

DELPHI SURVEY ON THE FUTURE DEVELOPMENT OF ELECTRONIC JOURNALS

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This paper presents the results of an international and interdisciplinary Delphi survey on the future development of electronic journals studying changes expected within the next 5 to 10 years. The expert panel comprised 45 scientists, publishers, librarians, journal agents and consultants. The survey covered five areas of interest regarding e-journals:

- (1) future role of scholarly journal literature;
- (2) scenarios for the journal of the future;
- (3) serials crisis;
- (4) archiving of e-journals, and
- (5) new pricing and access models.

The results indicate that we are caught in a substitution process wherein other publication and communication channels increasingly take over functions traditionally fulfilled by journals. Digital representations of printed journals are considered a transitional medium and will be replaced by authentic e-journals that will make use of the full advantages of new technologies. Electronic journals alone will not eliminate the serials crisis, but trends and services introduced by new technologies are expected to offer solutions in some problem areas. Archiving will most likely be performed by national depositories, possibly in co-operation with international subject-specific digital archives. There will be coexistence of different pricing and access models, with consortium licensing and pay-per-use systems taking an increasingly predominant position.

1 The Delphi Technique

The Delphi technique was chosen as the appropriate method for making forecasts on the future development of e-journals. The

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major issues discussed in the survey can be summarised as follows:

- What will be the future role or function of e-journals in scholarly communication and information?
- What could the (electronic) journal of the future look like?
- What contribution could e-journals make to alleviate the current serials crisis?
- How can long-term availability of e-journals be guaranteed?
- Which new pricing and accessing will gain greatest acceptance or be most commonly used?
- Which new technological innovations and developments are expected in the area of electronic publishing?

2 The Expert Panel

Having in mind that these changes affect all areas of scholarly communication and take place within a global market, the expert panel needed to be both interdisciplinary and international. The panel comprised 45 members (10 scientists, 9 publishers, 3 journal agents, 19 librarians and 4 consultants) from Germany (16), Britain (10), the Netherlands (5), the United States (4), Austria (4), Switzerland (3), Belgium (1), France (1) and South Africa (1).

3 Survey

In Part I of the survey, respondents were asked in February 1999 to give their written opinion on a number of very broad issues. These issues are reflected in the questions in section 1, above.

Part II consisted of two successive rounds in July and October 1999, in which the experts were required to assess specific developments and scenarios. They worked with a scale from 1 (not at all desirable/likely) to 5 (very desirable/likely). Where appropriate, questions included estimates about the expected year of occurrence or change (answers 2000 to 2010, "longer" or "never").

All the questionnaires were dealt with anonymously, and panel members were given comprehensive feedback between the rounds. Of the three questionnaires sent out to all panel members, between 86.7% and 93.3% were returned.

4 Results of the Survey

These are reported according to the six questions listed in section 1 above.

4.1 General Developments in the Field of Scholarly Communication

Looking back at the journal system of the last 50+ years it can be said that journals traditionally fulfil the functions of (1) priority stamping, (2) building a collective knowledge base, (3) distribution and communication of research findings, (4) enabling citation of articles, (5) quality control, (6) reward and recognition, (7) building a community of interest .

Answers from the first round show that experts still allocate journals a key position in scholarly communication. However, it is assumed that in future some of these functions may be taken over by other publication or communication channels.

When these functions are studied in detail, it becomes clear that *quality control* – achieved by peer-review – represents the most important feature of journal literature. The expert panel does not expect the importance of journals in regard to quality control to diminish over the next 10 years. Some even assume that the aspect of quality control in general in scholarly communication will become increasingly more important in the future.

It is widely recognised that journal publication is of great significance in the tenure process. Tenure, which is achieved by *reward and recognition* in academia, is essentially linked to the publication activity of scholars and the quality standard of journals. Therefore, as long as journals remain the main indicator for quality control, scholars will be forced to publish in high-quality journals in order to enhance their career

Experts recognise that *distribution and communication* of research findings can be achieved more quickly and effectively by other services. Journals are renowned for being expensive and slow to publish results.

