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Information Research: a case study in the free electronic publication of research

T.D. Wilson, Ph.D.

Research Professor in Information Management
Department of Information Studies
University of Sheffield
t.d.wilson@shef.ac.uk

Contents

Summary

Describes the development and current status of the electronic journal, *Information Research*, which began as a print-based Departmental newsletter and which now publishes original research papers. The discussion covers the rise of the e-journal concept and its implications for academic institutions, as well as the future of e-journals and the possible development of *Information Research* as a collaborative educational and research venture.

1. Introduction - the rise of the electronic journal

The concept of the digital library has now become almost commonplace - conferences act as fora for the latest research, the National Science Foundation in the USA and the Higher Education Funding Councils in the UK have research programmes in various aspects the digital library, journals advertise special

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issues, and new journals arise. Indeed, it seems almost as though the sole topic of professional writing has become the digital library.

Central to the concept of the digital library is the fact of the digital *resource*, since digital libraries cannot exist without being able to provide access to digital resources, and one of the most significant developments over the past four or five years has been the rise and continued rise of the electronic journal as a serious medium of scientific communication.

That rise is indicated by the size of the archive at *NewJour*, a Web-site which lists new electronic journals and from which an e-mail service of announcements is run. *NewJour* began life in 1993 as part of the Association of Research Libraries directory of electronic resources. In early 1995 there were 250 items in the archive, there are now (24th August 1998) 6,255 items. Not all of these are serious, academic journals: NewJour lists newsletters, popular magazines, trade journals and, indeed, any item that can be described as a periodical publication. However, many are serious journals and a particular feature, as many will be aware, is the rapid increase in the number of priced journals, published by the major journal publishers.

The fact that the publishers are rapidly making their journals available in electronic form is not, for me, the interesting phenomenon — clearly, they must do so if they are to survive this electronic revolution. More interesting is the fact that many of the titles in *NewJour's* archive are *free* electronic journals in many different disciplinary fields. Some are archival projects, like the *Jahrbuch uber der Fortschritte der Mathematik* (http://www.emis.ams.org/ projects/JFM/), which is a searchable database of the contents of the *Jahrbuch* from 1868 to 1943, others are in relatively new disciplines or professional areas, where the volume of demand for print journals may be insufficient to support a commercial publication. For example: *MC Journal: The Journal of Academic Media Librarianship* (http://wings.buffalo. edu/publications/mcjrnl/); *Journal of Australasian Graphics Imagery* (http://www.cs. curtin.edu.au/jagi/); *Journal of Buddhist Ethics* (http://jbe.la.psu.edu/); *Journal of Digital Information* (http://jodi.ecs.soton.ac.uk/contents.html); and the *Journal of Electronic Publishing* (http://www.press.umich.edu:80/jep/). Others are, perhaps, on the fringe of 'normal' academic research, such as the *Journal of Applied Missiology* (http://www.acu.edu/ academics/missions/jam.htm), which is devoted to the study of Christian missionary work.

Of course all of these examples are from only the „J" section of the *NewJour* archive, a survey of the entire file would reveal many more.

Why this massive increase in the number of electronic journals, and why are so many published free of charge? The answer to this has to do with the nature of academic research, with the costs of publishing, and with the complex relationship between the academic, his or her parent institution, the research community, and the patterns of scholarly communication. First, in most countries it is anticipated that the university teacher will also conduct and publish research – it is part of the contract. Consequently, the demand on print-on-paper publishing (POPP) sources

in many disciplines is high and, even if accepted through the refereeing process, a paper is likely to take months to reach the academic's peers. POPP is slow. Electronic publication, on the other hand can be rapid and the only real bottle-neck in the publishing process is the refereeing stage and even this is generally faster than in POPP, since the document can be transferred electronically and commented upon by e-mail. If the editor controls quality, or if the board of referees is based within a single institution, the refereeing process can be very rapid.

