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Electronic Publishing

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1 General Problems in Scientific Publishing

Publishing the results of scientific research is the basis of the advancement of science, technology and medicine. Over the past decades traditional scientific publishing has been facing ever increasing difficulties because of

- the continuously growing number of publications
- the specialization of science
- the rising cost of
  - distribution
  - acquisition
  - archiving, and with it
- the danger of unavailability and/or inaccessibility

The growing number of publications is the direct result of increased support of education and research all over the world. At the same time, financial resources for purchasing scientific literature are not expanding, thus limiting the dissemination and accessibility of this literature. Solutions for these problems are seen by scientists, publishers and librarians in the development of computer and network (telecommunication) as well as software technology.

Although some circles in science predict the doomsday of traditional publishing arriving within a couple of years, a closer look at the current status rather indicates that we are only in the prenatal phase of electronic publishing in science, technology and medicine. The rapid development and expansion of the science network (INTERNET) all over the world has certainly improved and enhanced communication (most of it even trivial), but we are still far from realizing a true alternative to traditional publishing in this electronic environment. Nevertheless, the electronic technology will eventually also become a publication medium. Many experiments have been initiated to gain experience as well as evaluate and possibly define appropriate methods and conditions for electronic article publishing.

2 Current Options

The initial transition from paper publishing to electronic publishing generates a high diversity of the way publishable or published material is presented, disseminated and made available:

- electrocopying with FAX dissemination of printed articles (document delivery)
- electronic editions of printed works
  - offline: CD-ROM
  - online: RightPages (LAN), INTERNET (WAN)
- electronic publishing proper (i.e. original is provided electronically; secondarily it might be printed) on NETWORKs (f.e. INTERNET)

Electrocopying and electronic offline (CD-ROM) editions of printed journals are not the subject of this discussion, however, publishing on electronic networks (online) is the central issue.

In preparation for setting up electronic publishing, we conducted market research among mathematicians in Europe (and in North America, but the results of the latter are not yet available) on how authors/readers are prepared to use the network and how they view this option.

Of the mathematicians, 90 directly on their desk (66 Of these, 70 services (90 primary use, however, is person-to-person communication.

Even so, close to 40 the last six months and have found relevant literature by searching via the INTERNET; however, regular reading of selected printed journals is still the most important means to keep oneself informed (since almost 100 only available in printed form, this finding is no surprise).

The most important advantage of electronic journals is seen in earlier and more comfortable access to the articles and improved search capabilities. Authors expect publication times to decrease and subscription prices of electronic journals to be lower than for printed journals (5 usage, 65 respondents would like the electronic journal to be delivered directly to the end user, the next preference being the library over the researcher's department or central computer center.

In contrast, authors express fears that their publications may be plagiarized or falsified during the publication process, and that their names will not always be connected to their individual contribution. Furthermore, they are worried about a "publication explosion," in numbers of publications as well as in volume. They also want the refereeing standards to be set as high as for printed journals.

Finally, they are concerned that the state of research at a particular point in time cannot be exactly determined, particularly for older articles, when more and more journals begin to be published electronically. Authors fear that journals may lose their documentation function in this respect if they become "living documents."

3 Role of Publishers for Electronic Journals

The results of the above outlined opinion poll indicate the fields of future activities for publishers:

- selection process, i.e. provision of peer-review organisation and quality control/verification
- editing, styling and formatting as well as fixation (encoding)
- storage, dissemination and documentation of authorized, i.e. "copyrighted" versions (authentication, encryption)
- cataloguing, referencing, indexing
- archiving
- standardizing
- access mode(s) / retrieval mode(s)
- continuous adaptation to new technologies to guarantee access and retrieval for a long period of time
- current awareness services (promotion)
- copyright protection (integrity, security)
- revenue/royalty collection, billing
- secondary or parallel use, e.g. prints of articles, of compilations a.o. more

If members of scientific institutions assume these tasks, they then become publishers.

4 Obstacles to Electronic Publishing Proper

There are still obstacles to the immediate increase in the number of electronic journals (but not necessarily preprint services) and the (at least partial) replacement of printed journals:

- technical
  - computer system (hard- and software) performance
  - network performance
  - accessibility
  - lack of standards
- legal
  - intellectual property protective conventions
  - worldwide (copyright)
- managerial
- economic - security
  - integrity
  - billing
  - tracing usage
- fiscal
  - taxation

Although these obstacles are not considered unsurmountable, it will take some time and concerted effort of all parties involved to reach consensus worldwide on legal and economic issues.