4.1.1 Preprint Archives and Scholarly Journals

Preprint archives will be the main competitors of traditional journals during the next decade. The

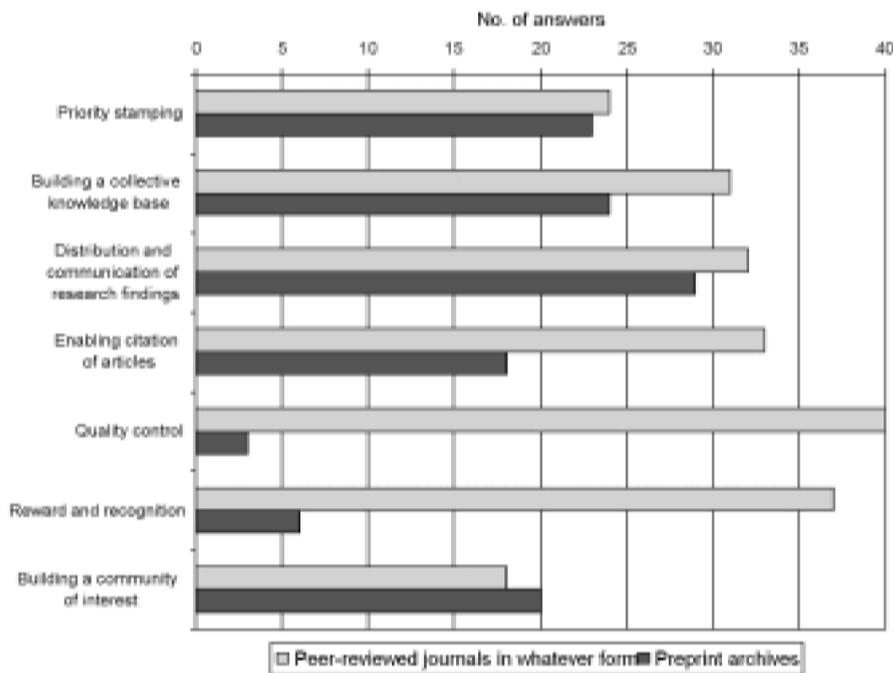


Fig. 1:

Which medium will be most suited to fulfil the following functions within the next 10 years? Comparison of peer-reviewed journals and preprint archives. (Round 2, n=42)

experts were asked to consider how suitable peer-reviewed journals and preprint archives will prove to be for different functions. Fig. 1 shows the results.

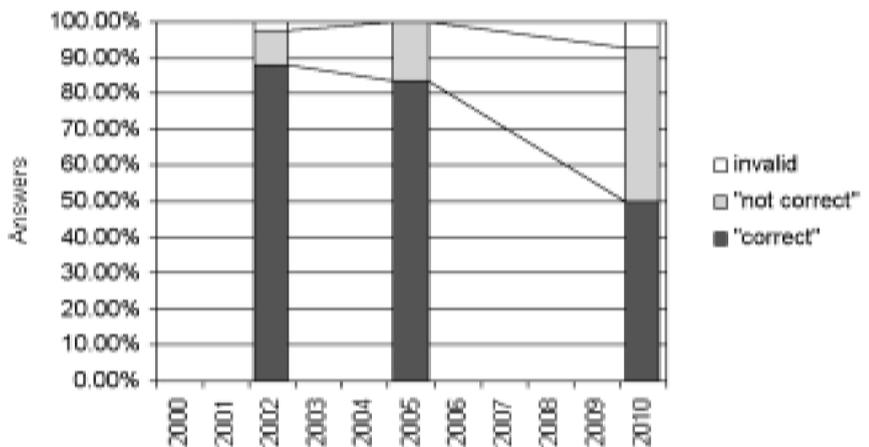
Although most respondents think it desirable that all major subject areas are served by large preprint archives, there are many reservations against these services. Some experts consider peer-review a prerequisite for publication. Others mention that speed of availability and maximum accessibility are not equally important in all disciplines. It is also suggested that preprint archives do not have a potentially sound commercial basis and depend too much on voluntary involvement of interested individuals; 20.5% of the respondents do not assume that all major subject areas will ever be served by preprint archives, the others estimate this will be achieved by the year 2008 (median).

