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Beyond CD-ROM: wider horizons in the provision of electronic information★

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The availability of information across the networks is explored and described, along with plans for the navigation and filtering tools which will promote access to them. Issues of funding of datasets, end-user training, document delivery, the marginalization of the traditional library and the Follett Committee Review of Library Provision in Higher Education are explored. The current level of investment in CD-ROM is discussed, as well as the possibilities and limits of the technology. The two technologies are compared and contrasted and the particular importance of services free at the point of use stressed.

It is some time since it was suggested amid some controversy that CD-ROM was a young technology with a great future behind it,¹ but that debate is over and it is now desirable largely to ignore CD and concentrate on what is beyond the blue horizon. The authors of the original paper still believe that CD-ROM has a future as part of single-user workstation technology or networked around offices. They remain equally firm that network technology for mass use will not rely on CD-ROMs. Like Dr Johnson's walking dog, the interest is not that it has done well or badly but that people bother. Most librarians have a personal library, but do not consider that a substitute for library services. In the same way we may expect mushrooming growth of CD-ROM as a personal and not a public tool.

We should now look at some of the elements making up the widening future and try to relate them both to where we are and to their specific relevance to medicine. It is important also to note the work of the Joint Information Systems Committee (JISC) and the Follett² Review of Higher Education Library Provision. We are already committing £6 million a year through JISC to networked services and if the Follett Review recommendations are carried through that is likely to increase to closer to £10 million on the networked services side. It is the intention of the JISC to spend that money to create national policy and national services for the whole of the higher education community. As a by-product it is hoped to extend those services to schools, public libraries and hospitals, but that is subject to the view of Of tel, and the relevant studies are under way. A coherent set of national initiatives will be mounted and national policy will be tailored to the international framework of INTERNET.

It can now be seen that library automation has taken place in three steps, beginning in the 1960s. First came library housekeeping systems, at first developed in-house then purchased commercially. This was more truly mechanization than automation. From the mid-1980s we began to look at the delivery of library and institutional information to

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the desktop. This led to the development of CD-ROM networks, Online Public Access Catalogues (OPACs) and campus-wide information services (CWISs). However, information was still essentially in-house. It was either purchased or repackaged electronically. In the early 1990s, came true automation with access to material not in our possession. For the first time users can seriously have the ambition to gain efficient access to the information they may need and not simply that contained within the four walls of the library.

There has been a sea change in user expectations on delivery to the desktop. The Bath Information and Data Services (BIDS) has led to expectations of document delivery using only a credit card; INTERNET allows users to borrow from one library, use another library for reference and yet others for images of manuscripts; experiments with networked textbook materials means that this expectation exists even at student level. At Blacksberg, in Virginia, an electronic village is being created where one can do everything electronically—call up entertainment, do home shopping, even for groceries and carryouts, and have articles delivered to one's home ordered from a database.

The next important element to mention is the massification of higher education. Most librarians will have already felt the impact of increased numbers and there is now talk in government of participation rates of up to 40%. Many of the sciences allied to medicine, such as nursing and physiotherapy, are increasingly becoming graduate professions. This has had an obvious impact on services. The networked services provided by the Information Services Sub-Committee (ISSC) are used by tens of thousands of people each month. The National Health Service (NHS) connection to the Joint Academic Network (JANET) will multiply this use. This poses enormous issues for libraries. Should we offer cheap and cheerful mass services or high quality services? EMBASE was mounted on the network at King's College with a simple interface within two weeks and is available to everyone. However, the networked version of GRATEFUL MED took one year to mount to 20 people at King's but is highly regarded by all the researchers who have access to it.

The training of users is central to the way ahead. There have been many initiatives in the UK—JUPITER, ITTI, Computers in Teaching Initiative (CTI), Teaching and Learning Technology Programme (TLTP₁ and TLTP₂), NISP. However, we have only achieved the creation of a small cadre of expert users and a large population adept at the very basics of computing—and that is computing with a capital K. The Follett Review may offer further comment and assistance in this area.

The nature of the data is also of interest. Approximately 80% of data accessed through the NISS gateway has been created within the community, the remaining 20% consisting of the things we have purchased, such as EMBASE. It is interesting to speculate for how long that will remain true. The nature of the data is also interesting. It is well known that library catalogues, and by extension OPACs, are less than perfect, as is commercial data. The bulletin boards are full of sad little tales of broken dreams because of faults either in the data or in the software which manipulates it. Another cause for concern is the increasingly ephemeral nature of data: for example, there have been demonstrations of layering weather data with census data and data on cancer to show the prevalence of

leukaemia downwind of a nuclear plant. Having made the point, the result is then deleted. What used to take a 3-year PhD study has become a disposable item.

A recent study for the Follett Review showed that the electronic journal will not produce savings. We must therefore look to a new model of publication arising from SuperJANET and its multi-media capabilities. If no price saving can be made with electronic journals their use can only be justified if we can achieve new things. We should consider what added value publishers bring and if they are actually needed in the chain. It has been estimated that some 20 million articles are published each year which presents unresolved problems of control. What may prove more interesting in the long term (at least to those in the scientific, technical and medical (STM) information chain) is a value-added service pioneered by Springer, where one can subscribe to an electronic table of contents and abstract service which appears 6 weeks before the printed journal. This service could soon become a necessity to high-performance research teams.

