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TRENDS

THE EVOLUTION OF LIBRARIES In The Digital Age

BY KIM H. VELTMAN

A revolution is underway. It is inevitably linked with computers, the Internet, the Intranet and now the Extranet. Some see these developments as a new panacea. Some have gained fame by decrying this socalled Silicon snake oil. Others raise questions whether we can ever afford the process. With respect to libraries, some predict that digitizing collections will make them obsolete.

Memory storage capacities are expanding enormously. In 1950, IBM's Rama C tape contained 4.4 megabytes and IBM was able to store 50 of such tapes together. That meant that 220 megabytes represented the frontier. In contrast, many of today's personal computers begin with a gigabyte of storage, more than four times the IBM capacity, and two gigabyte discs are on the market. However, it is sobering to remember that full motion video in uncompressed form requires one gigabyte per minute and that the 83 minutes of Snow *White* digitized in full colour amount to 15 terabytes of space. Fortunately new technologies are on their way. Holograms, sugar cube storage and ion etching offer a range of new possibilities. These developments are transforming how libraries operate and fulfill their roles.

CATALOGUING

In the past there were basic cataloguing rules such as Anglo-American or the Prussian Instructions which were then interpreted differently by each local library in cataloguing its own collection. Typically a scholarly institution such as the British Library would provide detailed records noting peculiarities in the individual copy, while a small public or school library might opt for a minimal description of a given book. The development of online catalogues has taken us all in new directions.

In the 1970's, it became the fashion to automate library cards. The University of Toronto's Library Automated System (UTLAS) effectively became one of the first automated national union catalogues and the Library of Congress established the MARC format. UTLAS now has approximately 65 gigabytes of data. OCLC, a network linking universities mainly in the United States, has over 30 million records online using MARC. The Research Libraries Group has expanded the scope of the MARC format to include archival materials, art (paintings, architecture) and museum objects, and has over 100 million records. Significantly the RLG network now includes a number of the major European research libraries and is adding over a million titles from Europe each year.

The Library of Congress is now championing the use of Z39.50, a protocol and standard for the interchange of electronic information which has been adopted for the World Wide Web sites of over 200 libraries mainly in the United States and Europe. While criticized by some for its high programming limitations, Z39.50 is destined to become more important as GIS extensions being developed by IBM and others are added to this format's capabilities.

In Europe, two alternative approaches are emerging: one fee-based, the other universal online public access catalogues. In Britain, for example, a fee-based system originating from the British Library (BLAISE) dominates the scene. In France, a project for a national PanCatalogue is underway which will require a subscription. The Netherlands and sections of Northern Germany are connected by the Pica System which is subscription-based. Meanwhile, other parts of Germany such as Bavaria have their regional catalogues accessible free of charge on the World Wide Web (WWW). This is also the case with countries such as Austria and Norway which have an online national catalogue freely available today. Sweden will soon be added to this list. In addition there are hundreds of libraries online via telnet, many of which are planning to switch to WWW. At the European level, there is an initiative to create a Gateway to European National Libraries (GABRIEL). The European Commission is supporting a number of initiatives which foster these developments, notably the ONE project which aims to provide a common interface for all the major European libraries.

At the world level, the G7 countries have included libraries as one of their eleven pilot projects (Number 4: Bibliotheca Universalis). Thus far, this project headed by France has focused on standardizing authors' names in the national libraries of Britain, France, Belgium, Spain, and Portugal. Meanwhile, Japan has its own approach to electronic libraries and has been developing a prototype which includes High Definition Television. Major corporations are also entering the field. IBM's Digital Library Project offers a comprehensive approach to these problems. Xerox, through its research facilities in Grenoble, is developing an alternative set of solutions.

The advent of online catalogues has affected libraries everywhere. Now, when a book is catalogued by a national or major library, most libraries simply adopt that format rather than providing their own independent entry for that book or title as they had in the past. This has the great advantage of establishing a sense of uniformity and standardization across the system. A drawback is that many individual variants of books are lost in the process.

The consequences of automated catalogues for users are already enormous. In the past one was restricted largely to the contents of the library in which one happened to work. The spread of published library catalogues changed this but ironically these were typically only available in the largest libraries. The evolution of standardized electronic catalogues means that one can now check the locations of a book from the comfortable location of one's personal computer terminal in an office, at a library or at home. One can search for copies around the world while sitting at one's own desk. And access to online library catalogues is but one dimension of this process. National book catalogues and publishers' catalogues such as Books in Print are also available in electronic form, allowing users to interchangeably search for books and to explore whether they wish to buy them for their own collections.

INTERLIBRARY LOAN

As networks have expanded, interlibrary loan has increasingly been automated such that users can enter their identification number and order a book straight from their desktop.