The costs of POP publishing are also high – certainly to the consumer. It is a well-established fact that the costs of academic journals have increased considerably ahead of the increases in the costs of living. Beginning a print journal requires the academic to convince a publisher (or his/her own institution) that the journal can break-even in a relatively short period of time, say, three to four years and, for a commercial publisher, that it can make a profit not long thereafter. If your field is a very small one and very esoteric, it is rather unlikely that a print publication is a realistic opportunity for a publisher. On the other hand, the start-up costs for an e-journal are either small or non-existent since, in the academic world, the intending editor/publisher will almost certainly have access to an institutional or departmental Web-server and the costs of putting files on the server are minute in comparison to the costs of producing printed pages. The e-journal editor is also saved virtually all production and, importantly, distribution costs for the journal. Production costs are low, amounting to the time needed by the academic to edit HTML documents (and little editing may be needed if style sheets are produced for contributors to work to) and set up the hyperlinks for the next 'issue' of the journal. Naturally, the load depends upon the frequency of publication and a quarterly issue will be less time-consuming than a monthly.

Turning to the patterns of scholarly communication, the original pattern of such communication was very much through personal communication and attending the meetings of the early scientific societies, such as the Royal Society. The *Proceedings* of such meetings were mainly to advise members of what had gone on at the last meeting. As expansion of the scientific enterprise took place, the numbers of members increased, more and more could not attend all meetings, and the *Proceedings* became a vehicle for not only reporting on events, but also for publishing papers that had *not* been presented at meetings. As membership grew, the number of non-members also interested in the *Proceedings* increased and distribution became more of a problem for the scientific society – at this point the commercial publishers enter the scene, because they already had distribution chains for their other publications, as well as the infrastructure to develop. We can argue that the emergence of the free e-journal is a return to the ideals of scientific communication – the free distribution of the results of research among those seeking to advance the discipline.

2. The history of *Information Research*

Information Research: an electronic journal is now entering its fourth year of publication. It had its origins in a small newsletter, *CRUS News,* which reported on the work of the Centre for Research in User Studies. *CRUS News* came to a natural end on the cessation of the Centre's contract and, although there was

considerable interest in the work of the Centre and associated research (we continue to receive enquiries some 10 years after it ceased to function), it was not possible to maintain *CRUS News* without the researchers who had carried out the related work. However, it was decided to expand the role of *CRUS News* and to use it (under the title *Information Research News* or *IRN*) to publish working papers on research in the Department.

IRN was published from 1990 to 1997 in paper form and, from April 1995 (under the title *Information Research*), in electronic form. During 1994/95 it became evident that continuing to publish *IRN* on paper did not make economic sense: when all costs were included, the income from the small number of subscriptions barely covered production costs, and in the course of 1995 it became evident that the electronic version, *Information Research*, was reaching many more readers than the paper version had ever done and, therefore, in 1997 the decision was taken to publish only the electronic version.

3. The aims and functions of *Information Research*

Information Research was originally designed to publish working papers, rather than fully elaborated papers that could be exposed to referees. However, from the response to the papers, in terms of the usage data as well as e-mail messages, it became evident that the journal was accepted as a 'normal' academic journal. Over the first three years, therefore, the aims of the journal have changed from publishing mainly working papers based on research carried out in the Department of Information Studies, to publishing working papers, invited papers (known as 'guest papers') from outside the Department, and, most recently, fully refereed papers, including, in the current issue, papers presented at a recent conference (this was done at the request of and with the full collaboration of the conference organizers). We aim to publish research papers of a quality that would be acceptable in a print journal and will increasingly rely on a Board of Referees to ensure that this is the case.

Information Research also has two other functions – one internal to the Department, the other external. The internal function is that it serves as a valuable public relations tool for the Department and, for example, attracts applications from potential Master's and Ph.D. students. With a world-wide audience, the PR value is considerable. The external function is that it provides users with free access to research papers and it is evident that many of those who register to receive update information, especially from Third World countries, find this particularly useful, since economic factors limit their ability to use print publications.

