

White Paper on Scientific Publishing

Scine, Oldenburg, Germany

- 1 *Introduction*
- 2 *The structure of science*
- 3 *Scientific information*
- 4 *Needs and expectations of researchers*
- 5 *Intellectual property*
- 6 *General principles of business models*
- 7 *New business models*
- 8 *Issues for future business models*
- 9 *Summary and conclusions*

1 Introduction

This white paper addresses the issue of business models in scientific publishing. Well known business models in scientific publishing are the subscription model and the open access model.

Starting point for this discussion is that any business model in scientific publishing should be measured by the value it creates for the research process. The inherent structure of this process is thus relevant in this discussion.

As long as science exists, scientists call for universal access to scientific information. This requirement for universal access has driven the developments in scientific publishing from personal communication by mouth and letter on to books, to journals, to letter journals and now to digital documents.

To improve universal access, the process of scientific publishing has been and is continuously changing to adjust to new possibilities provided by present day technologies. Nowadays technology not only allows a new dimension to universality, but also new types of services: information can be accessible around the globe and in a federated way and new innovative and powerful services focusing on further scalability of the information can be designed and implemented.

Business models should thus serve universal access, have to address the

availability of the information as well as the ability of the user to select the desired information effectively and efficiently. Following this idea will result in a suite of new services addressing these issues. The new possibilities of global *networking* provide new options for all stakeholders including the science community, universities, publishers, and libraries.

In this white paper we want to analyse the principles of business models needed in the digital age and strategies how to put these business models into practice.

2 The structure of science

The structure of the research process has been extensively studied e.g. by Merton[1], Gibbons[2], and Ziman[3]. For this white paper it is relevant to note that the universality of science means that nobody should be excluded from the science process. Anybody should be able to contribute to and to make use of the global knowledge base. To ensure this, scientific knowledge must be common property as it otherwise has not optimised its value in the process.

In science, information is not a final product but just an intermediary product accepted by the research community as being worth of scientific scrutiny and further effort, as discussed by Popper[4]. Its value is created by its potential usage by scientists.

The research process therefore requires that the relevant information must be shared between interested researchers which in turn requires that scientific information must be widely available as a basic service, hence universal access. Furthermore, the user must be able to select the relevant information for the purpose at hand for use in the research process and as an integral part of this process.

3 Scientific information

Scientific information is important as it provides the gateway to scientific scrutiny. This is the real value that scientific information creates in the research process. This is why the author wants to publish. It is therefore mandatory to integrate scientific information into the research process, meaning that the information can be merged, mingled, manipulated and used in new or existing settings like e.g. worldwide collaboratives or laboratories. It is in this sense that scientific information with its transferred knowledge is common property or else loses its proper function of sharing results with the research community to be subjected to scientific scrutiny.

Research results will also be used in worldwide innovative changes and developments serving society and industry. Vice versa researchers will be

driven by innovative goals.

To this end universities or research institutes need to have the right to exploit the findings of their employees in a competitive environment and this implies the full use of these findings under conditions to be determined by these universities and the research community.

If these conditions to scientific publishing are not met, it would erode its value.

4 Needs and expectations of researchers

In scientific publishing researchers either act as authors (creators) or as readers (users). And[5], "*Authors want to publish more, readers want to read less.*" Authors for the sake of scientific progress want to be more read in recognition for their contribution, and users want to read all worldwide created scientific information relevant to their given research task.

The author needs registration of his work to claim the intellectual property for this work and requires the protection of this intellectual property as it provides the only accountable proof of his work. Publishing is the only way to claim the intellectual property of their invention. Authors want their intellectual property being protected from plagiarism as this affects their scientific integrity directly.

Certification of the information by peer review is a must as it is the first step in the process of scientific scrutiny. As such, peer review should be seen as a service to the author in terms of quality assessment and confirmation. Peer review makes scientific publishing an integral part of the research process. The author negotiates with the research community to claim the 'invention'. It is this negotiation with the research community that has brought the author to eventually modify his paper, and such a decision is an integral part of the research process.

The reader requires awareness of the information for the efficacy and efficiency of research process, to support his research and assistance in the disclosure of certified and pre-selected new and relevant information. The information should be retrievable and this requires appropriate archiving.

