Interactive Multimedia in Library and Information Services

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Only a few years ago, David Clark used the term "twenty-first century books" to express his optimistic view of the future of interactive videodisc technology. [1] Talking about twenty-first century books today, we certainly need to look at the more recent members of the optical media family, some of which have already entered the marketplace or will do so in the very near future. These media will not only take over certain functions which traditionally were fulfilled by printed books, but they will also provide features that conventional text-based media could not.

The well-known benefits of optical discs include high-density storage, fast access time, compact size, physical robustness, durability, and various capabilities for computer-controlled interactive access. In addition to these features, several types of optical discs are capable of holding and randomly accessing different original media formats, such as still and moving images, graphics, numerical data, text, and sound, or a mixture of them, all integrated on one single medium. As this

has not been previously available, optical media have opened a revolutionary way of multimedia information storage and retrieval, with a wide variety of possible applications. The term 'interactive multimedia' refers to these capabilities, covering not only optical discs but also applications which make use of different storage media (e.g. magnetic discs). [2]

The increasingly popular quasi-synonym 'hypermedia' stresses the fact that interactive multimedia is an extension of the hypertext concept which refers to non-sequential reading and writing. [3] Hypermedia may be browsed by their 'readers' in a non-hierarchical way and even be altered by them at will; they permit access to the massive amount of multimedia information easily and quickly, and in a manner similar to the way in which we think. [4,5]

The focus of the research summarized here was on the use and prospects of multimedia optical disc applications in libraries and other information services, e.g. museums. [6] Its general aim was to

build up an informed view of this area, looking in particular at:

1. the present state of optical memory systems and their capabilities for multimedia,

2. applications in and relevant ongoing developments for library and information services, and

3. the current position of the information community concerning the new technology.

Optical storage technology and multimedia

The reflective optical videodisc, also known as LaserVision, was made commercially available in 1978; the compact disc-read only memory (CD-ROM) was introduced in 1985. After having been present in the marketplace for more than a decade, optical media can be considered to be feasible technology, providing the benefits mentioned above. However, several new optical media formats and technologies are presently being released or expected to be launched in the near future, including DVI (digital video interactive), CD-I (compact disc-interactive), and CVD (compact video disc). This indicates that optical storage, though rapidly developing, is still at an early stage and it seems questionable whether this process will slow down in the foreseeable future.

The increasing popularity of optical discs for professional applications within the area of information storage and retrieval - most significantly to be seen in the case of CD-ROM - is closely related to

developments in computing technology. [7] With regard to the hardware involved, the spread of industry standard personal computers has been of decisive importance for the present success of optical media; on the software side developments such as PC-based text retrieval programs, authoring systems (i.e. tools for software creation by non-programmers), and - most recently - software with hypertext capabilities have contributed to an equivalent extent.

Optical disc technology provides various capabilities and options for multimedia storage and retrieval. So far, only analogue storage media can be considered to be mature technology for this purpose. However, there will be a shift from analogue to digital storage in the not too distant future. Although present-day devotees of analogue multimedia are stressing the specific appropriateness of this technology for visual information storage and display, their arguments cannot hide the fact that the forthcoming optical disc formats will provide increasingly improved digital multimedia capabilities. [8] The launch of viable all-digital multimedia systems can already be expected for the early 1990s. [9] If this technology succeeds in achieving a large installation base in the domestic market, it would appear likely that analogue systems will eventually be superseded by their digital counterparts.

The development of optical storage media has shown the important role which standardization plays in the process of the adoption of new information technology. Both CD-audio and CD-ROM have benefited from early standardization, whereas e.g. write-once

optical discs (WORMs) are still suffering from disc and system incompatibilities. The standards involved are physical disc standards, standards for data storage on the medium, compatibility of players and drives, but also - especially in the field of multimedia applications - existing and future television broadcasting standards (PAL, SECAM, HDTV). The forthcoming range and variety of optical disc formats emphasize this point to an even greater extent. The successful uptake of the technology by the information community will undoubtedly be threatened if industry fails to provide compatible optical disc products and/or playback equipment which can be used for several if not all disc types.

