Electronic Journals: Transforming the Information Cycle ?

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Abstract

Starting from the present day printed information chain, the concept of electronic journals and their possible role in the virtual library is explored. Next the expectations and problems, as discussed in the literature on the subject are briefly explored with special attention for the problems of document integrity and archiving. In principal electronic journals can transform the information cycle if a concerted effort of scholars and librarians assures that the three basic functions which journals, whether printed or electronic, have: communication, quality control and archiving, are adequately fulfilled.

I. Printed Journals and Real Libraries

Approximately 200 years after the invention of printing the first scientific journals appeared almost simultaneously in London (Philosophical Transactions of the Royal Society of London) and Paris (Le Journal des Sçavants) in the year 1665. The growth of their numbers has been remarkable. In 1800 there were estimated to be 100 primary journals, in 1850 1000, in 1900 10.000. If growth had sustained in this tempo there would have been 1.000.000 journals around the year 2000 [1]. Growth has however, and fortunately so, dropped of, and in 1991 there were estimated to be approximately 133.000 primary journals [2].

In 1830, when there were about 300 journals, the first abstract journal appeared. These abstract journals, designed to efficiently disclose the information contained in the primary journals have shown an equal growth, around 1950 there were about 300 abstract journals. In the seventies the function of the abstract journal was more and more taken over by bibliographic databases which are superior in retrieving fast references to primary journal articles.

Today, the printed journal is the most important medium in which the progress of science is recorded. It is the centre of an information cycle in which the actors are scholars, both producing and consuming information; primary and secondary publishers which organise the editing and refereeing process and offer abstracting and indexing services (AIS); and libraries which select titles from the published universe to satisfy their patrons' needs and archive the record and supply the information on demand, both to their own institutions and via Inter Library Loan to remote institutions. The main functions of the journal are: communication and dissemination of information; quality control; archiving [3]. These basic functions are nowadays fulfilled by, and therefore attributed to, printed journals, but they are fundamental to the process of scholarly communication. They should apply to any new medium if it is to serve adequately as a carrier for recording scholarly communication.

There are signs though that the printed information cycle might collapse. The familiar term in the library world to indicate this danger is the serials pricing crisis. Library budgets are simply inadequate to catch up with the growth in journal literature and the economic basis of what Karen Hunter of Elsevier has called the "publishing ecosystem" [4] is eroding. Also it is obvious that the printed journal is losing its main function of communication. Scholars have found more and more informal ways of communicating their work. The Internet, with its many conferences organised in listservers, newsgroups and bulletin boards, has turned our scientific world into a truly global village. In this setting it was to be expected that an electronic counterpart of the printed journal would come into existence and it did so in the late eighties of this century, more than 300 years after printed journals started. The question is whether the electronic journal can become the core of the virtual library, fulfilling the functions served by the printed journal of today and perhaps innovate or even transform the way in which the information cycle works.

II. Electronic Journals and Virtual Libraries

The basic problem in defining what an electronic journal is that if we stick to much to the present world of the printed journal, Kessler would be right in observing that "electronic journals at first glance appear to be the networks' leading anachronism" [5]. Judy Myers et. al. describe this dilemma as follows: "The term 'electronic journal' does as little to describe [the] future as the term 'horseless carriage' did to capture the promise of the automobile." [6] Of course the same problems arise if we try to capture the idea of a virtual library as an electronic equivalent of the real libraries of today. In other words, it is better to start with trying to understand what is going on on the Net instead of departing from the well-known print information cycle. How comfortable we might feel in our real libraries of today, there is also a real danger of losing the essence of what is emerging, and perhaps our positions as librarians in the event.

However controversial it might seem, probably the best way of approaching the problem of what an electronic journal is, is to look at some developments in the library and network world and ask if they constitute what might be called electronic journals.

II.A. Electronic Versions

The first development which comes to mind are projects experimenting with electronic equivalents of printed journals. One of the oldest examples is ADONIS where images of articles published in printed journals are distributed on CD ROM [7]. More recent examples are Elseviers TULIP project in the United States and the RightPages^{TM} Service at AT&T Bell Labs [8]. A similar project with Elsevier in my own library at Tilburg University involving 114 journals which will be made available as images on end users' workstations can also be mentioned here. Still older examples are full text databases run by the major host organisations. All of these projects involve journals and all of them are by definition electronic, but I would not want to call them electronic journals since they are more adequately described as electronic *versions of printed* journals. The notion electronic journal to me, suggests something new, something synergetic, something which has sprung from the Net itself.