An important aspect of efficacy and efficiency of the research process is the acquisition of scientific information by the reader. This means that the reader must be able to select the information needed at that particular instant. To this end, the reader needs adequate tools at his own discretion.

In summary, the information as integral part of the research process must be:

- available;
- selectable;
- reusable;
- applicable;
- visible.

These terms need to be complied with for the research process to function properly.

5 Intellectual property

While scientific knowledge is common property, the claim of the invention is nonetheless owned by the author. The author claims the property of the 'invention' by publishing this 'invention'.

The author retains the 'moral rights'. These moral rights are the paternity and the integrity rights. They can only be claimed by making the results public.

The author may transfer the exploitation rights integrally or partially to a third party, be this a university operating an institutional repository, a university publisher, a non-commercial or a commercial publisher.

In exchange to these exploitation rights the service provider should serve to provide added value in terms of services and/or protection of the moral rights of the author.

Plagiarism is a common infringement of the moral rights; the author needs protection for his/her scientific integrity. Commercial abuse of the information or illegal use of value added services is a common infringement of the exploitation rights. The publisher needs protection against this abuse. As the kinds of protection required are different, the protection can easily be split over different stakeholders. The university or research institute, possibly as the employer of the author or if the work is published on the university's repository, might just as well guarantee protection against plagiarism. The publisher could then take responsibility for the commercial abuse, as this is in the publisher's interest.

6 General principles of business models

What does this all mean for business models for scientific publishing?

It obviously means that business models should allow and foster value creation for the research process. They also should allow commercial value for the stakeholders.

It connotes that publishing may be outsourced by the research community to external partners if this outsourcing results in additional value creation for the research process. Also, a business model should maximally support the creation of new scientific information, leading to scientific progress. This growth is essential for the research process. And last, but not least: business models should be sustainable.

A business model should involve all relevant partners, the stakeholders; it should include the intellectual property rights: it is the embodiment of the

organisation of property between the stakeholders.

In this white paper we define a business model[6] as having the following basic constituents:

- its value proposition;
- the relevant market segment;
- the strategic positioning of the stakeholders;
- the value chain it creates;
- the competitive strategy it results in;
- the cost structure.

The core value proposition is peer review, as the goal of publishing is making the scientific results available for scientific scrutiny. Peer review is core to the claim of intellectual property and therefore core to any business model for scientific publishing. Next to this, peer review is a service to the author and added value for the reader in assisting this reader in selecting the relevant information. This requires an appropriate editorial structure.

The presently known subscription model and the open access model represent each a specific combination of the conditions for availability and selection. Both models have in common that it is the research community that invests, albeit in the open access model via the author, and in the subscription model via the reader.

The differences between the two models lie in the different roles they have in the research process. The costs of making the scientific results available can be considered as internal research acquisition costs. This is the basis of the open access model. The subscription model, on the contrary, sees the reader as consumer and costs for the acquisition of information are treated as external from the research process. Other differences between the models are in the different weaknesses that they have with respect to the two main parameters of wide availability and power of selection. The subscription model provides little incentive for providing wide availability for the author; the open access model provides little incentive for investing in effective selection tools for the reader.

7 New business models

Would it then not be desirable to separate the costs and pricing for availability from the costs and pricing for selection?

This is even more interesting as we have seen that availability and power of selection represent different types of added value. Availability, coupled with peer review, is a basic need directly coupled to the notion that scientific information is common property. Power of selection is a proprietary added value that needs to be tailored to the desires of the reader. It should come optional and at an extra charge.

It allows for separation and individualisation of pricing for each service.

The separation of availability and selection as proposed here, of scientific information allows for a suite of adaptable value-added services, tailored towards the interests of individual stakeholders.

Peer review remains strongly coupled to availability as it determines which information is worthy of being published as scientific knowledge, of scientific effort and scrutiny, and thus as common property. Nonetheless, costs for peer review can be made a transparent part of the availability costs in order that they can be charged separately.