Applications in libraries and picture archives

In the field of libraries and picture archives, multimedia applications of optical disc technology have had very little impact so far. The present writer's world-wide literature survey of relevant projects showed that only a small number of libraries are 'actively' applying the technology, transferring audiovisual materials from their collections onto optical discs and providing them to their users in the new format. The institutions most likely to be interested in testing and/or applying the new technology are national libraries and archives (Canada, France, Italy, Netherlands, United States), which comprise two thirds of the projects found by the survey. The first European project of this kind was undertaken by the Sainte-Geneviève university library (Paris) in 1983, when the library produced a videodisc from its

slide collection of medieval illustrations and linked it to a text database. [10]

Of particular interest are the relevant activities of the Library of Congress (LC), where optical media have been applied since the early eighties. The LC's *Optical disk pilot program* aimed to examine, on a large scale, the potential of optical media for libraries. Although the project's main emphasis was on text rather than multimedia the library produced six videodiscs to store several hundred thousand images of endangered library materials (slides, drawings, film strips, etc.). [11] A new multimedia project, certainly larger and more ambitious than any relevant library project previously undertaken, is just emerging from the planning phase. Entitled *American memory*, this project stands for the LC's intention to publish major documents on American history, popular art and culture (visual, sound and text) on videodiscs and digital optical discs, both for the general public and the academic community. The project will commence with a pilot phase of six years during which the LC plans to produce 15 to 20 programmes. Already a market study has shown that among U.S. research libraries there is a considerable degree of interest in the outcome of these activities. [12,13]

There is no evidence of any widespread 'passive' use of multimedia optical discs in libraries, i.e. the acquisition, collection and provision of products from external sources. [14,15] This does not mean that optical media as such have failed to succeed in libraries; indeed, CD-ROM technology is becoming increasingly popular with librarians and library users.

Whilst at the present stage most applications of CD-ROM are text-based, the uptake of this technology by libraries might prove important for future multimedia applications.

Applications in museum and galleries

In the context of museums and galleries, the capabilities of multimedia optical disc technology are similarly underexploited. In 1985 it was estimated that only three per cent of American museums were actually using videodiscs or were at least in the first stages of project development. [16] Nevertheless, the survey of projects and applications conducted for this research indicated that a considerably larger number of museums than libraries are currently applying the technology. Unlike libraries, museums and galleries show a tendency towards growth in the use of optical discs for multimedia information storage, and no recognizable interest in textual applications.

The majority of optical disc applications in museums are used as supportive (didactic) programmes in exhibitions and gallery displays, often providing only a low level of interactivity. These programmes are easier to produce and require a smaller amount of image and data processing than projects dealing with the documentation of museum objects. So far such visual archives of photographs, paintings, artefacts etc. have been established only in a small number of institutions. A beautiful example of this category is the videodisc series of the Albert Kahn Collections (Boulogne), which after its completion will represent a true *Archive of the planet earth* - some 72,000 anthropological photographs taken in 48 countries between 1909 and 1930.

[17] Several museums have recently started large-scale projects aiming to create a visual and textual documentation of their entire holdings, e.g. the Museum of Canadian Civilization (Ottawa). [18] Others have joined forces to produce collection-based optical disc products of common interest in a collective effort, such as in France, where a national visual catalogue of contemporary art is being established. [19]

As museums tend to apply optical disc technology in exhibitions requiring daily performance for many hours, they are more concerned than libraries about the reliability of the playback equipment for optical media, and also about the most cost-efficient hardware configurations. Likewise, they are paying more attention to the user interface, especially in terms of the hardware devices installed to make multimedia systems interactively accessible to large numbers of visitors (touch-screens, interactive panels, keyboards, push-buttons, etc.). Issues of implementing and presenting optical media are already being recognized in exhibition design - a fact which can also be seen as an indicator of the increasing impact of the technology in the museum context. [20]

Problems and issues for libraries and museums

At first glance, the cost factor seems to be the major problem that libraries and museums will be facing if they consider to apply multimedia optical disc technology. It is certainly true that interactive multimedia are expensive to create, particularly when they are not produced for wide distribution, and they also may require costly playback

equipment which many institutions will find difficult to afford. There are, however, at least two other issues which must be kept in mind when thinking about 'active' applications of the new technology.

The findings of the author's survey of collection-based multimedia optical disc applications, both in libraries and museums, stress the problems of indexing visual materials. In many cases, the projects required the cataloguing and indexing of still and moving images from scratch, because the slides, films, objects, etc. had never been systematically processed before. Due to the lack of universally accepted conventions this task usually included the creation of an appropriate description format and the selection of a method for subject-indexing. Finally, the amount of qualified manpower needed for the indexing of large quantities of visual materials tended to be widely underestimated, sometimes leading to unfinished or delayed products. As a result of these problems, the access capabilities offered by present-day visual databases vary considerably in style and quality, which makes them incompatible and less user-friendly.

