Electronic Publishing: Avatar or Metamorphosis for Information Access by Academics

Nathalie Pinede and Lise Vieira
Centre d'ètude des médias,
Maison des Sciences de l'homme d'Aquitaine,
Universitié de Bordeaux
Esplanade des Antilles
33405 Talence cedex, France
e-mail: npinede@msha.u-bordeaux.fr

1. Electronic publishing: centring the concept

Paper-based publishing is an intellectual and commercial activity of long tradition: it is now undergoing an important mutation by using media other than paper. Will research use of information be deeply affected? Is this a metamorphosis implying deep changes, or will it be just an additional avatar, with new uses added to the previous long list of modifications to our traditional culture? Will there be disruption or adaptation in terms of scientific and technical information communication? We shall try to examine these questions below.

Publishing and electronic publishing

Will hypertext dethrone books?[1]. That is a question which has been asked by one of our newspapers. It would certainly be imprudent to start from such a radical position. We therefore ask a less extreme question: how is electronic publishing positioned[2] relative to terms of traditional publishing and what do academics really expect from this new technique in the discharge of their duties?

We first have to be precise concerning the meaning of the expression "electronic publishing". According to J.C. Guedon, electronic publishing is neither more nor less than the content of electronic networks. In fact, "publishing" refers to the process to bring out, to make public, to put a message in such a form that it can be approached under determined conditions[3]. If we adhere to this widely accepted definition, we may consider that electronic publishing has already surpassed the level of diffusion achieved by databanks, by providing products on material media (CD-ROMs) and particularly owing to the extension of networks. Its scope will become broader as the expected new information highways, of which Internet is said to be a precursor, are developed.

Scientific and technical publishing

A rapid overview of the French scientific and technical print publishing situation can provide a better understanding of the context and a clearer insight into this evolution towards a more innovative form. Development has been characterised by a low turnover, linked to a limited number of copies[4]. There is a major imbalance between the potential and value of French research, on the one hand, and the number of scientific books published, on the other.

The reasons for this crisis are both technical and economic. French publishers encounter serious difficulties when facing the potential of international publishing as it takes root in their own territory[5]. The linguistic obstacle is another issue: the hegemony of English

in the international scientific environment is so important that, to have their works recognized, academics must publish in Shakespeare's language. Yet big foreign groups, such as Elsevier (in the Netherlands) or Springer Verlag (in Germany), have published in English as a basic language for many years. French publishers have decided very recently to adopt the same strategy[6]. This explains the limited presence of our products in the international market. International scientific reviews similarly have an affect on French publishing. They are well-established[7], and represent a major publishing outlet[8].

French production and information and communication techniques: inventory

This convergent international context explains the hesitation of some French publishers to venture in electronic publishing. Their preference not to take risks in an unknown context is explained by the same sorts of technical[9] , economic and legal difficulties[10]. Many of them, backed by the long tradition of our country in encyclopaedia and dictionary publishing, are interested in this particular aspect of editing. They have now to create new products in order to keep their positions in the market and to adopt strategies capable of encompassing New Information and Communication Techniques (NICT)[11]. An analysis of French production will help evaluate opportunities for making a successful transition from paper to electronic media.

Products on material media (CD-ROMs)

Undoubtedly, the French have some difficulties in recovering from their handicap in terms of computing equipment. According to a sample survey made by SOFRES[12] in May 1996, covering around 20,000 families, only 14.4% of French families use a micro-computer[13]. This is a very low rate compared to our European neighbours[14]. However, a shift of domestic computing towards multimedia is increasing, since a third of micro-computers are now equipped with a CD-ROM player. The CD-ROM sales figures show a real increase. In 1995, the total volume of sales reached three million disks; in 1996, this number doubled to reach six million copies sold.

These indications confirm that, though the transition from paper to electronic media is not being made without difficulties, and despite their extremely cautious attitude, a significant take-off has occurred since the end of 1995 as publishers jockey for position in the electronic market.

Network products

If the Internet was initially used mainly by researchers, that is no longer the case today. The number of Netsurfers in the world is estimated to be between 35 and 50 million, with an increase of approximately 15% a month. But in France, the Internet has not yet acquired a high level of public interest. Only 1% of families are equipped with a modem, and only 4% of people have used the Internet at least once, including usage at work places. To offset these rather pessimistic figures, we can note that three million French families are equipped with Minitel. This suggests a massive awareness of the use of computer networks.