4. Production and use

4.1 Economics

In its original form, the economics of *Information Research* were relatively trivial: the Department used the University's Web server and, therefore, no capital costs

were involved, one person (the author) converted original papers into HTML format and passed them to the Department's Computer Manager for uploading to the Web-site. In all, the work-load was probably not more than two person-days a month at a cost of, say, £150.00. Since the Web-site was run and maintained by the University's central computer services, there were no readily identifiable maintenance costs separately attributable to *Information Research*. Material costs were similarly insignificant, since the papers were already in electronic form and all editing and conversion was done on the electronic versions.

Editorial work of one kind or another is generally accepted as falling within the normal work of an academic member of staff in a British university, and in many others around the world. We are encouraged to serve on Editorial Boards, to act as referees, and to serve as Editors. These tasks are seen as part of the involvement in research. I serve on several Editorial Boards and have been the Editor of two journals in the field, both of which I started from the stage of preliminary negotiation with the publisher through to production and development. In a real sense, Sheffield University subsidises the activities of publishers not only through my involvement but, of course, through the involvement of many more. It would seem curious if it was to seek to prevent similar involvement in electronic journal production from within the institution itself! If my, and others', involvement in editorial work is provided by the university without cost to the publisher, it is hardly likely that it would like to see a return on my work as editor and producer of an electronic journal, other than the kudos that might accrue to the institutions from the very existence of the journal. Therefore, both for commercial publishers and for the institution itself, this kind of involvement is seen as cost-free by the university.

The production of a *free* electronic journal has certain benefits in terms of other costs: it is not necessary to keep records of subscribers, no accounts need to be kept, no letters have to be sent to subscribers urging them to renew, we pay no commission to other businesses to act as agents, we have no offices within which all of these activities are carried out and employ no staff to perform them. These overhead costs are quite significant for both paper and electronic journals that are charged: for example, Fisher in a paper to the Conference on Scholarly Communication and Technology in 1997, provided the following information, comparing the overhead costs associated with and 'issue' of the *Chicago Journal of Theoretical Computer Science* (CJTCS) with those of an issue of the paper journal *Neural Computation* shows:

	CJTCS	NC 8:5
	$	$
Journals Department		
Production	8,000	1,000
Fulfillment Cost Per Subscriber	108	1
General and Administrative	31,050	2,300
Digital Projects Lab		
Staff	200	--
Hardware and Software	5,000	--
Total Overhead Per Subscriber	44,358	3,301
OH costs per page published	182	14

The author notes that:

From the comparison between CJTCS and Neural Computation, it seems that the direct costs of publishing an electronic journal are substantially below that of a print journal with comparable pages. The overhead costs, however, are much higher -- 1240% higher in this case... (Fisher, 1997)

She goes on to note that this disparity in overhead costs is largely a function of the amount of content published by CJTCS in the 18 months over which overhead was calcluated, compared with the distribution over 12 issues of the print journals, NC. In other words, like was not being compared with like. If you do not have subscribers, but only readers, a significant overhead costs is clearly removed, at least the $31,050 of administrative charges.

On the other hand, if *Information Research* has cost, let us say, £600 since April 1st this year (and it is probably much less), in which time we have published two issues and have had (at 21st August) a total of 4,520 hits, then the cost per hit is only 13 pence (or about $0.21) - to recoup costs from the registered users (283), and assuming that my cost calculations are 100% out, we would only have to charge about £14.00 a year - however, we could not do this, since the University will not let us charge less than £25.00 for anything because it is not worth charging less in terms of the associated accountancy costs! These numbers do not appear to be too far out, since, for example, the individual subscription cost of CJTCS is only $30.00 (£18.00) a year.

4.2 Usage

Information Research originally had a counter attached to it, which recorded all „hits“. However, this was abandoned as a result of a change in policy for the University server on which the journal is mounted - at the time it was abandoned, the journal was averaging about 800 hits a month. Since Volume 3 number 4, a free counter service (available from NedStat at http://usa. viewstat.nedstat.net/)

has been used and counters have been provided for individual papers through the Link Exchange Fast Counter service at http://fastcounter.linkexchange.com/.

