ELECTRONIC INFORMATION - WHO PAYS?

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I should begin by clarifying what is meant by electronic information. Evidently the electronic half of the title phrase is significant, for information remains information regardless of the medium used to convey it. But what then is meant by 'electronic', and why should the likelihood of payment be questioned? After all, information is delivered on CD-ROMs by electronic means and no one objects to paying for them, or for the supply of information-packed magnetic tape, so that what must be implied is information copied from a central store and delivered through an electronic network. Since the delivery costs in an electronic network are very low there are also great expectations that the information carried will likewise be extremely inexpensive.

The prospect of free information delivery through the Internet or JANET is alluring, but a mirage. Take the Internet as an example of an essential free service, if telecommunication charges are ignored. The Internet is open to anyone, and there is a vast amount of information available, including BUBL (the Bulletin Board for Libraries), but it is anarchic, with little or no protection against misuse. The quality of the information carried on the Internet is poor and valuable material, like airline timetables and seat availability, is carefully guarded. The Internet is also intended to be non-commercial, but business is beginning to intrude.

Time recently described the furore that ensued when two lawyers (Canter & Siegel) in Scottsdale advertised their services on the Internet by putting their notice on almost every active bulletin board (some 5,500)[1] "Within minutes [!] angry electronic mail messages began pouring into Canter & Siegel's mailbox, and there were thousands. The input was so great that the computer carrying the traffic crashed repeatedly under the load, and the company providing the connection to the Internet withdrew its services." The lawyers were unrepentant, threatened to sue the connection provider and said that they would repeat the exercise. This time the response was different: the office fax machine began delivering page after page of blank paper. The lawyers then found that they had been put down for hundreds of bogus magazine subscriptions and, a neat touch, a Norwegian programmer wrote a program that would seek out any Canter & Siegel mailing and destroy it.

This story illustrates the esteem with which the Internet is held by enthusiasts, its free-wheeling nature, yet adherence to a code of practice, the pressures for commercial input and opposition to

commercial input. It is true that shopping networks and advertising newsgroups have been set up as the equivalent of telephone directory yellow pages but advertisements are, for now, being kept away from bulletin boards.

If we accept that the Internet is unsuitable as a medium for the *publication* of valuable, long-lived information, it can nevertheless serve well as a carrier of current awareness services. Already BUBL offers the contents pages of journals in the information field through JANET and the Internet, and the tables of contents of many other periodicals can be accessed in one way or another. Book Industry Communication is extending a helping hand in this direction by promoting work on the establishment of standards for electronic tables of contents (EToCs). The adoption of a standard system covering the content, structure and layout of tables of contents would greatly encourage their use, particularly as publishers would probably make them available free of charge. On the other hand, overmuch elaboration of electronic tables of contents, by the inclusion of abstracts and other information, would have the opposite effect as they would become cumbersome and costly for the publisher to produce.

One of the recommendations arising from the recent study of the STM information system in the UK was that JANET should make its current awareness services available to industrial and commercial users and these benefits should be extended to public libraries[2] This idea is also implicit in one of the recommendations of a British Library Working Party on the impact of electronic publishing on library services and resources (1994), where it is said that Government action is needed to ensure that the public always has access to information through the public library system *regardless of the medium used*[3] The suggestion appears to have been welcome for two experimental projects, linking public libraries with JANET, are underway.

Coming to the material supplied through an electronic network - charges for electronic documents that are copies of printed articles pose no problem, but there is no consensus over the best way of charging for purely electronic material: that is, material having no print-on-paper counterpart. The British Library Working Party on Electronic Publishing tried to rationalise the licensing agreements covering electronic publications, without success[4] Instead, a check-list was produced which at least serves to draw attention to potential points of dispute. Debate continues over the relative advantages of subscription versus an access fee, or over the application of a fixed charge (preferred by librarians) or a variable charge dependent upon usage. The latter is unquestionably fairer, but much less easy to manage or finance if demand escalates. The provision of *Current Contents* online through the Bath Information and Data Service provides a cautionary example of the difficulty in gauging demand, which was much greater than expected, and arriving at a fair price which, based upon anticipated usage, was far too low.

