Scientific journals to the year 2000

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Introductory Remarks

I have been asked to comment on the effect of electronic technology on the future of serial publications. I am specifically to project over the next fifteen years and to pay particular attention to the role of libraries.

This is not a simple task because it implies that the speaker must preferably have both a proven track record in serials publishing and visionary views. I guess that more than 25 years in journal publishing gives me the former, but if I listen to my family and sometimes to my colleagues, I often wonder if my futuristic thinking really makes sense. At any rate, that is for you to decide.

A few opening remarks. First, I will confine my comments to scientific research journals. I will not try to forecast the prospects for more popularized science and technology magazines or the very large circulation scholarly magazines such as SCIENCE or NATURE.

Second, it should be understood at the outset that publishers now take as certain that journals will change, perhaps significantly, as a result of the application of electronic technology. The questions are "how fast" and "in precisely what ways?"

My third and final preliminary remark is a rather simplistic yet critical statement: the next fifteen years must be seen in the context of trends well underway for the past fifteen years. Serials have been changing since the early 1970s in ways largely unrelated to electronic technology. It is essential that we understand these changes in order to predict the trends for the remainder of the century.

Past and Present

Allow me, therefore, to take you back a few decades in order to put journal publishing a bit more in perspective. In the fifties commercial scientific publishing was still very much a book business. Journal publishing was by tradition a society activity and, given the enormous post-war demand from both libraries and individuals, books were quite profitable for publishers. Those few publishers who ventured into the journal area found it was possible, however, to create journals comprising complete seg-
ments of the sciences — all of physics or analytical chemistry or biochemistry or brain research, in Elsevier's case.

To many publishers, the sixties were heaven-sent and quite understandably so. The world was in those days experiencing a period of great prosperity. Scientific research and libraries were richly funded and the scientific community, experiencing a drastic acceleration in research, increasingly embraced the journal as a very convenient vehicle for communication. Journal publishing suddenly came of age, creating hundreds of titles and often with considerable success. And, due to the sometimes explosive growth in broad fields, the earlier comprehensive journals often became huge carriers of information, expanding in pages and price. However, strange as it may seem today, also in those days some doubts filled the minds of eminent people and there were predictions that a fast approaching electronic age and photocopying could easily destroy journal viability before the end of the 1970s.

Obviously, that has not happened, but the past fifteen years have brought changes which are now well-known to publishers, librarians and researchers alike. What now characterizes the present situation?

- New journals are in narrow fields of superspecialization. The market for these journals is small and their price is correspondingly high. These journals frequently take many years to break-even -- i.e. for the publisher to recover his investment -- and some never do.

- Although these new journals were created as a result of the existence of papers in new areas and an interest on the part of a group of editors to have a separate journal, the outcry against the "proliferation of journals" was for a while enormous. This seems to have subsided now -- and, for amusement, perhaps it is worth noting that there were complaints about the proliferation of journals as early as 1700, less than 50 years after the first journal was published.

- The larger, broader journal titles continue to grow in size as well, reflecting the growth in these fields and the organic nature of these journals, adapting their scope to accommodate changes in research. As they grow in size, so they grow in price.

- High prices -- whether of small, narrow titles or of large, many-volume journals -- have taken all but the society-published journal out of the personal collections of scientists. Libraries are the sole purchasers of the overwhelming majority of journal titles.

- This reliance upon libraries has been a mixed blessing for both publishers and scientists. Libraries provide systematic acquisition of and access to the literature. However, libraries followed the general economy in having budget problems in the 1970s. Over the years librarians -- first very reluctantly and later with perhaps greater acceptance -- had to abandon the notion that their research libraries would be the central physical archive for all that one would wish to know now about a topic or might wish to know sometime in
the future. The administration of library holdings became "collection management" rather than "collection development". Selective collections have been mandated by budget pressure and librarians' skills in making choices have been carefully honed. As a result, fewer and fewer copies of both old and new journals were purchased during the 1970s, a trend only recently stabilized. This is well-known by all here and is said only to provide completeness of the picture.

- In the meantime, the scientists' need to do research and to publish the results continues virtually unabated, and each year still more papers are written and published, whether in existing or new journals. Fortunately, identification of this ever-growing literature is somewhat easier than in the past, as the abstracting and indexing services can be used online; or at least it is easier for the trained searcher, who is largely not yet the scientist.

