
- commercial publishers charge higher prices than society publishers.

ELECTRONIC PUBLISHING AS A SOLUTION?

Following a period of scepticism and reluctance with respect to the developments of the digital library at the end of the eighties and early nineties most librarians welcomed the developments towards the provision of electronic information to the desktop.

The move to electronic journals was regarded as an opportunity to:

- provide better user services by "bringing" the information to the desktop of the end-users;
- make electronic journals available which would be a significant improvement compared to print journals that are frequently unavailable (stolen, in use by others, in bindery);
- improve information retrieval by full-text searching;
- speed up the information process;
- save space by moving from print journals to electronic editions;
- copy easily and properly quotations from journal articles in new publications using the correct references;
- and, above all, decrease the cost of journal subscriptions.

Some of these expectations have certainly been realised in the past ten years. The provision of electronic access to journals is a most appreciated service. From various usage statistics we have learnt that the use of journals has improved. Electronic journals are used better than print journals; there is a demand for access to more titles and more volumes including back-files. It should be stressed that we are still talking about a development during 10 years.

The University Licensing Project (TULIP) was born in March 1991. Some innovative library leaders in the US, including Bill Arms and Clifford Lynch, came together with Elsevier Science people to find a way to accelerate the distribution in electronic form of traditional journal information. The most important outcome of the project, that was confined to about twenty journals in materials science, was that the move to the provision of journals in electronic form was possible but would definitely require a significantly critical mass before it really could become a good and accepted service.

In 1993, I negotiated the very first site license agreement with Elsevier Science on all Elsevier journals subscribed to by Tilburg University (5). Although we were rather ignorant at that time of a variety of issues, such as "perpetual access" and "digital storage', I have never regretted this deal because it was a significant step in the development of the digital library. However, it took several years before the majority of large publishers were prepared and in a position to provide access to their journals in electronic form. It is obvious that we are still at the beginning of a fundamental change in the area of information production and information consumption. The first five years have been a learning period starting with not searchable images of scanned articles, access confined to the campus, irregular delivery, printing problems and a user community that had to get used to this new development. In 2002, electronic processes dominate all journal systems from authorship to reading.

It is generally accepted that journals should be available in electronic form and it is obvious that publishers who are not able to or prepared to comply with this development will soon be out of business.

In addition to these electronic versions of existing journals, more and more "only electronic" journals are becoming available, some of them refereed, some freely available on the Internet, some with an access fee. In most cases these electronic journals are still quite close to the print journal, only few offer full multimedia functionalities.

COST SAVINGS

The promises of cost savings for the library have not yet materialised. The transitional process is absorbing many resources, because subscriptions to print plus access to electronic versions of these journals are still significantly more expensive than print only.

A limited number of libraries have so far managed to cancel their print subscriptions and move to electronic only. The most important reasons for this slow change process are the following:

1. A number of users still prefer to have access to print editions although this is rapidly changing.
2. The move to electronic journals has been slower in the social sciences, the arts and humanities than in science and technology. Although the largest publishers provide electronic access to all their journals, libraries deal with many small and medium sized publishers who are running behind. The electronic coverage is still not complete.
3. The limited availability of back issues in electronic form. The importance of the electronic access to back numbers of key issues has clearly been demonstrated by JSTOR (http://www.jstor.org/jstor/).
4. Librarians are concerned about perpetual access and digital archiving of the electronic journals. Only a few publishers, including Elsevier Science, are committed to digital archiving, but most publishers are not interested in doing so. I feel that this problem gradually will be solved since both OCLC (http://www.oclc.org/strategy/preservation/) and the large national libraries http://www.bl.uk/ and http://www.kb.nl/ are developing frameworks and solutions for archiving and preservation.
5. In many European countries the fiscal rules are an impediment to moving to electronic only because "electronic" is charged with a significantly higher VAT percentage than books and paper journals. In this area the Frankfurt Group, a co-operation of European libraries, STM publishers, collecting societies, authors representatives and subscription agents, will make a joint effort to put this impediment for the development of the information society on the agenda of the European Commission and realise the same VAT for electronic scholarly scientific information as for print (see also 6).