Journal publishers are experimenting with electronic information delivery, though there is little sign of the conventional serial being abandoned on the appearance of the electronic version. Subsequent development will turn on the take-up of the electronic version and upon the revenue yielded by it. Initially, the electronic versions are likely to be cheap for they will duplicate the printed text, and be offered to subscribers for a small additional cost, provided that subscriptions to the printed journal are sustained. But if the circulation, and revenue, of the printed journal falls away then the electronic version will have to bear its full share of the overheads, and the price will rise steeply.

Since with an electronic system, papers and documents will be demanded, and delivered, singly the question then arises: why publish a collection of papers (or an issue of a journal) at regular intervals? For many journals an issue is just a convenience for packaging and posting, with the journal itself comprising a cluster or collection of papers on a particular topic or area of knowledge. But the journal is more than that. Its content reflects the interests of the sponsoring organisation, society or publisher (like that of the NAG journal 'Taking Stock') and acts as a cohesive force for the organisation, holding its members together. If the constituent papers were simply poured into an electronic system, then this unity would be lost and the identity or image of the publishing society damaged. This spoint,of major significance for a learned society or association of like-minded people, is not so

critical for a commercial publisher, like Elsevier, who can expect benefits from allowing customers or clients to browse its vast output and create individual clusters of papers,or 'journals', exactly suiting their needs.

The concept of the journal as an entity is important for another reason. Most journals are produced by learned or academic societies, either directly or via a publisher acting for the sponsoring society,and the most highly valued publications are those on which a great deal of editorial effort is expended. Although the authors of papers in learned journals are not paid, much screening of the papers goes on before publication. Very few scientific papers are ever published without substantial editorial amendment. In my experience as a journal editor, the arrival of a near perfect paper was a rare event indeed. Likewise, Stevan Harnad, of 'subversive proposal' fame, has written that "in over 15 years of editing *Brain and Behavioral Sciences* and 5 years of editing *Psycoloquy*, I have never once encountered a paper where the author's final draft could be published verbatim?"[5] Customarily, over publication. Even then, papers are usually sent back to the authors for revision and improvement, after which they are again refereed before the final checking and preparation for press begins. Most referees work for love, not money, despite the fact that much of their effort and that of the editorial staff is wasted for, generally, 50% of the papers submitted to a good journal are rejected and sometimes this figure rises to 80%. Yet the rejected papers have all had to be processed and sent to referees before any decision could be taken, and this process is expensive.

One of the reasons why referees are seldom paid for their reviewing function is that they see themselves as acting for the good of their subject and their society. To be invited to act as a referee is a mark of recognition and an accolade of sorts,for it means that you have achieved some status in your field. Referees are unlikely to continue to be so helpful, enthusiastic and free with their time when the material they review simply disappears into a computer or file server and their diligence not even marked by the inclusion of their name in an annual list printed in the journal using their skills.

Thus it is hard to see how quality control can be maintained if the journal as we know it disappears, for the motivation for careful and exacting reviewing will be lost if the object of such attention is simply stored in an electronic archive and never sees the light of day. It follows that high quality electronic information will continue to be provided by most of the present suppliers, for they operate the necessary quality control mechanisms.

The journal will continue to evolve to meet the demands of society members, though it is less easy to determine the direction. Publishers are not committed to the continued use of print-on-paper, and could well use floppy disks or CD-ROMs. News and other information of current interest, as well as notices and reports of meetings, could be provided on an electronic bulletin board, leaving the printed journal or CD-ROM to carry material of lasting value. Alternatively, since the readership and demand for current information and news of recent developments is much greater than that for heavy learned articles of limited appeal, it could be that the news material gets into print and the learned articles reserved for electronic publication. This is where market forces come into play to determine the outcome.

The preservation of quality control is of the utmost importance for publishers, for the reputation of a serial publication, or journal, provides a mark of customer approval that a miscellaneous collection of articles in a database can never attain. This is why publishers, whether academic or learned society, commercial or not-for-profit, are likely to remain important links in the information chain. Librarians and library users trust the big professional organizations, like the Institution of Electrical Engineers, the Institute of Physics or the British Medical Association, and these bodies will be able to sustain their position by establishing their own information stores, albeit electronic, to which the specialist will go for validated information. For example, the Institute of Physics expects to publish more than 60,000 pages of physics information in 1994, or approximately 250 million characters. All of this text needs to be converted into machine-readable form, and at present 63% of the edited and peer-reviewed material is in a standard electronic format. The process of electronic transformation began in 1988 and will not be fully completed

until 1995, though the programme is now yielding typesetting savings approaching £400,000 annually[6] With information held in electronic form, the Institute of Physics can offer new products to librarians. For example, CD-ROM versions of journals to subscribers, with the electronic copies of early volumes being free but only obtainable with a subscription to the printed edition.