Internet is being more and more utilised by scientists for the powerful means it offers to accelerate investigation[15]. It helps them compare their results, exchange data, have access to university libraries all over the world[16] and publish their papers. Avoiding the filtering imposed by traditional publications via their editorial committees would involve a real threat to the quality of the scientific work. But the slowness of this mechanism is increasingly

intolerable to researchers, as they have to face a culture of immediacy. We may predict that the new functions of diffusion and creation offered by electronic publishing will modify, with time, the traditional chain of scientific periodical publishing and will open new prospects.

2. Information sites and usage by university audiences

The main point of our study has been a qualitative survey of academics in Bordeaux. The methodology employed was the one of semi-structured interviews using a list of questions based on major lines of our interests. As the aim of this survey is to estimate the effect of new electronic tools on the practices of academics as regards information searching, a double approach has been used. First, after gathering some quantitative data and questioning several librarians[17], we tried to draw up an overview of the information on offer by main university document centres in Bordeaux. This could be supplemented via the vision that librarians have of the future. Secondly, we were concerned more particularly with usage. The first study, obtained from interviewing librarians, allowed us to gain a general view of the practices of academics by disciplinary area. It was, of course, necessary to refine our investigation by approaching academics themselves[18] from various disciplines (Natural Sciences, Sociology, Medicine, Literature and Human Sciences, Law and Economics). The sum of these studies allows us better to understand the dynamics of acquisition and information searching.

Information in the university area of Bordeaux

After a period characterised by a lack of resources and network connections, the tasks of university libraries have been strengthened by a new development of their environment. What then is their policy for NICT and how do they deal with electronic publishing? Three of the NICT products proposed and used by libraries for information searching (bibliographical, full text, etc.) are studied here: on-line databanks, CD-ROMs and the Internet.

On-line databanks

Subscribing to on-line databank providers (i.e. Questel, Dialog) was one of the first steps of libraries towards computerised searching. But it was by way of self-service access to on-line databanks, not a free-of-charge service. Interrogation of these on-line resources requires the presence of an information specialist. The cost depends on the time spent consulting the on-line databanks, and the service users, i.e. in the library, soon become aware of the cost of specialised information!

The use of CD-ROMs in libraries has not been without repercussions on consultations of on-line databanks, though there are some important differences according to disciplines. For example, in 1991, 533 requests were reported for all the sections of Bordeaux University. In 1995, only 137 requests (that is about four times less) were posted, almost exclusively in the Sciences and Medicine sections. Interrogations of on-line databanks in Literature, Economics and Law have been particularly affected by CD-ROMs. On the other hand, we observe a relative maintenance of the level of consultations in the Sciences because interrogation techniques are more accurate with on-line databanks. In the bio-medical area, though on-line interrogations have suffered a little from CD-ROM competition, they still remain important for five-year retrospective searches or for investigations requiring access to specific databanks. Nevertheless, we can note a general decrease in on-line interrogations caused by the economic and ergonomic elements favouring CD-ROMs.

CD-ROMs

CD-ROMs seem to be, at least for the next few years, an important electronic alternative for document handling. In 1996, there were about 50 titles in all sections of the Bordeaux university libraries[19] . The titles are mainly of a bibliographical nature, but can also be statistical directories, encyclopaedias or newspapers. We could not obtain statistics on consultation due to the almost general lack of CD-ROM networks[20]. In Sciences and Medicine, evolution towards a CD-ROM network is at present under consideration: the choice of this technical solution would allow access to a larger range of titles. One of the major problems encountered by librarians concerns the CD-ROM acquisition policy. Excessive numbers of titles brings up the problem of making the necessary choice; this is complicated by budgetary restrictions. Moreover, the number of disks goes on increasing, especially in scientific disciplines. This increase in the number of CD-ROMs makes it necessary to think about the limits the library must set on CD-ROMs.