If the move from print to electronic were to be made, a discount of 10 – 20 % of the print price could be realised.

SAVINGS BY MOVING TO ELECTRONIC JOURNALS

In D-Lib Magazine, Carol Hansen Montgomery, Dean of Libraries at Drexel University (7) discussed the "common assumption" that converting library journals to digital format will lower cost based on her experiences at a university that had decided to migrate to an electronic journal collection. She identified savings in:

- space utilisation;
- serials check-in;
- claiming;

- bindery;
- re-shelving;
- stack maintenance;
- photocopying;
- interlibrary loan.

But increased and higher level activities in:

- setting up access;
- software purchase and development;
- printing;
- negotiating;
- budgeting;
- licensing;
- cataloguing;
- collecting use data;
- instruction.

A general and preliminary observation has been that "comparisons for processing print versus electronic journals indicate that the electronic collection is substantially more expensive to maintain", but "Drexel's per title subscription costs are lower for electronic journals…we suspect that the majority of academic libraries will have the same experience, particularly if they purchase a large number of titles through aggregator collections. Since use is much higher for e-journals the cost benefit is even greater". It is obvious that further analysis and studies are required before we can make more profound estimates on the savings.

ALTERNATIVES AND NEW ROUTES: SPARC, HIGHWIRE, OPEN ARCHIVES AND OTHER INITIATIVES

SPARC

One of the most important alternative strategies to the current model of scholarly scientific journal publishing is **SPARC**. The American Research Libraries initiated this SPARC initiative to "create a more competitive scholarly communication marketplace where the cost of journal acquisition and use is reduced, and publishers who are responsive to customer needs are rewarded".

SPARC "introduces new solutions to scientific journal publishing, facilitates the use of technology to expand access, and partners with publishers that bring top-quality, low-cost research to a greater audience. "The Alternatives program is also intended to provide editors and authors with responsive, credible options for lessening their publishing dependence upon the established journals in a particular field where a relatively few dominant for-profit publishers often exercise control. SPARC-partnered projects must reflect incremental improvement in addressing the rights and privileges of both authors and users" (http://www.arl.org/sparc/core/index.asp?page=a0).

There are some cases of complete editorial board of prestigious journals that left their commercial publishers to find other, less commercial and cheaper ways of publishing. In this area SPARC might have had the most important impact so far. Recently a European branch of SPARC has been created with the support of LIBER, the association of European research libraries. This makes the American initiative more international and powerful. It can also put more focus on the publishing of high quality information by European researchers

HIGHWIRE PRESS

While SPARC is primarily looking for new solutions and the creation of new, less expensive journals, another approach was taken by Stanford University that founded Highwire Press "to ensure that its partners - scientific societies and responsible publishers - would remain strong and able to lead the transition toward use of new technologies for scientific communication".

Highwire acts as a platform, an umbrella for a variety of high-quality publishers. It provides a very professional technical infrastructure that could not have been realised by these publishers if they had done it on their own. In a way, Highwire challenges the large commercial publishers.

"Under the guidance of its publishing partners, HighWire's approach to online publishing of scholarly journals is not simply to mount electronic images of printed pages; rather, by adding links among authors, articles and citations, advanced searching capabilities, high-resolution images and multimedia, and interactivity, the electronic versions provide added dimensions to the information provided in the printed journals. Working within the individual (and very different) subscription policies of the societies and publishers, HighWire manages subscriber access to the journals it puts online. This ranges from individual subscriptions to institutional access, and can even scale up to consortia or national access policies" (http://highwire.stanford.edu/).

OPEN ARCHIVES

A third important initiative has been the "**Open Archives Initiative**" that aims at the development of "a universal service for author self-archived scholarly literature. Such a universal service is considered to be the fundamental and free layer of scholarly information, above which both free and commercial services could flourish. We think that important steps towards the establishment of such a universal service can be taken by identifying or creating interoperable technologies and frameworks for the dissemination of author self-archived documents (termed e-prints)".