Distribution and (commercial) publication of multimedia optical discs have so far only been pursued by a small number of libraries and museums. The major constraint in this connection seems to be copyright which particularly affects projects involving modern art, architecture, photography, design, and sound. Whilst some museums possess the copyright for their collections, others - and most libraries - would have to deal

with external copyright owners. For instance, the *Pilot program* of the Library of Congress has demonstrated how difficult it is to identify a large number of dispersed copyright holders in order to seek their permission for reproducing and distributing their materials. [21] Joint ventures with commercial publishers might ease the problem in individual cases, but also involve the danger of selling off distribution rights for a long period of time.

Applications in research institutions

A number of multimedia optical disc projects and applications of potential relevance for library and information services have been realized or are being conducted by research institutions, e.g. academic departments. The term 'relevance' here refers to applications which - besides being useful for academic teaching and research - could also find their place in reference collections or information departments. Examples include projects such as *Images de l'archéologie* (a videodisc and database on Greek and Mediterranean archaeology, made at the Universite de Paris X), *Interactive biological information system* (the University of Nottingham's encyclopedic visual database applying videodisc and CD-I technologies), and the Simmons College's widely publicized *Project Emperor-I* (two videodiscs and interactive courseware on archaeological findings from the period of the first Chinese emperor, about 2,200 years ago). [22,23,24]

Several of these projects indicate that organisations outside the information

community might take the initiative in creating multimedia resource discs if libraries and museums fail to do so. In other cases, the resulting multimedia products could be acquired by libraries and provided as reference tools to their users, in addition to relevant materials delivered by professional publishers of optical media. Generally speaking, it would be advisable for libraries and other information services to watch closely the ongoing activities in research departments and related organisations, not only to benefit from their output and developments, but also to draw conclusions on potential user needs which might require a revision of present policies for information provision.

Electronic publishing

The survey of ongoing activities in the field of professional and commercial publishing revealed a variety of multimedia optical disc applications of high relevance for reference work in libraries and other information units. Certainly the most famous of these is the BBC's 1986 *Domesday project*, which inspired a number of similar projects in other countries. Other products within this category are general and specialized multimedia encyclopedias, e.g. *Compton's multimedia encyclopedia* (one of the first multimedia CD-ROMs) and *Storia dell'arte Italiana* (History of Italian Art). [25,26] Also, geographical information systems (both analogue and digital maps and atlases on optical discs) represent a very promising group of optical disc-based multimedia. [27]

It seems, however, that publishers are still experimenting with different optical disc formats, retrieval capabilities and the actual marketing strategies for their products. From the view-point of the information community, the present range and scope of multimedia optical discs from professional publishers may not yet be sufficient to build up a reference collection; individual large-scale applications such as the *Domesday* discs can obviously not compensate for the lack of a large reservoir from which relevant items could be selected.

Multimedia and the information community

As a part of the research on multimedia, exploratory interviews with a number of information professionals (from libraries, museums and audiovisual services) were conducted by the author. This small-scale survey showed that, even among information professionals who are aware of multimedia information technology, the actual level of awareness is not very high, relying more on personal experience than on an overall knowledge of ongoing developments. It would certainly seem to be the case that the opportunity of learning from the experience of others is left largely unexploited, and that insufficient attention is being paid to marketplace activity.

The market for multimedia optical disc technology with particular reference to library and museum applications was seen by the interviewees as rather limited and subject to a number of constraints. In particular, the issue of publishing and distributing multimedia information contained within library, museum and archive collections by means of optical discs would not yet appear to have been taken up to any great extent.

It seems that with the exception of a small number of enthusiasts and specialists, the information community is not yet well-informed about multimedia optical disc technology and its application, is slow to adopt that technology and is not particularly motivated to become actively involved with it. The hypothesis can be posed that this attitude would be rather different if information professionals were fully aware of the role they (could) play within the overall education and entertainment market.

Suggestions for further research

Several aspects of the investigated area invite further research:

- There is a noticeable lack of reliable statistical data on the up-take of the technology. Previous surveys of optical discs in libraries have mainly focussed on CD-ROM, and no quantifying research has been done on the spread of other optical storage media in general or multimedia in particular in the various fields of library and information services.
- The findings of the exploratory study of the information community's awareness of and attitudes towards multimedia optical disc technology call for a large-scale examination leading to results which lend themselves to generalization and quantification.
- The problems of indexing and accessing visual materials require further investigation and development work which might eventually lead to widely acceptable tools for subject analysis and access. This research area should also include aspects such as the potential of artificial intelligence and the possibilities of indexing visual materials by pictures rather than text. [28,29]
- So far, little is known about the reactions of end-users to multimedia optical disc information systems. Therefore, research should be conducted to assess the users' preferences and problems in the context of the new technology, including evaluation studies of individual applications and products.

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