PETER B. SCHIPMA
Manager of Information Services
IIT

Videodiscs

To maintain a sense of perspective, I flavor my research activities at the IIT Research Institute (IITRI) with the teaching, each semester, of an introductory course in data processing. As illustrations in that course, I frequently use science fiction stories, and it is extremely interesting to note that those stories have a longer lifespan in the course content than most of the factual material. The data processing field changes very rapidly. As an introduction today, I'd like to quote from everybody's favorite science fiction author, Dr. Isaac Asimov.

> At the present rate of computer advance, the time will soon come (always assuming our civilization does not crumble through our own folly) when any household can have a personal computer, with a complex and thorough-going system for information retrieval. This implies a number of things.
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> You can get what you need for daily life—weather information, the specials and prices at local stores, news and sports headlines.
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> You can get what you need for daily business—stock market reports, office data, letters received and sent out. You can stay home and still do your work at the office or plant, electronically, or even hold conferences by closed circuit television if your system is complex enough.
>
> Most important, you can get information that you just happen to want for no other reason than that you want it.[1]

The good doctor goes on to elucidate the profound effects of such a society on many aspects of life, principally that of education. You have already heard of some of the new technologies that will affect the storage and processing of information, and more are to come. The topic I will address in this paper is that of videodiscs.

Videodiscs are a storage device for information, similar to scrolls, books, motion pictures, or phonograph records. The medium itself is not

unlike the phonograph record, and videodiscs can be mass-produced by a stamping process, as are audiodiscs. In quantities of thousands, replicate cost is on the order of $2.00 each. The storage density is very high. An hour of television program material can be stored on one disc. So can the equivalent of 15,000 pages of text—that's about forty-five books (each at $0.045)!

A complete system requires not only the discs, but a display device, a playback machine, and a recorder to make the discs in the first place. Currently, videodisc recorders are very expensive, costing from $80,000 to more than $1 million. At this time, therefore, we speak of display-only systems; users would buy prerecorded material and own only the first three components of the system. The cost for these is quite low, since players cost about $500, and television sets, used for display, are only $200-$300.

The two major types of videodiscs are optical and capacitive. In both cases the very high storage density means that the information bits must be exceedingly small, measured in millionths of an inch, so they have to be formed by a laser beam. That is why the recorder cost is high. In the playback mode, there are large differences. Optical discs are read by a laser, but since no burning away of material is required, a very low-powered (an inexpensive) laser can be used. The MCA/Phillips disc is reflective, while that of Thomson-CSF is transmissive. For both of these optical systems there is no wear; only a light beam touches the disc, and a single frame could be played for years with no damage to the disc. The capacitive system, such as that recently marketed in the United States by RCA and announced in Japan by Japan Victor Corporation, uses a stylus, and is subject to wear. Also, because styli are large, compared to a focused laser beam, several frames are recorded on each of fewer tracks, and so frame play and single-frame search are more difficult to implement. Kodak, 3M and others are also working on other techniques for manufacturing videodiscs.

For consumer use, videodiscs offer the potential of lower-cost playback devices, lower-cost materials, and higher-quality picture over videotape. However, they do not have a recording feature, and that factor may outweigh the others in the movies-at-home marketplace. From the commercial information processing viewpoint, though, videodiscs are much more exciting than videotape. Not only can sequences be played through easily, in forward or reverse, at various speeds, without jitter or frame breakup (as with tape), but frames can be accessed randomly, on demand, either manually or under computer control, and any frame can be displayed for any length of time.

The optical videodisc thus has large advantages for use in educational activities. Costs are low enough to store huge amounts of material; any frame can be easily accessed; and much information can be stored on each disc. Whether or not the "television generation" will accept this technology remains to be seen.

It is costly to put material on videodiscs. Videodiscs will have to compete with both videotape and microforms, even though discs have some capabilities that cannot be matched by those media. In a recent cost analysis at IITRI, we found that the break-even point for discs versus microforms is about 250 copies. This strongly indicates that videodiscs are going to become a formidable competitor to current technologies. Other work at IITRI has led to the development of a system and methodology to store full text on videodiscs.[2]

Videodiscs are part of the revolution Dr. Asimov talked about. It is conceivable that, for a few thousand dollars, anyone could possess a library that Alexander would have given his empire to own. Just as each of us can have, at home, a music repertoire that couldn't be matched in a lifetime of concert attendance, one day each may also have an information collection rivaling that of most present-day libraries.

REFERENCES

1. Asimov, Isaac. "The New Learning." *Apple Magazine*, vol. 2, no. 2, 1981, p. 1.
2. Schipma, Peter B., and Becker, David S. "Text Storage and Display via Videodisc." *Proceedings of the ASIS Annual Meeting* 17(1980):103-05.