"The aim of our initiative is to create a forum to address various issues regarding interoperability, as a way to break the ground for a more universal adoption of author self-archived communication mechanisms. In this context, interoperability is a broad term, touching many diverse aspects of author self-archived systems, including their metadata formats, their underlying architecture, their openness to the creation of digital library services, their integration with other information layers, their usability in a multidisciplinary context, the metrics for usage of e-prints and for evaluation of their scholarly impact…."(http://www.openarchives.org/).

This Open Archives Initiative is closely connected with the pioneering work of Paul Ginsparg and Stevan Harnad. Harnad (8) stresses that "most researchers are ready to make public the pre-prints that they have formally submitted to their chosen journal for peer review". He advocates that "authors should transfer to their publishers all the rights to *sell* their papers, in paper or online, but they should retain the right to self-archive them online for free for all".

ROQUADE

An interesting initiative in the Netherlands is the **Roquade project** launched by the Universities of Delft and Utrecht (http://www.roquade.nl/). The *Roquade* project is "characterised by a wide variety of possibilities. Together they constitute a basis for a gradual transition towards electronic publishing. The project aims at creating an infrastructure that integrates rapid publication with quality judgement without, however, the delay that marks traditional review procedures.

Based on a common organisational and technical infrastructure, *Roquade* offers a wide number of facilities to a broad audience:

- publication sites with peer reviews before as well as after publication;
- traditional electronic publishing replacing the traditional publishing process: digital journals, conference collections etc.;
- co-publishing: digital publication services in cooperation with established publishers;
- publishing of grey literature: research reports, dissertations.

Librarians initiated SPARC, Highwire and Roquade, whereas the Open Archives initiative is a combined initiative of self-publishing authors, librarians and computer scientists.

These initiatives make it clear that libraries are not passive but are looking for ways to:

- improve the information process in a new and innovative way;
- challenge the large commercial publishers;
- gradually develop new business models for electronic publishing.

PUBLIC LIBRARY OF SCIENCE

More than 23,000 scholars have already signed an "Open Letter" to the publishers supporting the establishment of an online Public Library of Science "that would provide the full contents of the published record of research and scholarly discourse in medicine and the life sciences in a freely accessible, fully searchable, interlinked form".

"We recognise that the publishers of our scientific journals have a legitimate right to a fair financial return for their role in scientific communication. We believe, however, that the permanent, archival record of scientific research and ideas should neither be owned nor controlled by publishers, but should belong to the public". Publications should be "freely available through an international online public library" within 6 months of their initial publication date. The authors announce that they will publish in, edit or review for only those scholarly and scientific journals that comply with these principles. According to the announcement this action should start in September 2001.

I believe that the follow-up of this activity has been very limited. The lack of a proper organisation cannot really threaten established publishers. However, this initiative should be regarded as a sign that an increasing number of authors are unhappy with the current situation and are looking for a way-out. This is a sign not only for publishers but also for libraries and intermediaries.

LICENSING: FROM OWNERSHIP TO ACCESS

The move to electronic access has not yet solved the "journals crisis". The crisis has only entered into a new phase. The current electronic services are creating new financial constraints and new challenges and roles for librarians. One of the most important changes involved is the move from the ownership of printed information to access to the information based on a license agreement**.** Initially libraries responded on an individual basis to license agreements for the use of electronic journals that were offered by the publishers. The publishers acted globally. They offered basically the same licensing agreements in Toronto as in Bielefeld.

LICENSING PRINCIPLES

It has been a logical step for libraries to improve their international contacts, to exchange experiences, and to cooperate with each other on these critical issues. Licensing principles were formulated, communicated and adapted, such as the Dutch/German licensing principles (http://cwis.kub.nl/~dbi/english/license/licprinc.htm) and the "Statement of Current Perspectives and Preferred Practices for the selection and Purchase of electronic Information" of the International Coalition of Library Consortia (ICOLC) (http://www.library.yale.edu/consortia/statement.html).

In the past 4 to 5 years many critical issues in licensing have been solved. The international consortia have played a major role in improving the situation and in strengthening the position of libraries. Publishers have gradually become more responsive to the issues raised by consortia because they have realised that otherwise they would not be able to make progress in electronic publishing. The progress in licensing has been documented by the EC project TECUP that brought together representatives of all major players in the information chain: libraries, publishers, distribution agencies, and collecting societies throughout Europe.