In spite of these problems, CD-ROMs are considered to be an interesting educational tool, providing a transition between paper and on-line databanks. They are easy to use and, consequently, do not need any special assistance. The only exception found is the thesaurus of Medline on CD-ROM which presents some difficulties. A major training effort for this has been made at the University Library of Medicine on behalf of post-graduate students and staff[21]. CD-ROMs are now integrated into the package of information search tools used in any libraries, and form an important element of documentary policy.

Internet

Unlike CD-ROMs, Internet terminals are not yet widely used in the University libraries of Bordeaux. Public access to the networked resources creates some problems for librarians. It seems there are differences according to discipline. Almost all of the internal services are now connected to the Internet, but there are some significant variations in public access. In Law and Economics, there are actually no Internet free-access terminals. The section has plans, however, to offer a multiple choice of servers for research. In Sciences, two "semi-public" terminals are proposed: a selection of sources is made according to the type of research and the identity of the person. In Medicine, after a preliminary step locating useful documentary sources in the discipline, an Internet terminal has been provided for public access. According to the person in charge, there is no major interest for the moment. One reason for this may be the impossibility of teachers or students having a personal electronic mailbox on this terminal.

Evolution of documentary structures and their tasks

The development of NICT in university libraries generates many questions and needs real changes. The problem of staff training is particularly acute. Choosing a CD-ROM network or public-access terminals to Internet implies the institution of a continuing training policy for all personnel of different grades. But the changing state-of-the-art can obviously constitute an obstacle to such a training.

The introduction of electronic networks also disrupts the existing order in the documentary world: how should university libraries position themselves relative to the Internet? If, as seems inevitable in the more or less near future, almost all university libraries

provide access to the Internet, this change may provoke varied reactions. In Law and Economics, and more generally in Literature and Human Sciences, the Net at present offers rather few elements (electronic journals or important Web servers) of major interest to these disciplines. In other areas where the Internet has a lengthier history, progress is better.

Electronic reviews are particularly important for libraries. For example, in Medicine, many abstracts and contents are readily available via the Internet[22] . But the main objective is to move towards services on request because this would allow some reduction in subscription charges. For instance, in the case of specialised and expensive reviews it would be useful to view contents and after, to obtain electronically requested articles. This solution, financially attractive for libraries, needs an important transformation both in outlook and in structures. With this new model, the library changes from its tradition of keeping documents, and becomes involved in an optimised management of information.

In view of the development of CD-ROMs and of new prospects with networks, the tendency to stop paper subscriptions in university libraries seems to be gaining ground[23]. But the approach continues to be cautious. In Law, jurists are still doing their documentary searches on paper. The emergence of electronic publishing does not always mean therefore the extinction of paper documents. It is the unanimous opinion that they will last for a long time and will coexist with electronic means. Differences of approaches between these two modes are seen as an enrichment of access to knowledge. Nevertheless, there is still some uncertainty for librarians: the instability and fleetingness of data present on networks go against the usual principle of readily available archival deposit.

Finally, one last aspect of the transformations induced by NICT and seen by librarians is delocalization. According to the person in charge of the Sciences section, the first task of university libraries is of an educational nature. The researcher is naturally a specialist, and the librarian, with his general training, cannot replace him in the research process. He can only assume a guide's role pointing towards some potentially interesting applications on paper or electronic resources. Accessibility to these applications via networks allows the user to free himself from dependence on the library and to build at a distance some new ways of access to knowledge. Availability of remote resources by means of networks can generate other forms of collaboration, research and learning.

Usage by academics: qualitative study

Librarians hold a priori a privileged situation to look at uses of NICT. Academics constitute a more undisciplined and elusive public than students. Nevertheless, we can note certain general points. Some disciplines, like Human Sciences or Law, are more impregnated with a "papyrocentric" culture than others. Exact or applied sciences are more involved in electronic processes, but there are some notable variations according to the type of usage[24]. In Medicine, there are training aids for diagnosis which open innovative prospects as regards to distance learning. But, globally, the Internet is basically used as a tool for exchanges between researchers (e-mail, newsgroups, or mailing lists). Exploitation of electronic documentary applications is still in its infancy. For the moment, the Internet seems to be a communication medium rather than an information tool.