The next areas of concern are the technical elements. Much of the physical cabling is already in place. For example, cable TV cabling is used as a carrier for some Metropolitan Area networks for SuperJANET. Cable companies could bring information as well as entertainment to the home. There has been a huge growth in bandwidth and the multi-media possibilities look extremely interesting; a good example of this is currently being undertaken at the Hammersmith Hospital. Information brought to the desktop ranges from MEDLINE to remote foetal monitoring, superimposition of different types of brain scan to give a holistic picture and even remote surgery by robots. While these image-based activities are experimented with in real time, there is a tendency to ignore how much of the material has to be stored and archived. Although as a community we have built up some experience of these issues, notably through the work of the Economic and Social Research Council (ESRC) Data Archive at Essex, they have not generally been resolved. It is an area where our traditional librarianly skills may offer some clues.

The other element of the future is that of the role of the library. The following statistics should be considered. The Higher Education National Shareware Archive (HENSA)—the shareware archive—is used by more than 70 000 people a month; The Institute for Scientific Information (ISI) data base is used by 60 000 users a month; the NISS gateway by 70 000 users a month. The number of list-servers and bulletin boards on INTERNET is estimated to have grown from 3000 to 5000 in the last year—and anyone connected to a bulletin board knows how much activity that generates. The first networked end-user-driven document delivery services are now on the market. The minimal impact of all this on our libraries should be considered. In the last 2–3 years in the UK alone we have gone from almost zero to hundreds of thousands of networked information-seeking sessions each month. Is this new use, or new users, or is the use displaced from someone else? If it is a combination of new users and displacement activity will this eventually lead to the marginalization of libraries except as archive stores? The recent Royal Society Report on the STM Information System³ showed that researchers in the 25–35 age group were least satisfied with and least likely to use libraries. It also suggested that the trend to document delivery will expand and shift to the end-user, thus moving funding control inexorably away from libraries. The optimistic view is that in what is now known as

cyberspace, it will be the role of information professionals to map out the new world and to train users. It is ironic that the technical world claims to have solved—if not implemented—all the problems of running high speed networks but acknowledges failure in describing information content. They are reinventing cataloguing and classification.

The other missing element may be loosely described as management. There is something approaching chaos on the networks. Standards such as Z39.50, Universal Resource Locators and adequate Resource Guides, are required. New methods of cataloguing data are also required. The recent hugely successful American Civil War series ran to approximately 16 hours. How does one catalogue the 3-minute sequence on the Gettysburg address so that it is retrievable? Quality control of data, not only in the formal sense of identifying and eliminating bugs, but also in defining its value, is needed. The expectations associated with printed volumes where, for example, publishers' name will give a clue to status and quality, do not translate to the network. A fairly average bulletin board will contain some four gigabytes of information from multiple sources of origin and there are thousands of these. We also need to develop the notion of 'connectedness' expounded by Lorcan Dempsey, allowing transparent and seamless movement between data sources with any information or search strategy carried forward.

Higher education has moved from the Computer Board to the Information Systems Committee to the Joint Information Systems Committee in no time at all. Just as the country seems to have passed the high water mark of nationalism the government, with its unerring eye for making needless decisions, has set up separate funding councils. The JISC has several sub-committees of which the relevant one is the Information Services Sub-Committee (ISSC). The ISSC is tackling the issues described above with a budget of £6 million. To this may be added whatever the Funding Councils allocate in response to the Follett Review. The ISSC is also in the process of making available up to 20 major bibliographic datasets. Data centres have been set up at Bath and Manchester and the ISSC has some responsibility for the ESRC Data Archive at Essex as well as looking at the creation of a national centre for the humanities to match Essex. Money is being invested in investigating the setting up of a free national OPAC for higher education based on the Consortium of Universities and Research Libraries (CURL) database. There is great interest in mounting document delivery experiments over the network. Many have been impressed by the way the British Medical Association (BMA) has set up a very cheap but apparently profitable service and there is a wish to see whether this model can be replicated. We also need network use studies to find out who is doing what and why. After 'vanity publishing' comes 'vanity searching'? If we are to make wise and sensible choices on the acquisition or creation of future services we need a much greater appreciation of user activity. The Follett Report has also commented on the electronic journal, the electronic book and networked access for students. It is proposed that money is made available for research into subject-based information gophers. This suggests a huge and probably unstoppable (or perhaps Gadarene) rush to develop the electronic environment. There is an enormous opportunity to use this resource to reshape not only libraries but the whole model of the information chain.

In conclusion, we are moving beyond CD-ROM for two reasons. The first is that better technical solutions are appearing. The second and perhaps more important reason is that central funds are being poured in an unprecedented way into the development of networked information services. The ability to access that data poses threats to the traditional custodial and even physical role of the library. It is, however, quite clear that, as Lorcan Dempsey put it, what we have is a flea market and what we need is a department store. The traditional problems and skills associated with the organization of knowledge remains central to the development of these services. We then come to the issue of training. In higher education in particular, an area where there is no real learning curve as students move in and out of the system and where numbers are multiplying rapidly, the whole issue of training literally tens of thousands of people in information management skills becomes critical. As the nature of higher education changes—this year for the first time there were more part-time than full-time students—and as the need for continual retraining continues—note the recent calls for relicensing of GPs—we can expect a growth in distance and open learning and a growth in services such as the BMA delivering documents to end-users. Finally, issues to do with quality assurance seem to me to be firmly in our area of responsibility.

It may be trite to suggest that these are not problems but opportunities, and that in large measure we face the collective task of redefining our professional future and skills. This is not blue sky fantasy, nor is the horizon very far off; 4500 people already use the BIDS service every day and the number is growing rapidly. These are large issues which go far beyond putting pretty coloured screens in parts of the library and thinking that we are revolutionizing user choice.

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