Important recommendations of TECUP (9) were:

- licensed content should be platform independent and should conform to generally agreed standards;
- publishers should deliver standardised metadata for content;
- continuing access to licensed material is highly desirable.

OUTSTANDING ISSUES IN LICENSING

A follow-up of the TECUP project, the "Frankfurt Group", that I have already referred to, is currently discussing the following outstanding issues:

- electronic interlibrary document delivery;
- cross-searching and cross-linking;
- rights management systems;
- continuing access to digital material;
- development of new business models;
- taxation of electronic information.

PROS AND CONS OF CONSORTIA BUILDING

The development of library consortia in the last five years has been remarkable. Consortia are currently making most license agreements. My estimate is that there are now more than 200 consortia in the world with different organisational structures and different funding bases and approaches, but all aiming at making deals with publishers that are better than bilateral agreements.

An interesting phenomenon is that some consortia have asked a subscription agent to act as their intermediary in the negotiation process with a variety of publishers, which gives a new role to these agents in the electronic environment. A good example is the role played by Swets Blackwell in the UK and in Greece. David Kohl and Fred Friend will give an overview of the experiences in the United States and in the UK, and they will certainly touch upon this issue as well. In addition to the positive achievements of most consortia, it should be realised that consortia can also have disadvantages and can even have a negative effect on the position of libraries in the long term.

Obvious consequences of licensing through a consortium are the following:

- The significant cost of overhead needed for the negotiation process with publishers and vendors and for the communication process with all libraries involved. If a national or regional government is not paying for these costs, a fair calculation of the cost-benefit of this overhead should be made.
- Since the large publishers take the subscription costs of a library in a particular year as the starting point for a long-term license agreement, the guaranteed increasing turnover for these publishers during the time-frame of the contract absorbs a significant part of the acquisitions budgets. This situation will jeopardise the expenses available for the monograph collection or the continued subscription to journals from other publishers.
- Important decisions in the area of collection development are being centralised.
  Within the university a part of the decision-making power is transferred from departmental libraries to the central library or even to the general administration. In addition, there is also a transfer from the individual library/university/organisation to the management of the consortium.

I agree with Landesmann and van Reenen (10) “that there are reasons to worry that consortial development, if it occurs without specific and adamant attention to supporting reform in the system of scholarly publishing, may actively work against the success of these efforts”. In the Netherlands the university libraries have tried deliberately to make this connection between a national license agreement and the development of university-based document servers.

THE DUTCH UNIVERSITY LIBRARIES: A DIFFERENT APPROACH

It took until the year 2000 before a national deal could be concluded in the Netherlands with Elsevier Science. A national agreement with Kluwer Academic was signed in May 2001.

Agreements were made after long discussions with these major STM publishers on the changing environment and the challenges of Internet publishing. The strategic approach was that the licensing activities should go hand in hand with initiatives to make the output of the universities available on their Web sites, on distributed document servers linked with subject-oriented international archives. With these activities, universities and research centres emphasise that they are not only consumers of information but also producers of information. If publishers can add value to this information by organising the selection, validation, and certification process, libraries/universities would be prepared to pay for this.

In the next five years all participating Dutch universities will have electronic access to all Elsevier (http://www.kub.nl/~dbi/english/license/es-ukb-p.htm) and all Kluwer titles. In addition, the publishers and the universities announced the setting-up of joint experiments with respect to changes in the distribution and business models that form the basis of scientific publishing. These experiments will hopefully help to clarify the path we shall have to follow in the future (11).

E-BOOKS

Although much attention has been paid to electronic journals, rapid and interesting Developments are taking place in the area of electronic books, E-book readers and Internet booksellers. Vendors such as netLibrary, Ebrary and Questia are building up large e-book collections, although in the educational sector the focus is primarily on undergraduate teaching and still on a relatively small number of disciplines (11), but this might rapidly change. Twelve major university publishing houses – including Stanford and MIT – signed agreements to publish many of their publications online with Ebrary.com. Harvard University Press made a similar agreement with Questia.com. Most developments started in the US, but are gradually gaining impact in the rest of the world. E-books are being used in e.g. Australia, Canada, Denmark and Norway.