4.2 The Changing Role of the Journal in Scholarly Communication

Most scientists and librarians regard the

journal as the most important document type in formal scholarly communication. The journal may, however, lose this leading position if the substitution process described above continues. The panel was asked to consider the following statement: *Peer-reviewed journals (in whatever form) will be the most important form of formal scholarly communication. Is this correct for the years 2002, 2005 and 2010.* The response of the expert panel to this statement is shown in fig. 2.

Fig. 2: Peer-reviewed journals (in whatever form) will be the most important form of formal scholarly communication. Is this correct for the years 2002, 2005 and 2010? (Round 2, n=42)



4.3 Scenarios of the Electronic Journal of the Future

The definition of “electronic journal” put forward by the participants can be summarised as follows: *an electronic journal is a collection of peer-reviewed articles on a related topic which are published periodically and distributed in digital form.* One question in the first round of the survey explored the journal of the future. The panel was required to suggest scenarios. Of the many scenarios put forward, the four most commonly mentioned suggestions were discussed more closely in the second part of the survey. These four scenarios can be described as follows:

- (1) The electronic journal of the future will incorporate multimedia and interactive features and will offer a substantial added value in comparison to today’s journals.
- (2) E-journals will represent customised collections of articles, put together according to users’ personal interest profiles.
- (3) Journals as envelopes for articles will disappear completely. Articles will be tagged with quality labels and stored in large knowledge environments.
- (4) Articles will be replaced by a stream of dynamic information objects which represent versions of a paper over time.

The panel was asked to assess how likely and desirable each of these four scenarios was. Although nearly all respondents agreed to the first scenario, scenarios (2), (3) and (4) did not show any clear trends. This result may indicate that these scenarios will coexist alongside each other.

4.4 The Serials Crisis and Alternative Journal Models

As to be expected, the deficiencies within the current journal system were discussed extensively in the first round. Some experts call it a serials crisis, others a library crisis. Some refuse to use the word crisis – because of its negative connotation – and insist on calling the current situation a revolution. Some blame publishers for increasing journal prices, others emphasise the underlying problem of information overload and the pressure on scholars to publish. These problems are very complex, and that there are no easy or obvious answers. Despite these very diverse opinions and points of view, respondents agree that e-journals as

we know them today will not eliminate the deficiencies within the journal system. The experts suggest four areas in which e-publishing and new technologies could offer solutions to the serials crisis, as follows

4.4.1 Alternative Access Models in an Electronic Environment

E-journals offer new opportunities for co-operative licensing, and the experts generally welcomed the opportunity to negotiate journal prices and make co-operative deals. The most important new access model to scholarly journal literature is, of course, the pay-per-view system. This new economic model is expected to have a great impact on publishers and libraries and is discussed in section 4.6.

4.4.2 New Technologies Support Innovative Pricing Models

Two models were repeatedly referred to by the panel: the initiative SPARC (Scholarly Publishing and Academic Resources Coalition) and the *New Journal of Physics* (NJP). SPARC launches new, low-priced journals in direct competition to high-priced commercial titles. Although SPARC does not focus solely on online-only journals, the aim is to use new technologies in order to help improve the publishing process and reduce production costs. The *New Journal of Physics* covers its costs by article charges to authors and is available free of charge on the Internet. These models are also discussed in section 4.6.