II.B. Electronic Conferences

On the Net itself there are numerous candidates which serve to offer the main function of communication: computer conferences organised in listservers or through Usenet; electronic pre-print services; electronic newsletters and, indeed, phenomena which label themselves as electronic journals. These are not derived from print serials [9] and therefore come closer to what we would expect. Singh and Meadows [10] counted 240 electronic journals and newsletters and 1152 scholarly conferences in the third edition of the Directory of Electronic Journals, Newsletters and Academic Discussion lists. A more recent version of this Directory, maintained by Diane Kovacs, can be obtained through the network [11]. I did not count the score sofar, but was interested in the difference between an electronic journal and an electronic newsletter. Or, stated otherwise, is the second main function of a journal, quality control or peer review, fulfilled ? The number of candidates for the label electronic journal shrinks dramatically if this test is applied. I am not sure, but guess that probably no more than 20 candidates remain, among them well known examples like Psycoloquy, PACS Review, and Postmodern Culture. Kovacs' directory still contains journals which are electronic versions of printed journals and I have the impression that it is limited to electronic journals which are published through, or are at least announced via newsgroups or listservers.

II.C. Online Journals

Two last examples which can be considered as electronic journals are first of all the well known Online Journal of Current Clinical Trials (OJCCT) [12] and its recent companion the Online Journal of Knowledge Synthesis for Nursing, [13]. I consider these two as problematic at least since they require special software to be retrieved and read. They do however live up to some of the expectations that are voiced in the literature on the subject of electronic journals.

II.D. Electronic Journals ?

An electronic journal is then in my opinion a medium which serves to communicate peer reviewed items of information (I deliberately choose not to speak of articles) which is not derived from a print publication. I have for the time being also ignored deliberately the archiving function.

Compared to the over 130.000 printed journals the phenomenon of the electronic journal seems to be insignificant. Also it seems that the number of electronic journals is not growing very fast. Okerson [14] for instance, predicted in 1991 that there will be about 100 refereed electronic journals in 1995. That number will probably not be achieved next year but it certainly will not take 135 years to reach the 100 as it did with printed journals, since electronic journals are the main candidates for information carriers in the emerging virtual library.

Having hopefully cleared the ground a bit it is interesting to look at the expectations and perceived problems which are discussed in the literature on electronic journals.

III. Expectations

The first advantage of electronic journals lies in their speed of communication and is mentioned by nearly everyone writing on the subject. This advantage is, of course, dependent on the speed of the peer review process, but this is usually also carried out via the Net. Well linked with this observation is the notion that the article as a more natural unit of information [2, 15] can be sent out immediately after the review process has been completed and does not have to wait until an issue can be completed. This raises the important question as to whether there will remain a need for an entity like the journal. Also there are no limitations to the size of an article [12] and the electronic format can be used to add experimental data or to create even multimedia documents [16, 17]. Moreover the principal possibility of linking an article with the body of literature on a given subject is sometimes mentioned [12] or at least a link with discussion on the article itself, creating interactivity in a system which Harnad calls "open peer review" [18, 19]. Harnad, as a founder of Psycoloquy, one of the leading pioneers in this field, goes even further and thinks that this might lead to a fourth cognitive revolution (after speech, writing and printing) because the speed of communication between scholars will approach more the speed of thinking, thereby boosting creativity and productivity. In this sense, Harnad expects a true transformation of the process of scholarly communication.

Compared to that the expectations of librarians are more down to earth. Electronic articles have the advantage of not demanding shelf space nor binding costs. They cannot be mutilated nor stolen and are always available [2, 20]. Much expressed is the belief that they are a solution to the serials pricing crisis [16, 17, 19, 21] and give universities the possibility of regaining control over the publication process which is now largely in the hands of commercial publishers [2]. Finally, electronic articles can be merged into an alerting system based on user profiles [12] while Manoff et. al. observe that the difference between catalogues, abstracts, indexes and full text can gradually disappear [16]. This would indeed be one of the main advantages compared with library systems of today where the retrieval of references is a piece of cake compared to the often cumbersome retrieval of the documents referred to [22].

It should be noted that many of the expectations that are mentioned here have as yet hardly materialised in the electronic journals of today.

IV. Problems

One of the basic problems of electronic journals, at least partly due to their relative youth, is that they fail as yet to attract prestigious authors. This seems to have to do with the function of quality control. According to Bennion the electronic journal lacks quality control [3], but Harnad points out rightly that this is independent of the medium although he ascertains that prestige is important [18]. Acceptance of the medium by authors is also considered to be a major problem by Line [23], and Metz and Gherman [2].

