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OPTICAL DISKS

Optical products inching their way to market reality

Optical Disks Inching Their Way to Reality

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Gary Hill's superiors at Dun & Bradstreet Corp. were not impressed in 1983 when he showed them what a fledgling new technology called compact disk read-only memory (CD-ROM) could do for the company's numerous financial and consumer data bases. But this rejection did no more to dampen Hill's enthusiasm for the technology than the Boland Amendment did to temper Ollie North's zeal for aiding the Contra resistance in Nicaragua,

Hill, a vice president and general manager of the corporate financial giant's Donnelley Marketing Information Services arm, launched an internal project to publish a consumer market research data base on CD-ROM disks. The project, it turned out, was quite successful. "Once [top management officials] saw what we had, they fell in love," Hill recalls. Indeed, Donnelley's revenue figures already indicate that the CD-ROM data base is having its effect on the company's distribution plans. Where online charges once represented 75% of the revenue in Hill's department, that figure is now down to about 2% of revenue. "I have no plans to go back to timesharing. " Hill says.

Hill is a pioneer in the new world of optical technology. But are he and other pioneers on a collision course with market reality, or are they the forefathers of still another technological revolution? The answer is that while its beginning has been slow, optical technology seems ready to make its move, standards, software and user security permitting.

In fact, there is no shortage of MIS interest in optical storage. Because of an explosion in graphics-intensive applications, magnetic media is stretched to its limits. One user facing this crisis is Gary L. Porter, systems analyst at Jeppesen Sanderson Corp. in Englewood, Colorado. Jeppesen Sanderson, responsible for 90% of the graphics-generated navigational maps used by commercial airlines, is choking on 1.2G bytes of magnetic disks. For Porter, optical storage promises gigabytes, even terabytes, of online storage within a single system. But it also leads to confusion and other drawbacks.

The navigational maps published by Jeppesen Sanderson must be stored and revised every 28 to 56 days, some with major, some with minor changes. Today's optical storage is not erasable: Once a laser image is burned onto a disk, it is permanent. Should the company wait for an erasable optical disk? Porter says his application can't.

But, he says, an even larger roadblock bars the technology's progress. There is a decided lack of standards in the industry, something Porter says must be corrected before his company decides to take the optical plunge. "We've gotten ourselves into trouble before because of nonstandard storage systems," he says.

Porter's skepticism is understandable — from the beginning, the optical storage industry has been plagued by unfulfilled promises and unmet delivery dates. If the technology finally seems ready to make real strides in the marketplace, it may be because the industry's biggest names are joining the fray. IBM and Digital

Equipment Corp. are both set to enter the field.

According to published reports, DEC will step into the optical arena at the high end, with a jukebox product slated to be introduced at DECworld next month. The product will be sold as a document-imaging system, combining features developed in-house with hardware acquired from outside of DEC. IBM, on the other hand has already entered the market at the low end, offering an optical disk peripheral with its Personal System/2 which was introduced last April.

Optical storage of all kinds comprises a technology that has battled user resistance but is now starting to discover its application potential. Indeed, up until recently, optical technology vendors have sold more shiny forecasts than shiny disks. "This is not a technological revolution in the same sense of word processing systems replacing typewriters," says Richard Fisher, an independent consultant with Kalthoff-Fisher Associates, Inc. in Santa Clara, Calif. "This is an additional option that won't replace anything. "

Optical technology can be divided into three categories. Most attention in the last year has focused on CD-ROM, which has thrived primarily at the personal computer level as a multimedia storage device that complements, rather than replaces, existing PC storage peripherals.

Write-once read-many (WORM) disks, on the other hand, are emerging as alternatives both to the image storage capabilities of microfiche and microfilm and the archival storage of magnetic tape drives. A greater threat to magnetic storage, however, is erasable optical disks, winch are still in the development stage. Most observers do not expect this technology to be available in production quantities before 1990.

CD-ROM off the ground

CD-ROM technology, boosted by the explosive popularity of its audio parent, appears finally off the ground floor and ready to lead users down the optical path.

CD-ROM disks are made of reflective metal, which records information in digital form, creating a series of microscopic pits and adjoining spaces arranged in spiraling tracks Each disk contains 16,000 tracks per inch and each disk is approximately 4.5-inches in diameter. Despite its large storage capacity and the joint marketing and development efforts of two of the world's largest electronics manufacturers that developed CD-ROM - Sony Corp. and Philips N.V. - the technology did not win instant acceptance by users. In its early years, from around 1983 until 1995, CD-ROM was like the high school cheerleader everyone was afraid to ask out for a date.