In D-Lib Magazine Lucia Snowhill reported an Ebook Task Force of the UC California Digital Library, that did a survey on academic institutions' experiences with e-books (12). The survey focused on 15 large academic libraries that provided access to e-books and 4 campuses of the University of California. "Respondents had purchased a range of 500 to 100,000 e-book titles with most selecting under 20,000 titles and eight under 5,000 titles."

Some of the interesting findings were that:

- " All institutions stated that acquisition of e-books has had little or no impact on their purchase of titles in print".
- "Most libraries had not purchased portable reading devices".

Clifford Lynch (13) recently examined the various aspects of the book in the digital world. The future of the book will not be purely digital, but many opportunities are arising and many

complicated new questions have to be answered. Lynch stresses that "new technologies – both in hardware appliances and in software for general purpose computers – are developing to facilitate the use of digital books... These new technologies should make digital books more convenient, more readable, and more useable…. We must continue to recognise that digital books, in the broadest sense, are at least potentially much more than simply digital content translated from the print framework that can be viewed by e-book readers…"

In various aspects the development of E-book readers by different vendors can be compared with the access to journals from different publishers. In both cases publishers try to combine the content with the their own proprietary way of accessing the content. The lack of standardisation is an obstacle for full use and is very costly, but it is a reflection of policies to conquer the market not only by content but also by tools to access the content.

BOOK SELLERS

The business of selling digital books is gradually expanding. Barnesandnoble.com is trying to sell electronic books directly to the readers and "to cut out the publishers by acquiring rights directly from the authors". This company "will pay authors a royalty rate of 35 percent of a book's list price on electronic books sold through its Web site." An interesting area of expanding activities is the market of books with expired copyright.

A critical question for libraries is "whether libraries can continue to collect books as they move to digital form, particularly in mass-market publishing" because libraries "want to maximise access and service at minimal cost, which in some sense is in direct opposition to publisher goals" (http://www.nytimes.com/2001/01/04/…logy/04BOOKBIZ.html?).

The initiatives of booksellers such as Barnes and Noble are a threat not only for publishers but also for public libraries and will stimulate us even more to rethink the future position of all different players in the information chain.

CHANGING ROLES OF THE DIFFERENT PLAYERS: LIBRARIES, PUBLISHERS AND INTERMEDIARIES

Publishers are looking for new ways to respond to the new developments and trends, although responses are different. The differences between the large commercial publishers and the small and medium-sized publishers are becoming more obvious in the electronic environment.

CROSSREF

In spite of many different approaches and in spite of increasing competition, many commercial and non-commercial publishers agreed on co-operation in the field of citation linking in the CrossRef project (http://www.crossref.org/), which should contribute to a better access to information from different sources. CrossRef runs from a central facility operated by the Publishers International Linking Association, and uses the Digital Object Identifier (DOI) to ensure permanent links.

On many other issues publishers disagree. There are a variety of policies with respect to:

- pay-per-view;
- digital storage and archiving;
- access policies;
- working papers and open archives;
- pricing.

A key question is whether the competitive and heterogeneous situation of the past will continue to exist in the future.

One of the most important aspects of developments in the last five to six years has been the significant mergers and take-overs by the large publishers. If we look at three major players, Elsevier Science, Kluwer and Springer, we notice the following.

SPRINGER VERLAG

A few years ago, **Springer Verlag** (http://link.springer-ny.com/**,** that publishes annually 2,600 new books and approximately 500 journals, has been taken over by Bertelsmann. The Bertelesmann/Springer combination focuses on science and on business media and employs 5,000 people with a turnover of 1.5 billion Deutsch Marks. This again is only a branch of Bertelsmann AG, "the most international media corporation, striving to be the world's leader in the markets in which it operates. We provide customers with information, education and entertainment through every possible outlet and in every conceivable format". A variety of companies belong to the Bertelsmann Group including Random House, BMG Music, RTL Television, UFA sports and Barnes & Noble.Com. Bertelesmann AG employs in total 81,053 people and has revenue of 16.5 billion Euro. In this case we see the development of a multimedia enterprise with strong distribution channels for entertainment, sports, music, books and journals.