The statistics of usage since 1st April 1998, show (at 3rd September 1998) that the top page of the journal (ircon.html) has had 4875 hits - or approximately 1,000 a month. This, of course, is not the true total - since users will be going directly to specific papers, as a result of search-engine searches and back to the same papers to re-read or pick up references, or whatever. Users come from eighty-five Internet domains, plus 20% from unknown domains. The highest-using domains are shown in Table 1

The fact that these thirteen domains cover 62% of usage and that 20% is from „Unknown“ means that the remaining seventy-two domains have very small usage, accounting for only 18%, or 0.25% each, which, at the 21st August 1988 means about 10 hits each since 1st April. The full list of domains is given in the Appendix Table A.
Those hits that could be assigned to a geographical region were allocated as shown in Table 2. There is clearly a relationship between the regions that

1.	United Kingdom	17.72 %
2.	US Commercial	10.84 %
3.	US Educational	8.67 %
4.	Network	7.39 %
5.	Australia	4.05 %
6.	Germany	2.50 %
7.	Canada	2.21 %
8.	Spain	1.95 %
9.	Hong Kong	1.73 %
10.	Malaysia	1.57 %
11.	Singapore	1.28 %
12.	Finland	1.15 %
13.	Korea (South)	1.08 %
Total		62.14%

Table 1: Internet domains of *Information Research* users

Europe	31.17%
North-America	23.63%
Asia	10.01%
Australia	4.64%
Africa	0.93%
South America	0.91%
Central America	0.69%
None (.net, .org)	8.00 %
Unknown	20.03%

Table 2: Geographical distribution of hits by region

dominate and the spread of effective Internet connections in those regions and the dominance of Europe and North America is, therefore, to be expected.

The busiest time of day is between 16:00 and 18:00 GMT - mainly, it seems, because of the volume of US traffic at that time - readers in Europe who want easy access, therefore, would be advised to use the site in the morning. The same pattern exists, of course, for on-line services and it is well understood that if you want easy access to, say, Dialog databases, it is best to do your searching before the USA wakes up. Similarly we can identify Wednesday as the busiest day of the week, with Friday being the least busy - however the difference between them is not great: 18.9% on a Wednesday and 14.1% on a Friday. Of course, there is always a surge in demand whenever a new „issue“ is announced.

Hits are a relatively crude way of assessing usage, but one of the few ways we have when producing electronic journals. We also suggest, however, that readers should register to receive information on the timing and contents of new issues and, at 21st August, there were 283 registered readers, 199 of whom were distributed as in Table 3 (the full distribution is shown in the Appendix - Table B). That is, 70% of the registered readers came from 12 countries out of the total of 53 - once suspects that the Bradford distribution, so well known in bibliometrics, exists here also.

UK	67
USA	50
Australia	15
Germany	9
India	9
Canada	8
Singapore	8
China	7
Ireland	7
Malaysia	7
Brazil	6
Spain	6

Table 3: Geographical distribution of registered readers

5. The future of *Information Research*

I have already described how, since 1995, *Information Research* has moved towards a fully peer-reviewed research journal and I anticipate that the movement will continue and that, over the next three years or so, the journal will be publishing mainly refereed papers. We are also exploring the possibility of making *Information Research* a collaboratively-produced journal, and we are having discussions to that end with three other departments in different parts of the world. These other departments will appoint a member of staff to act as regional Editor for the journal, seeking contributions, and preparing the papers for submission to the Sheffield server. In time, if demand on the server grows, the site may be mirrored in these institutions – this will give some problems in terms of monitoring demand, but I am sure that the problems can be overcome.

The collaborative model is a very interesting one from the point of view of the scholarly journal because it distributes whatever workload there is over several institutions and allows for more institutions to join the consortium if the workload grows. The working paper contributions, which usually involve collaboration between students and teachers will also serve to stimulate such collaboration within the partner institutions and the regional Editor might also build the HTML conversion process into teaching to give students some feel for the genuine production issues of electronic journals. We might, for example, hand over the entire production of an ‘issue’ to one of the partners to use as a project for a class on electronic publication.