The SPARC model is warmly welcomed by the expert panel. This model is expected to prove successful in the long term: 47.6% expect that such journals will prove to be a success and manage to keep their prices low for the year 2003; 69.0% for the year 2010. The model of the *New Journal of Physics* is considered to be less attractive and less likely to succeed.

4.4.3 The Future of Marginal Journals

As the total number of journals increases steadily, journals become more and more specialized, often addressing only a very small readership. These highly specialized journals are described here as marginal journals, in contrast to the heavily used core journals.

The discussion in the first round indicated that these journals will be among the first to move to an entirely digital environment. Respondents were asked to give their opinion on the following statement: We will see many marginal journal titles disappearing or transmuting into other entities, and 40.5 % of the experts find such a change "very desirable" and 19.0% "desirable". When asked in which year such a change may occur, respondents gave the year 2005 (median).

4.4.4 Do-It-Yourself Publishing

The concept of DIY publishing is based on the realisation that the traditional roles of authors, publishers, librarians and readers are changing in the electronic environment. New technologies, and especially the Internet, make it very easy for all participants to write, publish, distribute and archive articles: anyone can in theory perform all parts of the publication process. Will authors in future make use of these tools and become their own publishers and archives? Will such trends improve the availability of scholarly literature or just make publishing a complete chaos?

There was no consensus whether DIY publishing is desirable or not. One expert reminded us that the purpose of scholars is not to be a publisher, but to concentrate on doing research.

4.5 Archiving Electronic Journals

The first round revealed that the specialists have different opinions about *who* or *which institution* should be responsible for archiving electronic journals. The panel also feared that digital preservation would be more cost-intensive than the maintenance and storage of printed journals. Naturally it is difficult to allocate responsibilities before more is known about the exact costs and long-term implications of digital archives. Many experts mention the necessity of defining international standards for electronic journals (e.g. SGML, PDF, DOI). The adherence to such standards is an important prerequisite for long-term availability and readability of any electronic document.

4.5.1 Allocation of responsibilities

In the first round the panel mentioned five types of institutions as possible candidates for the task

of preserving e-journals:

- national depositories, e.g. national libraries;
- international discipline-specific archives, maintained by special international non-profit organisations or associations;
- publishers;
- authors themselves or authors' institutions;
- special commercial providers.

Of the respondents, half think it "very likely" and 31% think it "likely" that national depositories, including national libraries, will assume responsibility for archiving electronic journals. (Not all, however, consider that national depositories are equally suitable for this task.) The second most likely option is that international discipline-specific archives will accept responsibility for digital preservation (26.2% "very likely", 35.7% "likely"). Hardly any respondents consider that publishers are either likely or suitable candidates for this responsibility. Even fewer assume that authors themselves or authors' institutions will take an active part in preserving e-journals. There is no consensus as to the role of special commercial providers in this process.

4.5.2 Print Issues as Archival Copies

The vast majority of current e-journals are digital representations of printed journals. Only roughly 11% of e-journals can be considered online-only titles³. Although it is very important that a solution for the preservation of these 11% is found as soon as possible, the situation seems less urgent for the remaining 89%. The expert panel does not seem to be basically dissatisfied with the current practice, wherein libraries hold printed versions of e-journals as archival copies.

However, this may change in the near future. Electronic issues offer more features and functionalities than their printed counterparts, and also increasingly include supplementary material which is not part of the printed version.

The survey explored whether this practice of holding print issues as archival copies would continue, or not. Experts were asked: *In which year will libraries stop subscribing to printed versions of major scholarly journals for archival purposes?* The panel expects that this change will occur in the year 2007 (median), with only 2.6% of the respondents answering "never". The panel was

also asked: *In which year will the average article have so many interactive and/or multimedia features, that printing it will only convey part of the information?* Specialists expect to see this change in the year 2006 (median); only 2.6% of the respondents answered "never". By this time, reliable digital preservation will be indispensable for the long-term availability of e-journals, or long-term availability and accessibility of knowledge can no longer be guaranteed.