- Ironically, the pattern of selective library purchasing of journals -- made necessary by economic conditions -- means there are fewer copies in fewer locations. This inevitably leads to a figurative return to the medieval practice of chaining volumes to the shelves; fortunately for the scientist, now that chain stretches as far as a photocopying machine.

To summarize where the past fifteen years have brought us as participants in the scientific communication process:

- Scientists still need to communicate their research results internationally. The volume of such communications continues to increase. As of today, journals are still the most acceptable formal mechanism for such communication. Journals provide peer review, academic recognition, permanent archival treatment and a systematic means to identify and retrieve an article. One might say that the publication of journals today is driven by the supply side -- these scientists' manuscripts.

- Publishers continue to find distribution of these articles via printed journal issues, organized in volumes and sold on subscription, worth pursuing as a business. There is sufficient efficiency in the system of subscription selling and distribution via the mails to absorb the generally low level of demand for any given article. The economics may not be as good as they were in the 1960s, but -- unlike what has happened to the scientific monograph -- it is not so bad that one must stop. However, publishing criteria are tougher now and publishers are perhaps "leaner and meaner" than they were a few years ago, a trend in which librarians should rejoice.

- Librarians' role is more critical than ever. Not only are libraries the sole subscribers to most journals and the pivotal point for obtaining document copies, frequently they are also the only source of the arcane knowledge needed to unlock online search systems. Libraries now must cope with budget problems not only for the printed material, but also for online access and, in that regard, are learning to be even more creative in tapping non-library funding sources.
Future

If this is the present, what is in the crystal ball for the next fifteen years? I would like to approach this in two ways. First, what changes, if any, do I see in the relative roles played by authors, publishers and libraries. Second, a look at specific electronic media or buzz words.

Looking first at the relative roles played by the participants in the communication chain, to the best of our judgment there will be little change in these roles during this century. We see no evidence that the author community specifically wishes to either eliminate the role of the journal or of the journal publisher. While one could conceive of a system whereby scientists create a massive electronic article archive in the sky -- bypassing, for that matter, libraries as well as publishers -- there is to date no indication that they want to eliminate the organizational, financial and validation functions provided by an independent publisher. Scientists understand the role the publisher plays in organizing the international distribution of information and are not inclined to add that task to their already overburdened schedules.

If the publishers' role looks reasonably secure, what then of the libraries? Do publishers have some secret scheme to in some way avoid the library in the future and try to serve the scientists' information needs -- particularly their journal information needs -- directly? I find this prospect also unlikely, for reasons which may become clearer when I discuss projections for specific technologies. Suffice it to say here that it is not reasonable to expect that any alternative system for journal distribution -- including full-text online or laser disk -- will make it economically viable for a publisher to discontinue selling journals to libraries. What will happen, however, is easier access to individual articles on demand, easier searching for those selected files which are online, and the continued provision of selected information directly to the end user.

If I am correct that we are likely to continue to be in this business together, what specific technologies will have an effect on the scientific communication process in the relatively near term? I would like to briefly mention four clusters: electronic mail and electronic bulletin boards; local area networks; laser disks and laser printers; and selected online systems.

Electronic Mail and Electronic Bulletin Boards

It should be expected that scientists will increase their use of electronic mail and data networks, particularly the large academic networks such as CSNET and BITNET in the U.S. and JANET in the U.K. One notes with interest the well-funded program to establish an academic network within Germany and similar efforts in the Netherlands and France. These networks will not go unused, although experience in the U.S. suggests the build-up of activity will be gradual. In noting this trend, one should not jump to the conclusion that the network traffic will dramatically alter the present journal system. Indeed, there are restrictions in the rules governing these networks which
presently act to preclude their being used for such information distribution by publishers.

These networks will, rather, complement and substitute for other informal communication methods, such as telephone or correspondence. Electronic mail is easy, immediate, relatively low in cost, interactive and suitable for group communication. Its adoption will be gradual, but once adopted, will be permanent. Where we see an immediate application is for publishers' communications with authors and editors, a feature which we have been using for some time in certain disciplines.

From electronic mail it is a comparatively short step to electronic bulletin boards or magazines -- a collection of (textual) information and news which is accessible either to all interested parties or to a restricted member group. To date the use of such bulletin boards by scientists is relatively limited.

We expect this to grow but, again, our research to date says this will be a complement to rather than a replacement of the journal system. Put in other terms, the much-discussed idea of the electronic journal -- refereed, complete with supporting tabular and graphic material, mathematical and chemical formulae, permanently stored and accessible internationally only online -- may be common in the 21st century, but it does not appear that it will be significant in the next decade and immediately beyond.