Stephen Riggio, vice-chairman of Barnesandnoble.com. stressed a possible policy that could wipe out the traditional publisher:

> "*In an interesting way, the publisher may become an unnecessary middleman in the distribution of electronic content if they really don't do anything to build the market. We have the technology, the Web site, the traffic*".

KLUWER ACADEMIC

Kluwer Academic publishes books and approximately 850 scientific scholarly journals and comprises a.o. Kluwer Law International, Baltzer, Plenum, Maik Nauka, Chapman & Hall and Thomson Science. Kluwer Academic is a part of Wolters Kluwer that is "in the business of providing smart information tools for professionals.." It focuses on professional customers in Legal, Tax & Business, International Health & Science, and Education. The annual sales are more than EUR 3.7 billion; the company employs approximately 19,000 people.

This year, Wolters Kluwer (http://www.wolters-kluwer.com/) acquired SilverPlatter Information, a provider of search and retrieval technology to medical, academic, corporate

and educational researchers. SilverPlatter will be combined with Ovid Technologies, a previous acquisition of Kluwer. "The combination of Ovid and SilverPlatter will offer its customers a comprehensive channel for medical and scientific information and research tools". Obviously Kluwer too no longer focuses on content only but is also looking for ways to provide its own gateway and mode of access to the content. In this respect Kluwer is obviously competing with Elsevier's approach.

ELSEVIER SCIENCE

After the acquisition of Academic Press (Harcourt Brace) in June 2001, **Elsevier Science** (http://www.elsevier.nl/) strengthened its leading position in the area of STM publishing with approximately 1,600 journals. The focus is on scientific, technical and medical publishing. Elsevier has invested already for a long time in the development of electronic products. Their platform is Science Direct which will also be the platform to access all the journal titles coming from the Harcourt portfolio. Elsevier Science is a part of Reed Elsevier, a publisher and information provider, operating in four core segments: science and medical, legal (including Lexis-Nexis), education and business. The company employs approximately 30,000 people.

Reed Elsevier's key objective is "to be the indispensable source of information-driven services and solutions to its target customers, through the delivery of highly valued and demonstrably superior and flexible solutions, increasingly via the Internet". The turnover of Elsevier Science in 1999 was 991 million Euro (19 % of the total turnover of Reed Elsevier); the adjusted operating profit was 351 million Euro (29% of the total operating profit). A very interesting development was the acquisition of Endeavor Information Systems, one of the fastest growing library automation systems, by Elsevier Science in June 2000.

This is obviously a clear example of a combination of the content with the tools and the engines to access and search this content. The aim is to create the largest database of scientific information, the largest scientific network and the most powerful platform for accessing scientific content.

INTERMEDIARIES AND AGGREGATORS

It is also interesting to see that some publishers, who have co-operated with subscription agents for many years and still rely on their intermediary role, question *"why a subscription agent should be in between librarians and publishers, especially in the electronic environment"*.

The publishers will ask the same questions with respect to aggregators. For libraries and consortia it still seems to be efficient to use intermediary organisations that can deal with many smaller and medium-sized publishers and offer access to a combination of secondary and primary databases.

SwetsBlackwell provides online reference service and electronic access to hundreds of journals for the customers who use this company as their subscription agent. In addition, SwetsBlackwell supports consortia, e.g. in the UK and in Greece, in making license

agreements with a variety of publishers and promotes its Navigator as an access platform. Although some publishers claim that they can create a world without subscription agents and intermediaries, some aggregators also try to establish a stronger position in the market. EBSCO, ProQuest (formerly Bell and Howell) and the Gale Croup offer large databases with full-text journals. Important is that there is a dangerous and unacceptable tendency towards exclusive deals with publishers.

Larry Krumenaker (14) reported that many titles appear uniquely on the services provided by these three aggregators:

ProQuest	1,742 out of 3,602
InfoTrac (Gale group)	1,160 out of 2,784
EBSCOhost	2,170 out of 4,039

High prices are being paid to publishers to create this situation of exclusivity, including for a heavily used journal such as the Harvard Business Review.