If should now be evident that evolution, not revolution, in serials publication is anticipated. Changes will come, but transistors will not replace type in the course of a semester or two. Several arguments can be advanced in favour of this conclusion and the first is that valuable electronic information cannot and will not be free. It costs money to refine information and to provide the necessary quality controls, so that the information has to be sold to generate income. However, while there is a broadly acceptable means of charging for information found in journals - familiar as subscriptions - there is, as yet, no counterpart in the electronics field.

Another reason for caution in embracing the electronic revolution is that library users remain content with the present system. One of the observations made in the course of the Study of the STM Information System in the UK[2] was that the majority of academic users preferred familiar and well-established sources of information and exerted little pressure for change. In a similar fashion, resistance to the electronic journal does not come from publishers, but from the would-be authors and users, who remain to be convinced about the longevity of the medium. Electronic bulletin boards and newsgroups are eagerly adopted, but when it comes to the lodgement of definitive information then the printed word is favoured.

To my mind, publishers will remain an essential part of the information chain not just because they are there, but because they serve a variety of valuable functions. Publishers look after the business of publishing by supervising the process, paying printers and editors, collecting revenue and distributing royalties. Publishers establish, and do their utmost to foster, an imprint, which serves as a measure of quality or, at the very least, as a guide for potential customers. Publishers do all they can to enhance the appeal of their product, by paying attention to presentation and readability. Publishers are (or should be) skilled in the marketing of their products. In other words, they are adept in putting their material before the right audience and matching it to the market. They have to be skilled, for if they are not they go out of business and the best publishers have that magical sense of anticipating the demands of the public. Further, publishers are watchful in protecting the rights of their authors against illegal copying, plagiarism and piracy.

There are other reasons for embracing caution in considering the electronic world, despite claims that the electronic journal is the answer to the librarian's prayer. For the enthusiasts,all that appears to be necessary is to feed the network with the articles that would otherwise appear and be distributed in costly print on expensive paper. If a manuscript is good. so it is argued, it will be retrieved, read and valued. If it is bad, then, so the story goes, it will slide into oblivion in the electronic slime at the base of the file server. However, this scenario makes a number of presumptions that are highly questionable.

One such premise is that the necessary electronic infrastructure will continue to be provided free of charge to the user, and that central payment of the costs, like that of the universities to JANET, will continue. These postulates appear unlikely, for as the electronic system expands to support a vast number of users, the capital costs will escalate to a degree that steps will be taken to claw back costs. All too often electronic information systems are regarded as having elastic, ever-expanding, memories. But memory costs money, and the maintenance of large memory stores is expensive. Further, a backup system is needed in case the original store or compilation becomes faulty, damaged or destroyed. That doubles the amount of storage needed, and complicates management. The storage and transmission of pictures, let alone colour images, vastly increases the demand for wide bandwidth and consumes massive amounts of memory.

Another premise is that some, preferably cost-free, management structure will be devised to run the system, and deal with such matters as controlling the input and looking after necessary housekeeping. But how would this function? Would we have a separate system for each cluster

of journals, or would we have a national all-embracing system? Who would manage the system? Who would decide what material, or information, is to be added to the store? Or, if the gate is to be left wide open, who is to label, classify and index the information - and to guard the store? How will we keep track of the information becoming available. On two occasions recently I have downloaded files from the Princeton University fileserver on to my computer (Harnad, 1994, archive. NOW and who.payspiper), but I cannot be certain that this material will still be available in six months time, let alone six years. And how would the enquirer then set about following up or checking my reference?

We thus come to a crucial matter, too often neglected: that of archiving. I was unappreciative of the importance of this feature until the deliverations of the Electronic Publishing Working Party drew my attention to this vital concern. How are those electronic marks, the dots and dashes, the zeros and ones, to be preserved for posterity? What form will the archive take? What medium will be used for storage (for, like the traces on magnetic tape, the coating on Cds seems to have a finite life)? Must plans be made to copy the archive on to a new stock or storage medium every ten or twenty years? Who will pay for this somewhat unproductive exercise? This is not a minor issue, for without such an archive there is no assurance that your bright ideas and superb research results will be kept for future generations. I fully expect my research findings in the field of endocrinology and reproductive physiology, printed on old-fashioned paper in standard journals, to remain available for coming generations, but the same cannot be said for material distributed in the current electronic journals. Already, valuable information published in sadly short-lived electronic journals has vanished.