4.6 New Pricing and Access Models

Electronic journals offer a whole new range of possibilities on how to price and distribute articles. You will soon no longer have to subscribe to a whole journal in order to get the few articles that really interest you. Articles can be delivered electronically, individually or in packages, customised to match requirements of different user groups, and possibly with add-on services if required.

Answers from the first round indicate that subscribers and readers will in future be offered a variety of pricing and access models. An analysis of these answers led to the formulation of a scenario that was presented to the panel. The scenario assumes that libraries *will offer unrestricted electronic access to core journals through license agreements (possibly consortial) and pay-per-use access to journals of secondary importance*⁴. When asked whether they agreed with this scenario, 87,2% of the specialists answered "yes".

4.6.1 Pay-Per-Use Access

Although not all experts are very enthusiastic about pay-per-use systems, it seems obvious that this access model will become increasingly more important in future

The panel was asked to reflect whether the widespread introduction of pay-per-use access is not favourable, because it restricts access and is inconsistent with the library's core concept for offering equal access to all readers. There was no consensus on this question. It seems that

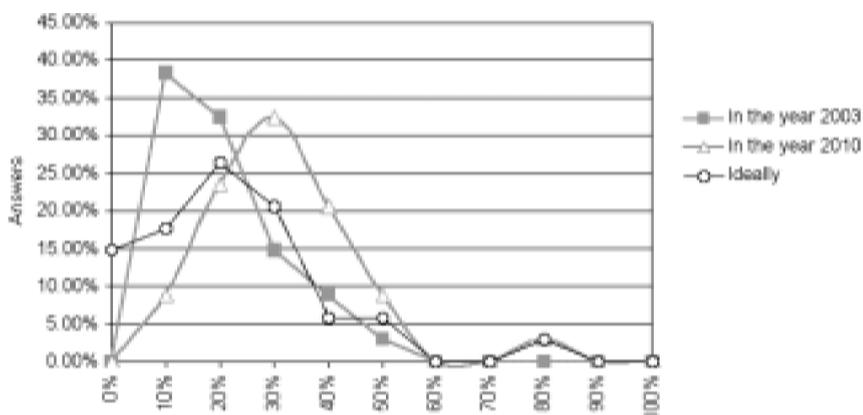
we cannot yet anticipate the full implications of the widespread introduction of such pay-per-use models.

When asked *who* will pay for pay-per-use access, librarians and non-librarians disagree. All librarians agree that users will pay part – if not all – the costs. Not all non-librarians, however, expect that users will have to contribute to the costs. From a librarian's point of view, it is not surprising that librarians expect contributions from the readers.

The scenario suggested here is that users will have unrestricted electronic access to core journals and pay-per-use access to journals of secondary importance. An interesting question is how often scholars will have free and unlimited access to journal articles, and how often they will need to refer to pay-per-view systems to access their required journal articles. The expert panel was asked to give an answer to the following question: *Consider article access from the point of view of a research scientist in a large university. How many percent of required articles will he have to access through pay-per-use models? (In the year 2003, in the year 2010 and ideally).*

As the results indicate in fig. 3, scholars will access considerably more articles through pay-per-use systems in the year 2010 than in 2003. Respondents expect that roughly 30% of the articles required by scholars will be accessed via pay-per-use models by the year 2010. Interestingly, the ideal percentage is estimated to be lower than the expected situation for 2010.