However, once users discovered that this attractive phenomenon had a personality, its dance card began to fill up with applications and new ideas. For instance, MIS and PC managers are finding that CD-ROM provides a means of distributing 600 million characters of data equivalent to 175,000 pages of ASCII text, plus indices — to any end user with a microcomputer and a $700 drive.

Whereas today's average PC random-access memory is about one megabyte or less, CD-ROM can expand ROM available on PCs to more than half a gigabyte. With the ROM supplement, applications once unheard of become a strong possibility.

Already, Microsoft Corp. has introduced Bookshelf, an online reference source that, on a single disk, includes the contents of major reference works, including a national ZIP code directory, Bartlett's Familiar Quotations, a thesaurus and a manual of style. Other online reference facilities in the works from other vendors include a medical reference guide for physicians and a legal precedence guide for attorneys.

Converting Online Data Bases

CD-ROM's focus has turned away in the past year from the more ambitious applications of online multimedia encyclopedias and graphically enhanced video games. In the corporate world, the technology has set its sights on converting online data bases to CD-ROM. Currently, most of the data bases converted have been volumes that are less frequently updated, such as biannual catalogs, quarterly financial information and the like.

But even with these maturing applications, growing up hasn't been easy for CD-ROM technology. According to Ed Rothchild, chairman of San Francisco consulting and market research firm Rothchild Consultants, CD-ROM shipments dropped to 8,000 units in 1986, compared with 12,000 shipments in 1985, probably due to confusion about the technology. However, Rothchild says the tide has been stemmed by standards developments His organization recently increased this year's forecasts of 25,000 units shipped to 38,000 units.

And as shipments have gone up, prices have come down. CD-ROM has already experienced the beginning of a price decline as the technology begins to mature..

Lower prices notwithstanding, the lack of standards has been a major hurdle on CD-ROM's acceptance track. More than any other optical technology, interchangeability is critical to CD-ROM. Fortunately, the largest manufacturers of CDROM players, media and software - as well as some influential observers - convened at Lake Tahoe, Calif., to develop what has become known as the High Sierra standard. The result is a disk format that can be played on any CD-ROM player — just as a compact disk can be played on any compact-disk player.

This means that people like Hill will eventually be able to publish a Dun & Bradstreet data base that records the spending habits of consumers in a particular demographic area and that the manager of the local K-Mart or the national advertising manager of Proctor & Gamble can access the data at his own convenience and at his own rate of speed - without worrying about running up online costs. The disks can be distributed through the mail - like a floppy disk -and at far less cost than the weighty printed manuals that once held the data base.

Part 3: IRS Audits document imaging

While Plesums' paper congestion problem would seem huge to most users, it is no match for Uncle Sam's own IRS. Frank Moore, chief of the Laser Technology Center at the Information Systems Development section of the IRS says that more than 1.5 billion documents are currently stored in IRS files, at a total cost to the government of some $40 million so far. The congestion arises because federal law mandates that the IRS keep originals of forms such as the familiar 1040 for various lengths of time. For example, while personal income tax forms must be kept for a little less than seven years, corporate income tax returns must be stored for 75 years.

In a pilot program at the IRS service center in Fresno, Calif., a custom-designed set of three jukeboxes with WORM disks capable of storing up to 600 gigabytes of digitally scanned tax forms is now being tested. Taxpayers targeted for audits will be happy to know that when the system is up and the IRS picks out the lucky returns for a closer look, they can be accessed in as little as 30 seconds, where it took six weeks of rummaging through files. It also means, according to Moore, 'that taxpayers with a question about a return filed years ago can have their queries answered in a much faster time. Moore says the present system "can retrieve 30% of the 1.5 billion documents now in storage in Fresno."

The IRS's decision to go with an optical disk system was made in 1984, when the technology was still relatively new. Since then, Moore notes there has been quite a bit of progress in optical disk technology. Data throughput times have increased, access time is improving, and the cost of the high-resolution terminals that retrieve the images is on the decline. The Fresno project remains a pilot program, however, and "there is no indication that this system will become part of a complete system in the future," Moore says.

Not Hard, Just Different"

Systems such as those custom-made for the IRS and USAA were designed for highly sophisticated users. As a result, very little emphasis was placed on creating operating and applications software that is entirely user-friendly. Plesums, however says even his custom system does not pose a major training problem for personnel assigned to its operation. "It's not hard; it's just different," he says.