Local Area Networks

Returning a moment to the academic networks, one sees clearly as well the trend toward the "wired campus" -- the creation of local area networks on university campuses and within corporations. These L.A.N.S. without question will increasingly change the information gathering and distribution habits of researchers. The services which exist today but will be much more common within fifteen years include:

- centralized online searching of databases by library search experts, either in response to a specific search requested over the network or an SDI profile and downloading of the search results back over the network to the scientist's local workstation for personal manipulation and incorporation into personal databases;
- student and faculty access to library holdings online from remote locations and delivery of material via intercampus mail networks;
- mounting on local mainframes of certain frequently used databases for local access over the network.

All of these systems are technologically old hat, of course, and certainly have been relatively common within industry for some time. The change which is coming is in scale -- more universities and more corporations will take such facilities for granted -- and in the priority of funding and time given by administrators for planning and implementing such projects. It is not too extreme to say that universities and corporations
without such facilities will simply not be competitive by the mid-1990s.

Laser Disks and Printers

If the growth in local area networks provides an infrastructure which should be exciting for the library -- for there is literally no end to the ways the library can use these arteries for information dissemination -- what of the prospects for making more information locally available to the library for such dissemination? I said earlier that one of the, in a way, sad trends of the past fifteen years was the absolute need for libraries to become much more selective in their holdings. While libraries have become skilled in sharing their resources via lending and photocopying, it is still somehow not the same as knowing it is already there, on campus, accessible for immediate retrieval.

An answer may -- and I stress may -- eventually evolve via high-density storage media such as laser disks, notably the newer compact disks, and high-quality, low-priced local printers. As with so many other things, the ultimate use of this technology will be determined by supply and demand in the marketplace.

It seems inherently appealing to think about journal files on disk for local retrieval and printing on demand. Think of having the output of several hundred or even thousand journal volumes on a single compact disk. It's small, portable, not easily damaged, etc. -- almost like smart microfilm, smart because it is also searchable. But it is also tied to a machine for use; one-user-at-a-time (well, not necessarily, but then even more administration is needed); unlikely to replace the paper copies -- for paper continues to have a quality which is preferred for browsing and reading -- and so forth.

There is no question that laser disks will proliferate in our scientific library markets. Laser printers of high quality are rapidly dropping in price. As to scientific journals, however, the question will be whether buyers and sellers of information can agree upon fair pricing systems which will permit optimal use of the technology. My crystal ball is cloudy here -- I think so, but I cannot be sure.

Selected Online Systems

The final "technology" or application of technology that I want to touch on is our by now old friend, online databases. What is the future for journals in full-text online? As you are aware, only a few scientific journals are available in full text now, and those are without the graphics. Specifically, there are the journals of the American Chemical Society and a number of medical journals, including the British Medical Journal, mounted by BRS. Given the enormous number of legal, business and general news publications online, why so few in science? Very simply, supply and demand again. It is very expensive at the moment to supply this information in this format and the demand at that price is very limited. There simply is no market yet for full-text online -- and there may never be a large, comprehensive
market.

What publishers do see, and here is the one area where I would say we may end up bypassing the libraries, is selected markets for selected full-text material, bundled with sufficient other information of interest and very friendly front-end search systems to make it inviting for the scientist or physician or engineer to access these systems directly, frequently from his own home in off hours. And in the end disk-based work stations may prove to be the more desirable medium here as well, rather than online. As you are all well-aware, online is expensive and psychologically intimidating for all but the most experienced user. To date most scientists and professionals show little inclination to devote the time necessary to become adequately proficient. Obviously that will change in time, as systems get easier and artificial intelligence has more of a role in search strategy formulation, but again we wonder if this will really be in the next decade.

Conclusion

In conclusion, what are my messages today? The primary changes which have occurred in the journal publishing and distribution process during the past fifteen years have come from the scientists—that is, a growth in the number of papers and in the superspecialization of their disciplines—and from economics—the need for libraries to be more selective at the same time that prices made libraries the only customers. Technology also changed dramatically during this period but technology, in the end, had relatively little effect on the journal system, except to improve access and retrieval.

And in short, we project a similar situation for the remainder of the century. Technology makes many things possible, but in the end it is the desires and habits of the scientists and the economics of the distribution systems which will govern how that technology is used. Thank you.