Krumenaker argues that "EBSCOhost has found at least a short-term solution to building up its market by adding STM and other periodicals, evidently by making higher than average offers to publishers."

Steven Bell (15) confirmed in D-Lib Magazine that exclusivity deals are a new trend in the business model of database aggregators and stressed that embargoes come along with exclusivity. "When a full-text electronic journal is embargoed, the publisher holds the right to prevent the aggregator from making the full text available for a specific period of time" which seems to be a method to prevent cancellations of the printed journals.

DO WE NEED PUBLISHERS AND LIBRARIES?

A key question is, of course, whether we will need publishers and libraries in the future. Various proponents of electronic publishing call for a downplaying of the role of the publishers, but few believe that publishers should be completely eliminated from electronic publishing. Tenopir and King stress that the advantages and commitment that formal publishing bring are historical and far-reaching. "The formality and regularity of the process bring legitimacy and constancy to scholarly journals".

Andrew Odlyzko (16) emphasised that the journal system is full of unnecessary costs for both publishers and libraries. He argued that electronic journals would become almost universal but that they will be just as expensive as print journals. He expects major changes in the information chain more in the library system than in the publishing system. "Change will come when administrators realise just how expensive the library system is, and that scholars can obtain most of the information they need from other sources, primarily pre-prints".

"Journal subscription costs are only one part of the scholarly information system…. Internal operating costs of research libraries are at least twice as high as their acquisition budgets. Thus for every article that brings in $ 4,000 in revenue to publishers, libraries in aggregate

spend $ 8,000 on ordering, cataloguing, shelving, and checking out material, as well as on reference help. The scholarly journal crisis is really a library cost crisis". (17)

I believe that this is not a very good analysis of the role the library plays in an academic institution in support of teaching, learning and research. Libraries will have to provide access to journals as long as there is a demand for it. Moreover, the "journal system" will be maintained as long as researchers rely on it and have not created a proper alternative.

The positive element of Odlysko's comments is that it can stimulate libraries to work more cost effectively. Libraries, or rather universities, will play a decisive role in the outcome of this exciting process of change in the field of electronic publishing. Librarians are working close to the source of information production and maintain in general a good working relationship with their users, who are also, producers of information in a university environment. Without the cooperation of the authors, who transfer their copyrights, and without the academic community that maintains the current system of outsourcing the certification procedures, there would be no bread and butter for the publisher. Authors, editors and reviewers are gradually becoming more aware of their position and power as shown in various new initiatives.

On the other hand, it is fair to say that many academic decisions still depend on the current model of publishing.

CRITICAL ISSUES AND QUESTIONS

This brief overview shows that many key issues still need to be solved and that many questions need to be answered. Some important ones are:

- What will the future relationship is between the open access to "E-Archives" and "high ranked peer reviewed electronic journals"?
- How will electronic journals and individual articles be priced in the future? Should we move to a new pricing model?
- Can the library privileges on ILL and document delivery be maintained in the electronic environment?
- Free choice of ways to access the information vs. forced access through commercially controlled gateways.
- Standardisation of access to documents.
- The increasing gap between wealthy research libraries and the majority of universities/libraries/non-commercial institutions.

Moreover:

- Will all players in the information chain survive?
- Should libraries become publishers?
- Can aggregators and publishers take over the role of libraries?
- Can we do without the commercial publishers and completely rely on societies and university publishers?
- Can we move towards new business models and what would these models look like?
- What do our end-users want in 3 – 4 years?

CONCLUSION: THE ROLE OF LIBRARIES IN ELECTRONIC PUBLISHING

Electronic publishing has not yet proved to be the solution to the "journals crisis". New journals controlled by the research community and by universities are taking off, but the developments are going slower than expected. At the same time we have to recognise that most publishers have been able to make the transformation form print to electronic and have been capable to sell their new products to the libraries that are prepared to pay for the licenses.
Users are in general happy with the increasing availability of electronic information on their desktop, but the discussion on the future of the system is more intense and lively than it has ever been before. Authors and users are becoming more "independent" and more aware of the drawbacks and the costs of the current system. Electronic Publishing touches on all aspects of scientific and scholarly communication and librarianship. It is also closely connected with the international developments in teaching, learning and research.