But for most future users of optical systems, a user shell and refined applications that reflect the write-once limitations of today's WORM disks are key requirements. In fact, software is a barrier even more critical to WORM technology than standards. The software problem with optical disks comes into play in the relationship of the optical drive to the operating system.

Since operating systems were deigned with magnetic disks in mind, the operating system has a tendency to want use disk space, which is not possible on a WORM disk. This must be overcome with software that makes the WORM disk transparent to the operating system. A number of systems houses working with various CPUs have developed software to overcome operating systems, including Microsoft's MS-DOS, Unix and DEC's VMS. But more must be done to create transparent user shells. Erasable disks

Most erasable disks are recorded using lasers to heat magnetized areas coated with various metals. The magnetism provides polarity in the sections, which can then be read with another laser. Data is glares the IRS's requirement for a second source he says he feels standards in the industry can only help the future of the technology — and especially users. "Standards will give users confidence in the technology and, at the same time, force media prices down as more supplied ers emerge," Plesums notes.

But confusion reigns supreme in the brave new world of 5¼-inch optical disks. At a meeting in Portland, Ore., in March, the ANSI X3B11 committee endorsed continuous and sample servo formats.

OSI Develops Standards

The sample servo format has become known as "the OSI standard" in honor of its most forceful proponent, the Optical Storage International division of Colorado Springs-based Laser Magnetic Storage International — a joint venture company formed by Control Data Corp. and Philips N.V. The joint venture is joined in the format endorsement by three other major optical disk makers, Sony Corp. in Japan, Alcatel Thomson Gigadisc in France and Philips & Dupont Optical Co., a joint media venture.

However, a large contingent of smaller 5¼-in. optical disk drive makers, led by Optotech, Inc. in Colorado Springs and Maxtor Corp. in San Jose, Calif., are pushing for the continuous servo.

The continuous servo disk features a grooved media previously used in 12-in. disk drives. Proponents say the continuous format will allow far greater capacity in drives mid media in the future. Opponents, however, say the sample servo is technically superior because it allows additional recording space occupied by the grooves of a continuous servo disk. Sample servo proponents say the only reason smaller companies are sticking with the continuous servo is because they made production commitments early on and are unable to afford the high cost of retooling. The American National Standards Institute (ANSI) is not the only source of confusion on the 5¼-inch optical disk standard. Japanese standards agencies reportedly also will support a dual banner. Observers there say not enough evidence exists at this point to make either standard technically superior.

In addition, IBM's decision to advance its own format — with its optical disk drive introduced as part of the Personal System/2 — has not made the problem any easier. The IBM disk is closer to the continuous servo than the sample servo, but it does not come close to either.

IBM's optical disk, reportedly manufactured by Japan's Matsushita Ltd., has been both hailed as a long-awaited IBM endorsement of optical technology and condemned by one media manufacturer, who asked to remain anonymous, as IBM's bid to kill the technology forever.

This type of criticism has come from competitors and experienced users of optical disks; who say the IBM offering is too conservative. The IBM WORM disk holds only

200M bytes and has a very slow access time. It arrives at a time when magnetic disk technology is pushing past the IG-byte-level and dual-sided 5¼ -inch optical cartridges hold nearly 2G bytes.

However, the loudest complaint about the IBM disk is that it fails to adhere to either of the two standards recently adopted by ANSI. Critics say standards are crucial to low-end products like IBM's, and some note that the company has not been as successful in determining low-end storage standards as it has at the high end.

Standards More Important at Low End

The anxiety in all of this is that standards are far more important at the low end - in drives using the 5¼ -inch and smaller form factor — than at the high end. The small form factor optical drives, like their magnetic cousins will be entering applications that are more likely to need some sort of disk interchange. By definition, low-end disks are produced in greater volume and at lower cost and are likely to be distributed over a wider area. As a result, the question of interchange becomes more important and, therefore, so does the question of standards.

Already, there are signs of alarm, within the industry. Frederick F. Geyer, program manager of the maw memory division at Eastman Kodak Co. in Rochester, N.Y., says his company has opted for a 3½ -inch. form factor for its one-of-a-kind erasable optical disk. He says Kodak does not even want to get involved in the 5¼ -inch standards war. Instead it will start from scratch and make its plans known to all, potential rivals included. "We will act responsibly," Geyer insists.