Following the above arguments on the different aspects of availability and selection as core added values of scientific information, and the different roles they therefore play in the business model it is feasible to have separate suppliers for availability and for selection by the reader. These suppliers can be both, universities and publishers.

The digital scientific information market allows differentiation of business models based on the main parameters discussed. Such business models need to be developed and tested in the market.

All business models should be firmly based on the fact that scientific information is an integral part of the science process, and that scientific publishing should serve research.

8 Issues for future business models

As seen before, the digital scientific information market allows differentiation of business models based on the main parameters discussed. These business models can be differentiated in terms of market segment, strategic positioning of the stakeholders, the value chain, competitive strategy, and cost structure.

This means that different stakeholders, and this accounts for universities, publishers, libraries and other potentially, new intermediaries, can take different roads compatible with the value they want and are capable to add. Each stakeholder can focus on those services for the scientific information market it specialises in.

Examples[7] of added values services at optional charges could be:

- long term archiving;
- bibliographic and semantic metadata adding;
- semantic field specific search;
- intelligent reference-netting (over the whole space of open access documents) before/after refereeing;
- professional embedding in third party retrieval and search services;
- printing on demand of bundles of papers;
- direct source code download;
- alerting services including work of third parties at distributed open access publishers;
- creation of living documents with different authors;

- creation of networked documents interwoven with other documents or raw material resp. data.

It may be noted that the success of many of the innovative service types indicated above, especially those depending on search and semantic synoptic evaluation of document content, are the more efficient the more documents they can comprise, e. g. by accessing these via the web.

9 Summary and conclusions

This white paper discusses the main strategic perspectives for business models for scientific publication in the digital age. These strategic perspectives need to be put into action and this requires clear choices for marketing, market segments and niches, technical design, realisation and implementation of services, financing etc.

These choices, however, can and should only be made on an individual basis and are proprietary for each potential service provider.

Nonetheless, all stakeholders could and should benefit from a general exchange of thoughts and experiences. And it is here, where this white paper wants to be of help.

20th August 2007

Hans E. Roosendaal, Knut Barghorn, Eberhard R. Hilf

Scine Oldenburg, Germany, www.scine-all.de

contact: roosendaal , barghorn , [hilf @scine-all.de](mailto:hilf@scine-all.de)

References

- [1] R.K., Merton: *The sociology of science: Theoretical and empirical investigations*. The University of Chicago Press, Chicago, London, 1973
- [2] GIBBONS M., H. Novotny S. Schwartzman P. Scott M. T. C. Limoges L. C. Limoges: *The new production of knowledge. The dynamics of science and research in contemporary societies*. SAGE Publications, Stockholm, 1994
- [3] J., Ziman: *Prometheus bound. Science in a dynamic steady state*. University Press, Cambridge, 1994
- [4] K., Popper: *Logik der Forschung: zur Erkenntnistheorie der modernen Naturwissenschaft*. Springer, Wien, 1934. – *The logic of scientific discovery*, Hutchinson & Co, London; (first ed. in English: 1959)
- [5] ROOSENDAAL H. E., Geurts P.: *Forces and Functions in Scientific Communication: an Analysis of their Interplay*. In: *Proceedings of the Conference on Co-operative Research in Information Systems in Physics*, University of Oldenburg, Germany, 1997. – <http://www.physik.uni-oldenburg.de/conferences/crisp97/roosendaal.html>
- [6] CHESBROUGH H., Rosenbloom R.: *The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-offs companies*. In: *Industrial and Corporate Change* Bd. 11 (4). 2002, S. 529–555
- [7] HILF, Eberhard R.: *Digitaler Open Access zu wissenschaftlichen Informationen - Ein Umbruch zu neuen professionellen Diensten*. In: B. LUTTERBECK, MATTHIAS BÄRWOLFF, R. A. GEHRING (HRSG.) (Hrsg.): *Open Source Jahrbuch 2007 — Zwischen freier Software und Gesellschaftsmodell*. Lehmanns Media, Berlin, 2007. – Artikel: <http://www.opensourcejahrbuch.de/portal/articles/pdfs/osjb2007-06-02-hilf.pdf>; Jahrbuch: <http://www.opensourcejahrbuch.de/download/jb2007>