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THE THIRD WAVE OF LIBRARY AND INFORMATION WORK

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The technological advances which will impact on library and information work from now up to the end of the century are already identifiable. Several of the current trends give rise to a conflict of interests between possible new entrants to the field and already established services. Our problem today is to identify the type of service that we should be offering in the next two decades and the part that we should play in the process of information transfer from source to end user.

Libraries have not always been, in the past, as much involved with advanced technology as they are today. If we look back historically to the three periods identified as describing mankind's technological development, that is, the agricultural, the industrial and the micro-electronic periods, it is not so easy to find similar periods for comparison in our own field of professional advancement. Perhaps we can say that the wheel and the plough of the agricultural period find their counterparts in the library field in the invention of paper and in the invention of movable type, and we can perhaps also include that addition of the last century, the introduction of the card catalogue. Over all these centuries, libraries were essentially repositories and collection forming was the task of their custodians.

The beginning of an industrial period for the library could be said to have begun only around the middle of the present century. The phenomenon which sparked off the developments of this period was the sudden explosive growth in the amount of published material, especially in science and engineering which followed the end of the second world war. At this time, the concept of information handling and transfer came to the fore; specialists in information systems arrived on the scene; in-depth indexing and sophisticated retrieval methods were introduced. Many countries developed their national bibliographic recording services, centralised cataloguing services and their national library collections to handle the increasingly wide international coverage of the major secondary indexing services. During this period too, the possibility of introducing computer handling of data both for library operations and for information retrieval was quickly recognized and exploited. However the advantages and the potential of networking for information dissemination were not so quickly understood. Only during the last seven or eight years have the possibilities offered by a distributed network been available to us in Europe.

Inspired by these advances, fast access and rapid service became our aim. Our users were supplied with personalised profiles from our new machines and our readers' patterns of communication became a subject for our research.

The trend that we have just observed, of the application of electronic data processing to information handling and retrieval is the trigger point of a new period of development. The technological advances in micro-

electronics have so shrunk the world from a communications viewpoint that information handling has suddenly found itself swept into the main stream of technical activity. As we shall see, information will now tend to be generated at the terminal and to be retrieved from the terminal. The problems which now preoccupy us are the type of systems which will link the terminals and the role that we shall play in exploiting some of these links. The technical factors which influence the setting up of new systems may, on the one hand, improve existing facilities, but on the other hand, they have a marked tendency to short-circuit traditional spheres of activities. We can claim now to be entering our third period of development. For the first time ever we can perhaps claim to be in phase with and even at the forefront of, world technological development.

Six closely interlinked factors are responsible for the current change of pace.

The first factor, which we must not overlook, is the continuing high level of world output of information both in text form and in raw data form. In conventional publishing alone, between two and two-and-a-half million primary contributions in science and technology appear annually in all languages. I have as yet seen no attempt to quantify the increasing amount of information in raw data form which is now becoming available.

The second factor is the increasing use of the word processing machine which, by releasing data directly in digital form has overcome the cost barrier to the creation of machine readable records.

The third factor, closely linked with the previous one, is the continuing reduction in the costs of mass storage. The trend to full-text storage of documents can only tend to increase as the size and cost of memories decrease.

The fourth factor is the improvement and extension of telecommunication coverage without which the previous factors could not be readily exploited. Shortly, developments in fibre optic links and in satellite communications will make it probable that multiple holding of records in several machines, even for world access, may become superfluous. Complex networks, not necessarily visible to the user should make it possible to retrieve information without specifying its source.

The fifth factor is the change that we can expect in user expectations. This will arise from his becoming accustomed to accessing in self-service mode on his home or office screen an increasing range of information from one of our assumed competitors, the Viewdata, or its equivalent names, service.

The last factor, which must act as a limit to the others is that of hard economic constraint. The electronic solution will be successful in replacing existing traditional systems only to the extent that its economic advantages are proven.

The development that now confronts us is, in essence, the substitution, to some extent, of the traditional paper record by the electronic record. This will be accompanied by the replacement of the distribution and storage of paper by telecommunication networks. Information will therefore be accessed as and when required. A possible variant might be to access and to copy records into one's own system for later re-use. We may well ask the question, "Was 1981 not indeed the right year to sell the Times?".

Full text digital storage of documents will undoubtedly increase. Likely candidates for such files are texts of laws, patents, standards and reports as well as the proposed electronic journals. Certain reference works, encyclopaedias and directories will appear in online data bases with the advantage of permanently up to date entries. The new information field of data banks will continue to expand its range of subjects - to name but a few - finance, economics, commodities, demographics, agridata, marketing figures, securities, trade and government statistics. The special skills to learn to retrieve this data and to manipulate and tabulate output according to requirements must be acquired. As the technology advances, new systems will offer improved graphical and eventually pictorial information. How long will it be before we can attach a colour printer to a colour display?

A library or information service may well be judged in the future by the ease with which it can gain access to information rather than by its holdings alone. It is impossible to believe that the skills needed will not increase in complexity. We shall need to operate by knowing of all available sources and by knowing how to tap them.

Some of the future systems mentioned are as yet too nebulous for us to be able to define with precision what their impact will be. However we have not been slow to integrate existing services into current operations. Even if our collections are going to contain decreasing amounts of paper, we will surely continue to incorporate all useful systems into our present and future routines. Soon the large mechanised systems now installed in larger libraries will become available to smaller services. Cheap ready-made "turnkey" services will integrate all our order, cataloguing and loan operations from a single master input record which we shall be able to amend or correct online. We shall probably take this record from one of several online cooperative centralised cataloguing systems. Terminals will operate at the touch of a finger to facilitate access for those with no typing skills. We shall be able to obtain announcements of new material via Viewdata or via one of our current online hosts. Both the British and the US government publications services propose to make their files available in this way and presumably other publishers will follow. If tele-ordering is available then we shall place our orders via a tele-ordering system. Shall we perhaps see the day when some publisher will pick up our order directly? How soon will it be before a file owner will offer access directly rather than via a host? What will happen to national lending libraries if we do all order by telefacsimile? We see conflict of interests on all sides.

I now come to the question of information retrieval techniques. One thing is certain - the retrieval operation will have to become considerably less complex than at present if our role of intermediary is to be dispensed with entirely. The transparency of the services leaves much to be desired and access procedures and languages which are user friendly are only in embryonic state at present. Systems are no better than our own intellectual skills allow them to be. The retrieval complexities of full-text documents in large files have been underestimated. More work on automatic indexing and weighted feed-back will be required to exploit them fully. Advanced user interfaces permitting a natural language approach for the less skilled, or even for all of us, will be needed.

Even when the public accesses its Viewdata services as easily as it now uses the telephone, even when the encyclopaedia, the dictionary, the directory and the newspaper are online at home, the individual will not seek direct access to all world knowledge. He will need and expect

guidance for access to specialised areas in depth. Any service offering assistance with this access will be, and should be seen as, an extension of our own profession. It is here that our skills will be needed, and we shall continue to identify and access these areas for our users. Readers will still reject the screen, like the microfiche, whenever possible. Like the student who, for centuries has covered his standard texts with annotations, the researcher too, likes to pencil notes on his own paper copy. No single individual however will be skilled enough or even interested enough to seek to access all areas of knowledge for himself even if he does become increasingly competent to do so in a particular sub-set which immediately concerns him.

One of the main functions of the librarian or information officer will continue to be the exercise of judgement and selection, to provide skilled guidance to users to enable them to filter the mass of available data and to arrive at a required end product quickly and economically. If we accept the challenge of the new technologies as an increase to our skills, the third wave will not bowl us over - we shall be riding on the crest.

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