One step towards the resolution of this problem would be the establishment of a national electronic archive, and extension of the legal deposit system to encompass electronic material. This would open the way to recognition of a definitive version of an oft-modified electronic manuscript and go far to prevent, or resolve, copyright disputes.

Copyright underlies much of the present discussion, although there is no fundamental difference between the copyright of publications on paper and those defined by the distribution of electrons. However, use of the computer greatly facilitates the copying and manipulation of copyright material and greatly worries the rights holders, whether author or publisher. Just as the carpenter, gardener, ariline pilot, librarian and bookseller deserved to be rewarded for his or her labours, so should the publisher. The Follett Report accepts that copyright is a legitimate means of protecting the investment of time and energy and the intellectual property rights of authors and publishers, just as it is aware of the common infringements of copyright[7] In the electronic of things authors will need to strive much harder to protect the copyright of their work than in the print-on-paper world. This is being recognized by governments. In the United States, changes in the Copyright Act aimed at giving the owners of digitised information a solid foundation for obtaining payment are being recommended by the Working Group on Intellectual Property Rights, chaired by Bruce Lehman, Assistant Secretary of Commerce and Commissioner of Patents[8] If their proposals are accepted, consumers would not be allowed to bypass or disarm devices or procedures aimed at protecting the information stored and there would be restrictions on the use of such information by authorized recipients, who would not be allowed to display or distribute the copyright work. The UK Copyright Act of 1988 already bars the manufacture, distribution or sale of devices intended to circumvent copy-protection systems.

The developments just outlined will not only affect publishers, but librarians too. Earlier this year I discussed these issues with librarians in Vancouver and San Francisco, and was astonished at their lack of awareness of the implications. Seemingly, the attention of librarians has been so focused on the high cost of journals and the search for ways of reducing expenditure on them,that they have seen electronic journals simply as a way of saving money, or just as a means to an end - which is a very blinkered view. After all, the bulk of library expenditure goes toward buildings, maintenance and staff costs, and it is hard to justify cuts in the

provision of the information for which the library was established in the first place.

Few librarians seem to have grasped the consequences of electronic document delivery for their own work. With information supplied directly to the desk top computer, why should academics go to the library at all? And why should they, or their departments, pay for libraries that they do not and will not use? If the users have to pay for document delivery, and make little use of other facilities, then the library acts simply as an access point for information exchange, and has little need for much else. Indeed, it is conceivable that expanded links with the British Library, and other national information stores, could take over much of the work attempted by impoverished libraries.

From the point of view of the librarian, let alone the publisher, quality control is lacking on the Internet as is accepted by Stevan Harnad, a leading advocate of free (to the author and user) electronic publication of esoteric (non-trade, no-market) materials. Indeed, he admits that quality control in the form of peer review and editing is a major factor standing in the way of his ideal.

JANET and the Internet can be employed by publishers and document deliverers to supply, electronically, copies of articles and other materials directly to the computer of the user, although, until very recently, the transmission of pictures and of colour was extremely difficult. That problem has been solved and the way opened for rapid development, but charges for document delivery are inescapable, simply because it is expensive to produce high quality information and the costs incurred must be recovered.

It also needs to be borne in mind that if a national network for refereed electronic publication were to be established then the views of a very few people (several referees and an editor or two) for each subject would determine whether a manuscript was acceptable. This would only be one step away from censorship, for if the decision was against publication (or addition to the database, there would be few alternative opportunities for publication, and a monopolistic situation would arise, together with a new threat to academic freedom.

In facing the electronic future, publishers have a choice: they can either licence document deliverers to supply electronic versions of their publications on their behalf, and hope for some revenue, or they can refuse to permit the production of electronic versions of their material in an effort to safeguard the number of paid subscriptions to their journals. It is already clear that the provision of access to little used journals through an electronic database often leads to the cancellation of subscriptions to them. Few expect the income from the sale of copies of articles from journals to match that from subscriptions.

Only when present uncertainties concerning revenue, or loss of income, are resolved will publishers decide what to do next, although it is likely that most good publishers will survive, alongside some new players. Again, evolution rather than revolution is favoured because of the need to maintain quality, and publishers have the extensive editorial services essential for quality control.

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