Various components of the system of scientific and scholarly publishing are changing and can be organised differently. A key issue will be who will provide added value. Who will organise the information, which will organise an independent system of quality control, which will add metadata, who will customise the information?

Libraries have a role in this process and are in a position to add value for their customers. I would like to stress the following components of a library strategy in this area: Universities/Libraries have to cooperate also at an international level:

- Libraries should provide electronic access to journals (and books) through fair license agreements based on user needs.
- Libraries should support the students and researchers of their parent institution in the E-publishing process.
- Universities and Publishers should reconsider their business relation.
- Libraries should put an effort in customising the information and provide personalised information to their users.
- If we want to make better use of the valuable information, information literacy will become crucial. The library can play a role in instruction, training and support.

REFERENCES

[1] Carol Tenopir and Donald.W. King, Towards Electronic Journals, Special Libraries Association, Washington, 2000;
[2] Assar Lindbeck, Principles for Successful Research (originally at: (http://www.iies.su.es/tencom.htm)
[3] Report of the ARL Serials Prices Project, Association of Research Libraries (May 1989)
[4] Policy Statement of Dutch Academic Libraries on the Pricing of Scholarly Journals (http://www.uba.uva.nl/en/projects/journals-pricing-ukb/policy.html)
[5] Hans Geleijnse, The KUB's experience with electronic subscriptions, in: Library Acquisition: Practice & Theory, Vol. 21, Issue 3, 1997
[6] Giuseppe Vitiello, a European Policy for Electronic Publishing, in: The Journal of Electronic Publishing, March 2001, Vol. 6, Issue 3 (http://www.press.umich.edu/jep/06-03/vitiello.html)

[7] Carol Hansen Montgomery, Measuring the Impact of an Electronic Journal Collection on Library Costs, D-Lib Magazine, October 2000 (http://www.dlib.org/dlib/october00/montgomery/10montgomery.html

[8] Stevan Harnad, Free at Last: The Future of Peer-Reviewed Journals, in: D-Lib Magazine 5 (12) December 1999; (http://www.dlib.org/dlib/december99/12harnad.html

[9] TECUP, Memorandum of Understanding, SUB Göttingen, 2001 (http://www.sub.uni-goettingen.de/gdz/tecup/)

[10] Margaret Landesman and Johann van Reenen, Creating Congruence, in: The Journal of Electronic Publishing, December 2000, Vol. 6, issue 2; (http://www.preshttp://www.press.umich.edu/jep/06-02/landesman.htmls.umich.edu/jep/06-02/landesman.html)

[11] Hans Geleijnse, Licensing Experiences in the Netherlands, Journal of Library Administration, Haworth Press, 2001 (to be published)

[12] Lucia Snowhill, E-books and Their Future in Academic Libraries, in: D-Lib magazine, July/August 2001, Volume 7 Number 7/8 (http://mirrored.ukoln.ac.uk/lis-journals/dlib/dlib/dlib/july01/snowhill/07snowhill.html)

[13] Clifford Lynch, the Battle to Define the Future of the Book in the Digital World, in: First Monday, Volume 6, Number 6 (June 2001) (http://www.firstmonday.dk/issues/issue6_6/lynch/)

[14] Larry Krumenaker, A Tempest in a Librarian's Teapot: EBSCO, ProQuest, Gale Exclusive, and Unique Titles, in: Searcher, Vol. 9 No. 7, July/August 2001 (http://www.infotoday.com/searcher/jul01/krumenaker.htm)

[15] Steven J.Bell, The New Digital Divide, in : D-Lib Magazine, July/August 2001, Vol. 7 Number 7/8 (http://www.dlib.org/dlib/july01/bell/07bell.html)

[16] Andrew Odlyzko, The Economics of Electronic Journals, in: First Monday, 1997 (http://www.firstmonday.dk/issues/issue2_8/odlyzko/index.html)

[17] Andrew Odlyzko, Competition and cooperation: Libraries and publishers in the transition to electronic scholarly journals, 1999 (http://www.research.att.com/~amo/doc/competition.cooperation.txt)