Hypothesis of work

The objective of our enquiry into academic usage is to highlight differences in research practices according to various factors, such as:

- the nature of the discipline: natural sciences or human sciences
  personal background: the age of the searcher

Our first hypothesis suggests that academics are more inclined to use new technologies if they belong to scientific disciplines and if they are young. According to our second hypothesis, NICT contribute to the process of delocalization of information, and the corresponding progress of research. Products of electronic publishing involve new forms of information acquisition and treatment which do not replace the earlier ones, but combine with them.

Academics, naturally, had a range of viewpoints, but combined a liking for the power of the new technologies with a reluctance to use tools that are still not well understood. Resistance is caused by a dislike of changing habits, by a certain laziness in terms of the training effort required, and, finally, by hesitations regarding computing tools[25]. Though many academics use word-processing software (Word) or spreadsheets (Excel)[26], few of them yet use the Net. Though this will change in the future, students will have to be motivated and trained.

We expected that, amongst all the disciplines, searchers in the natural sciences would make most use of computer resources. Yet, this is not always the case. LCT is internationally known in the field of chemical engineering. According to its researchers, computing is perceived rather as an unpleasant necessity. Its use is relatively low and there is no motivation from the teachers to make students work with it. Another reason is that the laboratory is shared with an industrial partner - SEP (Société Européenne de Propulsion). Due to this partnership, the laboratory is subject to a double confidentiality: industrial and defence. Consequently, only a single machine, independent from the institutional network is authorised[27]. On the other hand, in a discipline like computing, the nature of the speciality has imposed from early on the use of computers for computational development and the use of networks to work with remote super-computers. LABRI[28], which has used networks since the late seventies, was the first laboratory in France to use the Internet.

The advantages of using new technologies are far from being ignored, but are seen more as a social phenomenon than on an individual basis. New technologies change the relation between writing and memory. The present growth of access to resources made easy by information technology leads to the double risk of saturation and over-consumption. We shall have to protect ourselves from this abundance, because efficient research requires an appropriate selection. Specialists in information will be necessary for extracting the significant information from this profusion, and this reflects the indispensable reorientation of the library's mission.

The access to resources

In terms of access to bibliographical references, we find that three sorts of resources (paper, on-line databanks, CD-ROMs) are being used simultaneously. In other words, new resources have not supplanted traditional ones. In fact, most researchers we met use these

three sorts of resource at the same time, in order to benefit from the complementary aspects of their respective qualities.

Paper will stay, for it fits with the desire manifested by human beings to conserve, to appropriate, and to keep trace. We shall have to get familiar with other practices: surfing networks may be a pleasure similar to leafing through a book, but it is another culture which we have to learn about. Otherwise, rapidity of access, immense richness of resources and possibilities of downloading make the Net an indispensable tool. The question to be asked is whether the contribution of networks will bring a maximum benefit in terms of teaching and research.

Uses of networks

E-mail is used by a great number of researchers. It has some disadvantages, such as the unsightliness and low readability of its characters and the lack of restraint on the messages exchanged. Nevertheless, the scientific community uses it every day in almost all sectors of the university. This rapid exchange of information may have a positive influence upon reducing time for publishing contributions as well as for the organisation of discussions. Otherwise, e-mail is very advantageous for international relationships because it is faster and cheaper than telephone calls.

As regards other possibilities offered by the Net and particularly Web servers, we observe a certain amount of reserve on the part of some of our colleagues in Bordeaux. Attractive aspects of these servers are not ignored: the design of screen contents via ergonomic criteria is an undoubted advantage. However, some people consider this as indicative of an 'entertainment' approach., as if the fact of being pleasant to the eye and easy to use inevitably implies a mediocrity of contents. Others insist that the Web is essentially for students and not for teachers. Several explanations can be found for this rather negative judgement:

- The age issue: young persons brought up with computer science find it easier to use. The colleagues we interviewed, being 45-55 years old, are less familiar with it.

- The status issue: surfing on the Web is good for students, but teachers have better things to do!

- The validity of information issue: only what is collected in well-known and tested resources (databanks, reviews, books) is trustworthy.