6. Conclusion - the future of the free scholarly journal

The growth of free electronic journals depends upon a number of factors:

a) the extent to which researchers in new and/or multidisciplinary fields find it difficult to publish in core journals and difficult to persuade commercial publishers of the existence of a big enough market for a print journal;
b) whether speed of publication and world-wide exposure will outweigh the perceived value of the citation of papers in print journals;
c) how quickly electronic journals come to be covered by the citation indexes;
d) how much longer academic institutions will be prepared to tolerate the present *un*economic situation in which they are, effectively, subsidising the profits of commercial publishers;
e) whether the scientific societies will find new sources of income through gaining sponsorship of free electronic journals to replace the income they get by contracting commercial publishers to produce their journals.

All of these are big questions and papers could be written on each of them, but I believe that the logic and economics of the free publication of scholarly research will be overwhelming and that we shall see a return to the ethos of the free interchange of knowledge in a genuine community of scholars. We no longer need to depend upon the technology that has served research well for the past 350 years, and the new technology offers not only speedy publication but multimedia publication, which is very attractive for many fields. The new technology will give rise to new models of the process of scientific communication and, for academic institutions, new models of the research dissemination activities of their staff members. When all the circumstances are right, the trickle of new, free e-journals will become a flood — and will cause new problems for librarians and users. One thing we can be sure of: just as librarians have coped with many of the problems of POP publication, so they will cope with the different problems of electronic publication.

7. References

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[Information Research 1998]
Information Research: an electronic journal. Available at: *http://www.shef.ac.uk/~is/ publications/infres/ircont.html* Site visited 25th August 1998

[NewJour 1998]
NewJour: electronic journals and newsletters. [*Archive site*] Available at *http://gort. ucsd.edu/newjour/* Site visited 25th August 1998.

Appendix

Table A: user Internet Domains

Argentina
Australia
Austria
Bahrain
Belgium
Bolivia
Botswana
Brazil
Bulgaria
Canada
Chile
China
Costa Rica
Croatia (Hrvatska)
Cuba
Cyprus
Czech Republic
Denmark
Ecuador
Egypt
Estonia
Ethiopia
Finland
France
Germany
Great Britain
Greece
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
Japan
Jordan
Korea (South)
Kuwait
Latvia
Lithuania
Luxembourg
Malaysia
Mexico
Namibia
Netherlands
Network
New Zealand (Aotearoa)
Non-Profit Organization
Norway
Old style Arpanet
Pakistan
Philippines
Poland
Portugal
Qatar
Romania
Russian Federation
Saint Lucia
Saudi Arabia
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sweden
Switzerland
Taiwan
Thailand
Trinidad and Tobago
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
US Commercial
US Educational
US Government
US Military
USSR (former)
Venezuela
Yugoslavia
Zambia
Zimbabwe

Unknown

Table B: Registered Readers

UK	67	South Korea	1
USA	50	Sudan	1
Australia	15	Switzerland	1
Germany	9	Tanzania	1
India	9	Trinidad & Tobago	1
Canada	8	Turkey	1
Singapore	8	UAE	1
China	7	Yugoslavia	1
Ireland	7	Total	283
Malaysia	7		
Brazil	6		
Spain	6		
Belgium	5		
Hong Kong	5		
Sweden	5		
Indonesia	4		
Netherlands	4		
Portugal	4		
Denmark	3		
Finland	3		
Greece	3		
Italy	3		
Norway	3		
S.Korea	3		
South Africa	3		
Taiwan	3		
Austria	2		
France	2		
Hungary	2		
Israel	2		
Japan	2		
Thailand	2		
Argentina	1		
Colombia	1		
Costa Rica	1		
Estonia	1		
Iran	1		
Lebanon	1		
Lithuania	1		
Pakistan	1		
Panama	1		
Peru	1		
Russia	1		
Saudi Arabia	1		
Slovenia	1		