FULL TEXT RETRIEVAL

Most of us are aware that full text versions of major works such as the *Bible,* Dante's *Divine Comedy* or the works of Shakespeare are already available online. Initiatives such as the Gutenberg Project aim to make the major writings of western culture freely accessible in electronic form. Less well known are the growing electronic repertoires. In France, there is the database of French classics which has a mirror site in Chicago. In Britain, there is the Oxford Text Archive which is linked with the Text Encoding Initiative. In the United States, the Coalition for Networked Information is speaking of entering the full texts of ten million books.

While some view such projects as futuristic, the Bibliotheque Nationale de France is already engaged in scanning in full text versions of some 400,000 books. IBM, through its Digital Libraries Project, has scanned in 10 million images at the EDO Museum in Tokyo, is scanning in 50,000 manuscripts at the Luther Library in Wittemberg and, thanks to funding from Rio de Janeiro, has begun scanning in the full texts of the 150,000 manuscripts at the Vatican Library (the subject of a plenary session at last year's OLA Super Conference). At present there are only eight test sites in the world for the latter project, including one in Canada at the Perspective Unit of which I am Director.

ROLES OF LIBRARIES

Eventually all books now in manuscript and printed form will be translated into electronic form and made available online. This process is analogous to that which took place after Gutenberg introduced printing to the West, when everything had to be translated from written to printed form. That process took nearly two centuries. No one knows how long the electronic equivalent will take: much shorter or even longer? In a sense it does not matter. Already now and increasingly in the future the roles of libraries will change as a consequence of these developments.

In the past, libraries were places for storing books but it was primarily their role as places for reading books which gained attention. In addition, great libraries served as

an important meeting place for scholars. A drawback was that scholars had to travel long distances to reach a major library and spend considerable resources while they lived in the city in which the library was located. One of the motivations behind IBM's Digital Libraries Project is to save scholars the cost of travel and accommodation by providing them with manuscripts and published rare books on demand. If this model were pushed to the limit, then libraries could technically be reduced to being specialized storage houses.

There are several reasons why libraries are likely to remain important in spite of or perhaps because of digitization. Firstly, some aspects of books and manuscripts cannot be conveyed through electronic versions or even facsimiles, such as the manner in which a book is bound; its feel, whether it is well worn or almost untouched. While such aspects can theoretically be replicated in holographic or three-dimensional laser images, historians of the book and publishing will need continued access to the originals.

Second, although it is foreseen that there will be universal access to the Internet in developed countries, it is generally assumed that this will entail relatively slow speed connections. The notion of ATM capacity at everyone's desktop is still a long way off and may not happen at all. Meanwhile, experts have suggested that ATM or analogous high speed connections will evolve in the context of service centres.

Given the traditional role of libraries as focal points for their communities, they are ideally suited to take on the role of such service centres. While it may be impractical to connect every home with ATM, it is perfectly feasible to connect all the major libraries and even the lesser libraries throughout the country. Linking Ontario's 5,000 or so libraries with high speed connections is simple compared to the challenge of trying to provide the province's over 10 million individuals with a direct high-speed connection. Connections within the institutions might in turn be at different speeds. Public and university libraries might be at OC12 speed, while schools were at T1 speed.

The manuscripts and rare books which are presently being scanned into electronic format are typically 30-50 megabytes per page. Paintings range from 50-100 megabytes at the low level to 1.4 gigabytes per square meter at the high level. On regular modems these would be entirely unwieldy. On the other hand, reading rooms with high-speed connections would make consultation of such works entirely feasible. Lecture rooms with high speed connections could transform the content of teaching. Such facilities would in turn serve to revitalize the role of libraries as a focal point in their communities and institutions.

Libraries are much more than storehouses of physical books and objects. They serve as centres which collect and nourish the collective conscious and unconscious memory of a country variously described as our heritage or culture. For this reason, they play an essential role as centres of community which is more than community centres in the usual sense. The new technologies will make aspects of this heritage accessible online such that it can be shared by individuals throughout the country and not only in the large centres. Yet paradoxically, because the most dramatic new technologies, such as virtual reality, are so expensive, these products will need to be limited to

specialized institutions such as libraries and museums and thus provide a new foundation for their role as centres of community.

Libraries are the repositories of the collective memory of a culture. Just as individual memory is the richer if it is refreshed, this collective memory is the richer if libraries become centres for its ongoing interpretation and reappraisal. In this way they become more than records of past deeds. They become the source for present discussion about future directions, hopes, and dreams.

Kim Veltman is Director of the Perspective Unit and creator of the System for Universal Media Searching (SUMS). He gave the 1996 Elizabeth Ann Cummings Memorial Lecture and opened the 1997 Ontario Library Association Super Conference. This article is edited from ideas appearing in New Roles for Libraries in the Digital Age *by Kim Veltman (Toronto: Ontario Library Association, 1997).*