At the same time, some colleagues, aware of the power of this new tool, use it daily. Some of them even use it for research, developing a method based upon study of articles available on the network[29]. Today most of the laboratories present their activities and their annual report on WWW. This use allows teachers to weigh up its risks and limits while assessing its qualities. The abundance of information on the Web and the saturation of networks calls for the further development of search engines to find information[30]. Furthermore, there is a transformation of the search procedure, induced by hypertext architecture, which implies an evolution from a linear or sequential process (one document after another in a well-defined order, like the left brain) towards an heuristic or "systematic"

process (access to data based upon association of ideas, like the right brain). This changing approach represents an important disruption for researchers, who are mainly concerned with their own work. Furthermore, it is still necessary for researchers to communicate directly with each other. They need to met face-to-face regularly during international conferences.

It is likely that the new activities will have an impact on careers: it will be important to be connected to useful networks and to be introduced to one's peers in one's own special field. Modes of promotion will be modified[31]. Furthermore, networks are a powerful force against the compartmentalisation of research at the international level. Research becomes more universal, which means it runs the risk of "de-contextualisation". This risk, however, is limited because the products remain strongly marked by their country of origin.

The publication of articles in electronic reviews is another application which will probably be important in the years to come. Despite some hesitations, especially regarding risks of information pirating, most researchers admit that traditional ways of publication have to be reconsidered. There is currently so much competition that researchers run the double risk of seeing the content of their articles spirited away and of waiting indefinitely for them to be published. The supremacy of publishers (most often commercial) can be circumvented using the expedient of articles published via newsgroups and then read by colleagues[32]. This new model of publication does not exclude the necessary quality control of contents (coherence of demonstrations, intelligibility of conclusions, accuracy of form). In most of these cases in Bordeaux, we are, for the moment only at the consultation stage[33].

Conclusion

The results seem to confirm our first hypothesis - that the use of NICT involves information delocalisation and affects the logic and dynamics of research. Nevertheless, we must mention that the documentary resources available on networks are still not fully used by academics.
Far from establishing a break with previous practices, new tools multiply ways of accessing knowledge: we have noted that it extends individual scientific relations. With the Internet, information exchanges between specialists reach an international level. New activities come to be added to existing ones, but at different levels and rhythms, according to field, generation and character.
On this last point, we find that the priority of most academics concerns communication with peers and publication of their work rather than improved facilities for access to information. While the traditional system is locked onto this difference, the Net offers an opportunity to bypass it. That would represent a real metamorphosis.

References

1. François Reiner (Director of Médiathèque Cité des Sciences, Paris) *L'Événement du Jeudi* 01/02/1995.

2. Philippe Schuwer, article "Édition" in *Encyclopaedia Universalis*. Jacques Breton. *Le Livre français contemporain: manuel de bibliologie*. Malakoff: Solin, 1988.

3. Jean-Claude Guedon (publisher of the on-line review *Surfaces*, University of Montreal) *L'Édition savante et l'autoroute électronique*. Http//www.droit.umontreal.ca.

4. STM turnover: 772 million francs (5.5% of global turnover). Average number of copies: 2250 (the lowest level in French publishing). SHS turnover: 828 million francs (5.8% of global turnover). Average number of copies: 4396 (Source: *Statistics 1994*, Syndicat national de l'édition).

5. Springer and Elsevier are major multinationals. Elsevier, Waverley, Addison-Wesley and Wiley are established in France, attracted by the creative potential of our authors and by the opening up of the French-speaking market.

6. Techdip (books on petrol and gas) publishes 40% of its titles in English, sometimes in association with Gulf Publishing (US). Le Moniteur has about ten English or bilingual titles. Bordas co-publishes some titles with Wiley. Masson, Flammarion Medicine Sciences, Arnette and Les Editions d'Organisation also publish extensively in English.

7. There are 1460 scientific reviews in France.

8. The Masson group with its associated companies (in Spain and Italy) publishes 201 reviews. This represents half of the turnover of the firm. Bordas, Dunod, Gauthier-Villars publishes 35 reviews over all scientific sectors, except medicine. The major part of them are in English for economic reasons.

9. For instance, SONY or PHILIPS are working now at production problems.

10. Members of the Syndicat National de l'Édition, foreseeing upcoming difficulties, created GAME (Groupe Audiovisuel et Multimédia) and published in 1993 *Questions juridiques relatives aux produits multimédias.*

11. Hachette-Grolier Interactive and le Groupe de la Cité, who are main actors in French publishing, are now increasing their hold on this territory.