A related factor seems to be that the electronic journal is considered to have low visibility [16]. This problem seems not only inherent to relative youth but is also due to the fact that electronic journals have hardly made their way into the information infrastructure we call libraries. Few libraries have as yet incorporated electronic journals in their catalogues, and the reports of libraries that are struggling with the problem give the impression of very diverse solutions [17, 24, 25, 26, 27]. Also, electronic journals are hardly covered in conventional abstracting and indexing services [9]. Part of these problems can in turn be attributed to a lack of standards in the area, which means that there is no single solution which applies to even the few electronic journals that exist today. Modes of access for instance, vary from automatic e-mail, e-mail of table of contents with the possibility of requesting separate articles by e-mail, to ftp, and the networked information retrieval tools Gopher, WWW and WAIS. This in turn brings up the question whether articles should be downloaded (and sometimes printed to be shelved like their print counterparts !), and if so to which platform, or if should be relied on networked access. In the latter case, userfriendliness of different solutions is questioned. And finally, even something as simple as citing an electronic article becomes a problem [15, 28] Rooks also observes that library personnel sometimes lacks training in coping with networks [20].

A more fundamental problem raised by Metz and Gherman is that electronic journals could become a parallel to the printed journal system and thereby an extra burden, not alleviating but aggravating the serials price crisis. Only if universities develop policies to regain control of the information cycle can electronic journals be a solution [2]. This requires the cooperation of scholars which closes the circle.

V. Integrity and Archiving

Two related and very basic problems touch upon the quality control and archival function of journals. Printed articles have a big advantage from a library point of view: they are stable bibliographical entities which we know how to describe formally. In other words, the integrity and origin of a printed document is beyond any doubt. While preparing this paper I received through dark channels a mutilated version of an electronic publication on the subject of e-publications. I was able to contact its author by e-mail and he sent me a complete version but also warned me that he was working on a new version which he would sent to me as soon as he had finished it. For two reasons I have not used his work in this paper: first of all there is no stable version which I can properly cite, and secondly I think the author's paper should be publicly retrievable. The latter brings us to the archive problem. Although paper is not at all a perfect archival means (there are great problems in conserving many publications from the nineteenth century) its archival properties are well known. Electronic publications will inherently suffer from the fast developments in information technology meaning that future conversions of e-publications will be inevitable [29]. Standards could be helpful here, but it should be observed that if some of the advantages mentioned above, notably multimedia and hyperlinks, materialise, the very way in which they materialise could aggravate the archival problem if certain e-publications are too software dependent. This problem is also connected with the access problems mentioned above. A solution could lie in standardising on an SGML approach, also in use on the Web, but the conditions remain anarchic and it remains to be seen in which way SGML develops.

VI. Conclusion

Turning back to the three functions of journals mentioned above let's try to evaluate if electronic journals stand a chance as a networked successor of their printed counterparts.

As to the function of communication, the electronic journal seems to offer the greatest advantage. Whether this is a real advantage remains to be seen because speed is not everything. Communication also asks for visibility and retrievability. As long as navigating the networks is not a trivial task this will be a problem. In my view the solution is that libraries start to incorporate electronic journals in their information infrastructure while at the same time libraries should become more and more part of the network, in a sense virtualising themselves. Louis Rosenfeld together with Joseph Janes in a recent electronic article pointed out that in order to navigate the Net there is a need for travel agents [30]. I think libraries are the natural travel agents given their expertise in selecting information, i.e. separating the chaff from the wheat and thereby assisting users to determine the usability of information which is also an important task on today's network; map and disclose the available information in an integrated way, staying comprehensible for our patrons; and offer access to scholarly communication, whatever the medium. These are traditional functions of a library and they will remain important in the virtual library.

As to the function of quality control, the initiative is with the scholars themselves as they already perform this function in the present day information cycle. If the awareness among scholars grows that the serials pricing crisis is not just a problem for librarians and that the Net offers the potential for transforming the information cycle, than a basic condition for a transition will be fulfilled. Libraries today can stimulate this awareness by showing the potential of electronic journals and incorporate them into their information infrastructure, which in my opinion requires more than simply setting up a Gopher.

The archival problem is perhaps the most difficult one but by no means a problem which cannot be solved. Here libraries can offer real contributions, perhaps building on expertise already acquired in the conversion of catalogues.

To answer the question raised in the title: can electronic journals transform the information cycle? The answer is yes, they can, and all the buts raised in this paper equal as many interesting challenges to scholars and librarians.

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