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Multimedia on the PC: A Guide for Information Professionals

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Introduction

Multimedia is nothing new. The nature of human communication has always involved "multimedia". We hear, speak, write, draw, make gestures, play music, and act out our thoughts and feelings to one another. We have enjoyed multimedia presentations since our childhood through film, television, and, more recently, videotape and videodisc. These have all involved analog media. What makes recent developments in multimedia new and exciting is that we can now deal with these various media in a digital format.

The digital format allows manipulation, sharing, and merging of data in ways that analog cannot. For example, writers can incorporate digital images into a word processing document. They can record and edit sounds to link with images or text, permitting the data types to serve multiple purposes with a minimum of re-working. Users can program the computer to seek randomly, to store these different files digitally, just as any computer file. They can edit this information, eliminating unnecessary parts, transforming them, or adding alternative data or special effects - all without expensive post-production.

Anyone with the right kind of computer hardware and software can play, record, and manipulate various types of media. Once the exclusive domain of recording and broadcast companies, the recording and playback of audio and video have entered the popular arena through the cassette recorder and video camera and recorder. Now, the multimedia PC (MPC) further popularizes these media.

The computer permits new ways of interacting with these media. Here, again, the idea is not new. When we scan the newspaper and select articles we want to read and decide on the order, we interact with them. When we tape a television program for viewing at a later time, we interact with the television. The computer, because it sorts, searches, and catalogs large amounts of information so well, gives us almost instant access to requested information. It appears on the screen in real time, cutting out any unwanted material. When we tape a television program, we still must tape it at the scheduled time of broadcast. We cannot interrupt a broadcast to search for other related information. The computer allows us to store information for viewing at any time. We can interrupt it, repeat it, and change or enhance it in a variety of ways.

What is Multimedia?

Multimedia evokes different images depending on the listener's or reader's understanding. Even the unabridged second edition of *The Random House Dictionary of the English Language* (c1987) leaves room for interpretation by defining the term as "the combined use of several media".

Mixed Mode

Some people understand "multimedia" to mean the use of two or more types of media in the same product. We know that CD-ROMs (Compact Disc-Read Only Memory) can store virtually any type of digitized information. If we can digitize the data, we can also store it on a CD-ROM, just as any other type of digital file.

Many applications in the MS-DOS environment that employ multiple media in this way usually use them as discrete elements or as complements to each other, just as magnetic disks do. Philips and Dupont Optical Company (PDO) refers to this as "mixed mode". It defines a mixed mode CD-ROM as one which contains computer readable data on track 1 and CD quality audio on the remaining tracks, 2 through 99.

Compound Mode

Others understand "multimedia" to mean the integration of several media within the same application. Philips, Microsoft, and Sony refer to this as "compound mode" in the pamphlet, *Introduction to CD-ROM XA*. These types of discs present special problems which we plan to discuss later on.

CD-ROM presents an ideal medium for the distribution of software using multimedia because of its large capacity and its read-only nature. Since CD-ROM essentially consists of one long linear medium, it stores data only sequentially, even though it permits random access. In addition, files vary in length and playback requirements. For example, digital images require much more storage space than text. One type of medium may play in a "static" mode at the same time as another must play in "dynamic" mode, such as an image displayed on the screen accompanied by audio (music and/or narration) or text accompanied by graphics and audio. Any compression of motion video must take into account the CD-ROM drive's limitation of 150 kilobyte-per-second data transfer rate. This averages out to 5K per frame.

Multimedia - An Extension of the Television or of the Computer?

We shall address issues related to the various media in their respective chapters. We now want to take a brief look at the various approaches to delivering multimedia. The first method views multimedia primarily as an extension of the television (CDTV and CD-I). The second approach regards it as an extension of the computer. Manufacturers who favor the first strategy target the consumer market while those who prefer the latter aim primarily at the business and commercial sectors.

Commodore's CDTV

Commodore introduced its CDTV (Commodore Dynamic Total Vision) Interactive Multimedia player in April, 1991. It emerged as the first consumer interactive multimedia player, able to run a new generation of compact disc-based applications. A blend of CD-ROM and Motorola 68000 and Amiga multimedia technology form the core of CDTV.

The CDTV player resembles a conventional audio compact disc player. It connects to a television set and home audio system to become an interactive education, information, and entertainment center for the living room. A simple hand-held infrared remote control provides access to an entire library of multimedia titles.

Specifications

Its memory includes 1 Mb chip RAM, 2 K non-volatile RAM reserved for the system (clock, prefs, etc.), and 512 K ROM.

The video display consists of 400 lines/vertical frequency 60 Hz (NTSC), a maximum 1 Mb video memory (chip memory), and a palette for 4096 colors.

Its text modes support 80 characters/25 lines, 60 characters/25 lines, and various font sizes and typefaces.

The CD-ROM drive consists of a Sony/Philips type capable of operating under CD-ROM standard mode 1 and mode 2. CD-Audio supports 8-times oversampling.

Front panel controls include: power on/off, headphone volume up/down, play/pause, stop, forward/reverse - scan/skip, CDTV, and reset.

Planned accessories include: an external floppy disk drive, trackball (infrared), joystick (infrared), MIDI in/out, a personal RAM or ROM card, genlock, keyboard, two player IR interface, a modem, and a printer. Bookshelf audio speakers will enable consumers to adapt the CDTV player for various applications.

Compact Disc Interactive (CD-I)

When we consider CD-ROM, we usually envision a disc player connected to a computer (PC or MAC). CD-I (Compact Disc Interactive), on the other hand, consists of a computer inside a CD player. The computer in the CD player contains a megabyte of memory and a real-time operating system (CD-RTOS). To use the device, one need only hook it up to a TV set.