12. *Le Monde* 3/10/96. Michel Alberganti. *Internet toujours massivement ignore.*

13. This may be compared with 11.6% in May 1995 and 4% in 1990. Another 3% of respondents intend to buy equipment in the next six months. Pascal Hureau, Sofres, Director of Studies in Information Technologies, indicates that the French market for micro-processing has grown by a factor of three in five years. See also Norbert Paquel *L'Édition et les supports multimédias* (A Jour éditeur).

14. Home computers are owned by about 20% of the population in UK, 30% in Germany and 35% in the United States.

15. *Le Monde* 3/10/96. Michel Alberganti, op. cit.

16. Bibliothèque Nationale de France has undertaken the digitising of 100,000 books, including recent ones.

17. Contacted persons: Mrs Montbrun, Director of Law-Economics section; Mrs Salabert, Director of Sciences section; Mrs Vitrac, Director of Medicine section; Mr Briand, Director of SICOD (Service Interétablissements de Coopération Documentaire).

18. Contacted persons: Mr Humbert, Professor of Geodynamics and encharged of new technologies at University of Bordeaux III; Mr Vignolles, Professor of Chemistry and searcher at LCT (Laboratoire des Composites Thermostructuraux); Mr Lamy, Professor of Sociology and searcher at Maison des Sciences de l'Homme d'Aquitaine; Mr Lung, Professor of Economic Sciences and searcher at IERSO (Institut Economique de Recherche du Sud-Ouest); Mr Sorbets, Professor at IEP (Institut d'Etudes Politiques) and Director of CRECQSS (Centre de Recherche et d'Etude sur le Québec et le Canada en Sciences Sociales); Mr Guitton, searcher et LABRI (Laboratoire Bordelais de Recherche en Informatique); Mr Barbaron, Professor of English at LEA (Langues Etrangères Appliquées).

19. Some titles, like *Doc-Thèses*, *Francis*, *Pascal*, *Myriade*, *Medline* or *Le Monde* may be duplicated between one section and another.

20. Only the Literature section disposes of a CD-ROM network, but this configuration is too recent to give relevant statistics.

21. 1,500 persons have been trained over two years to use this CD-ROM.

22. Except for *Nature* (http://nature.com), or *Science*, there are few texts immediately acessible on the Internet.

23. Paper subscriptions to the Pascal and Francis databanks have been, for example, dropped since 1994.

24. Physics Laboratories at Bordeaux are more dynamic than Mathematics in terms of interest in publishing.

25. In UFR (Unité de formation et de recherche) in Sociology, only half of the 16 professors use computers for various purposes (Excel, Word) and three of them use the Internet.

26. In Economic Sciences, for instance, all the searchers are equipped with a microcomputer, and doctorate students use a computing workroom for their work. In Political Sciences, computing is mainly used for numerical treatment of data, for consultation of documentary databanks and by students to produce their texts.

27. LCT has 40 members, with 12 permanent - the others are doctorate students and students on their probationary period.

28. LABRI has 60 permanent members, with 20 Professors and Directors of Research at CNRS and 40 Maîtres de conférences and involved in research. There are also 40 doctorate students, 10 invited postdoctorate members and 10 administrative and technical staff.

29. Invented and improved by Mr Barbaron, this method consists of a multimedia database composed of articles circulating on the Internet (*Times*, *Economist*, *Daily Telegraph*, *Business Week*) and of articles stemming from encyclopaedic CD-ROMs, like *Britannica Universalis*, *Atlas Microsoft*, *PC Globe*, with links to texts and pictures.

30. Most search engines, like Lycos, Altavista or Yahoo, although extremely powerful, are too generalist to satisfy the needs of researchers, who ask for more specific tools.

31. In a discipline like the Political Sciences, competition in our country is much less important than in the United States; there are 2,000 political science academics in France, as compared with 25,000 in the USA.

32. In computer science, for example, information diffused via the network immediately reaches 2,000 specialists, which makes circulation of information easier.

33. Reference reviews are frequently consulted (for instance in Chemistry, the Electrochemical Society at http://www.electrochem.org, or Elsevier publications at http://www.elsevier.nl).