Fig. 3: Consider article access from the point of view of a research scientist in a large university. How many percent of required articles will he have to access through pay-per-use models? In the year 2003, 2010 and ideally? (Round 3, n=34)



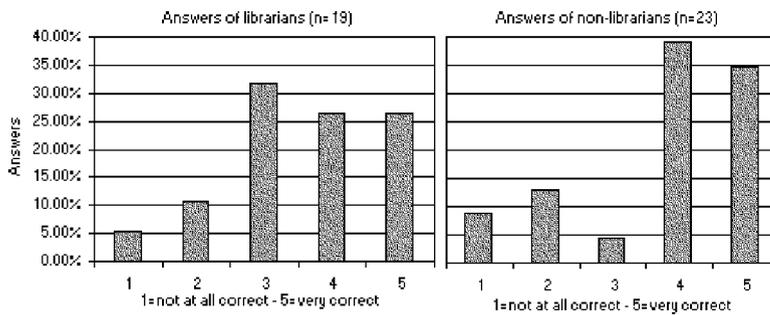


Fig. 4:
Consortia provide libraries with much more information for their money's worth. Is this correct or not? (Round 2)

4.6.2 Consortium Agreements

The panel is convinced that more and more licensing will be done in consortia. However, not all members of the panel are equally enthusiastic about the benefits of consortial agreements. Many librarians have reached the conclusion that consortia do not solve their financial problems, and publishers are worried about losing print subscriptions and income through such agreement. The panel members were asked to give their opinion on the following statement: Consortia provide libraries with much more information for their money's worth. The survey shows that librarians are more critical about the actual benefit of consortia than non-librarians (fig. 4).

5 Conclusions

In many areas respondents have very similar expectations and estimates concerning the future developments of e-journals. The panel agrees on the following issues:

- Other publication channels will increasingly prove to be more effective than journals in certain areas. Especially communication and distribution of information – traditionally performed by journals – can be achieved faster and more efficiently by other publication channels.
- Peer-review and quality control remain the most important contributions of scholarly journals.
- The status of the journal as key element in formal scholarly communication will fall noticeably in the second half of the decade.
- Electronic versions of printed journals represent a transient medium. In the medium term they will be replaced by authentic

electronic journals, which make full use of the new technologies.

- Electronic journals alone will not solve the serials crisis. The implementation of new technologies can, however, alleviate the situation in many areas.
- In many cases libraries currently hold printed versions of e-journals as archival copies. This practice will be discontinued during the second half of the decade. As electronic issues often include features and supplementary material not available in their printed counterparts, it is assumed that print versions will no longer be an adequate archival medium.
- Pay-per-use access will become increasingly more important. Libraries will offer unrestricted electronic access to core journals through license agreements (possibly consortial) and pay-per-use access to journals of secondary importance.

On various issues the experts do not agree.

They are:

- It is not clear whether preprint archives are desirable for all subject areas or not. The lack of quality control represents a major handicap. It is not evident whether the advantages of preprint archives are equally decisive for all disciplines.
- There is no consensus what the electronic journal of the future will look like. E-journals of the future may be (1) customised collections of articles, put together according to the users' personal interest profiles; (2) simply individual articles tagged with quality labels and stored in large knowledge environments; (3) articles may disappear entirely and be replaced by dynamic information objects that represent versions of a paper over time.

- It is very likely that the journal of the future will not be uniform: we expect increasing product variety and diversification.
- It is not clear who will take the responsibility for archiving e-journals. Two scenarios are possible: archiving can be seen as a national task (national depositories or libraries) or as a co-operative task (with national depositories and subject-specific archives taking the lead and special commercial providers offering certain services).
- The consequences of a widespread introduction of pay-per-use access to journal articles are not yet clear. It may lead to the discrimination of certain user groups. Furthermore, there is no consensus who will pay for this access.

- The benefits of consortium licence agreements remain controversial.

If it is considered that there is a variety of possibilities offered by new technologies and diversity of users' requirements, it seems very likely that we will be confronted with a wide range of different publication formats, access systems and price models.

From this point of view, it would have been wrong if this Delphi survey had only offered one scenario for the future. Librarians will in future be required to choose which titles, services and add-on functionalities they want to offer their patrons. Evaluating these offers and choosing the right option will be a library's greatest challenge for the next five or six years.

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