CD-I, introduced in October, 1991, basically extends CD-ROM, just as CD-

ROM extends Compact Disc-Digital Audio (CD-DA). CD-I resembles CD-ROM from a technical point of view but CD-DA from the player/product point of view in that it's designed for "plug and play" environments.

Like CD-DA, CD-I is interchangeable with other CD-I systems and backwardly compatible with CD-DA and CD-ROM (i.e. CD-I players also play CD-DA and CD-ROM discs). In addition, the discs are self-contained, meaning that they do not presuppose any other hardware or peripherals other than the CD-I player and a TV. Manufacturers also envision it as building upon existing products in the consumer electronics market. This means that CD-I players would interface with present and future TV sets, video, and HiFi systems.

Because many applications for the consumer market require real-time activity, CD-I incorporates a microprocessor (the Motorola 68000 which also runs the CDTV) and an operating system called the Compact Disc Real Time Operating System (CD-RTOS). This operating system
1. provides multi-tasking capabilities with real-time response,
2. has a versatile modular design and can be loaded into ROM,
3. supports a variety of arithmetic and I/O co-processors,
4. is independent of the playback device,
5. can handle multi-level tree-structured disc directories, and
6. supports both byte-addressable random access files and real-time files.

Because of the presence of the operating software (operating system and applications) on the disc, CD-I is not a peripheral like CD-ROM but rather a self-contained system like CD-DA. It is similar to having a computer on a disc. However, the incompatibility resulting from the proliferation of computer operating systems, file formats, etc. which remain a fact of life in the computer world will not affect CD-I because the designers specified that the software and hardware must ensure compatibility, upgradability, and extendibility. This means that all discs which comply with the standards will play on all present and future products based on these standards.

In addition to CDTV and CD-I, we have several other types of TV-based systems. Game producers like Nintendo, Sega, and TurboGrafx have begun producing their games on compact disc to take advantage of the medium's capability for superior sound and its ability to store large files that color graphics of 16-bits or better require. Microsoft hedged its options by releasing Microsoft Modular Windows, in December, 1992, which it proposes as an operating system for devices that use television as a display. The drawback with most of these systems is that the manufacturers use proprietary formats for producing their discs. Consequently, the systems require a special player that can only play a particular type of disc, making it impossible to play products produced by another manufacturer and limiting the consumer's flexibility.

PC-based Multimedia

While some manufacturers target the consumer market, others see the future of multimedia as an extension of the computer. The Apple Macintosh has always enjoyed a superior position in regard to multimedia applications. PC manufacturers and software developers want to put the PC on par with the Macintosh. They announced platforms such as the MPC, DVI, and Ultimedia operating under MS-DOS or Windows or OS/2. In addition, we have Sony's Data Discman for Electronic Books and NEC's Turbografx-CD which will concentrate on educational multimedia titles. We can also expect developments to extend to the VMS, UNIX, Atari, or Acorn platforms.

The variety of hardware platforms and operating environments introduce incompatibilities which result in consumer confusion and market fragmentation. In addition, developers incur added costs to produce the same products across a variety of platforms. This all translates into higher prices.

MPC World Magazine recently commissioned Fairfield Research to study the market for MPCs in American households. Highlights from that research indicate that 69% of the people who either already own or will soon purchase a 386/486 machine are aware of Multimedia PC products; 16% of those who already own 386/486 PCs are very or extremely interested in upgrading to a Multimedia PC; and 26% of those who plan to purchase a 386/486 machine are very or extremely interested in purchasing a Multimedia PC.

Among those who have a high interest in upgrading to or purchasing a Multimedia PC, 72% overall show interest in the entertainment and education potential for their children and other family members. This proportion jumps to as high as 91% when young children reside in the household. And 71% want entertainment and educational products for themselves[1].

Interactive Multimedia Association's Efforts

In order to promote the development and use of interactive multimedia and to reduce the barriers to widespread application of this technology, several companies formed the Interactive Multimedia Association (IMA), a trade association based in Washington, D.C. and a subsidiary of the Software Publishers Association. Members include IBM, Apple, Sony, and Philips. Its main role focuses on bringing vendors together to discuss standards issues, and it aims to define and publish common interface specifications for multimedia platforms and applications. To that end, the IMA announced a broad-based plan which emphasizes the critical need for compatibility in multimedia technology and involves an open forum, sponsored by the IMA, for development and distribution of hardware and software specifications for multimedia systems. It also proposes to facilitate testing and validation of multimedia platforms and applications.

In connection with the compatibility studies, the IMA also announced that it will provide a series of "marks" for certification of various classes of multimedia platforms, assuring customers that the platform meets IMA specifications for interactive multimedia.

Products for the consumer market will come self-contained and rely solely on the optical disk as the publication medium. Products targeting the computer market should have more flexibility to interface with other types of hardware. Users should have the ability to access multimedia information regardless of the source: audio tape, CD-ROM drives, videodisc or videotape players, video cameras, or television.

In this study, we want to focus our attention on the multimedia PC. We shall examine the hardware requirements and compare them to other systems. We shall look at the issues involved in using the various media -- text, audio, graphics, and motion video -- and the corresponding tradeoffs. Since multimedia involves working with more than one medium, the creative process and the synergy will differ from using individual media separately; so we shall outline some of the principles to focus on in the creative process. Since multimedia computing is emerging as a new phenomenon, the problems involved in running it on a local area network present many challenges. We shall discuss these concerns and examine possible solutions. Finally, we shall attempt to peer into the future. However, given the rapid pace of change in the computer industry, the future will soon turn into the present and, even more rapidly, into the past.

1. *Report on the Consumer MPC Market*. San Francisco CA : MPC World, 1992