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ABSTRACT

This paper contains brief synopses of recent technical progress/projects in the field of advanced learning systems. This issue contains the following 12 items: (1) "Guest Editorial" (Sylvia Charp) concerning the need to provide better learning experiences for all students; (2) "Steps in Developing an Expert Systems Model," as implemented by Blue Cross; (3) "Graphics Update: New Boeing Program Represents Data in Stacked 3-D Images"; (4) "Chip Technology Update: The 486 Super Chip"; (5) "DIGITAL PAPER?"; (6) "What Kind of Testing for ETA and Vocational Training?"; (7) "Hypertext Update"; (8) "CD-ROM Review: Report on PC-SIG CD-ROM Volume 6"; (9) "Voice Recognition Systems Update"; (10) "Macintosh versus IBM"; (11) "Notes for a WORM Primer; and (12) "Quotable Quotes." A calendar of upcoming events is included. (KC)

CALS TECH BULLETIN #3

July 10, 1989

AN OCCASIONAL PUBLICATION OF
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QUOTE OF THE MONTH

The history of technology is that of human history in all the diversity. That is why specialist historians of technology hardly ever manage to grasp it entirely in their hands.

-Fernand Braudel
The Structures of Everyday Life

GUEST EDITORIAL

DR. SYLVIA CHARP

Dr. Sylvia Charp is Editor in Chief of TECHNOLOGICAL HORIZONS IN EDUCATION (THE Journal), in our opinion. a pre-eminent publication of information on educational and instructional technology for all professionals concerned with human resource development. The May issue was devoted to technological issues in the workplace. We thought the following editorial by Dr. Charp most relevant to our current concerns in ETA:

We are ceaselessly being warned that America's scientific and technological leadership is disappearing and that we are becoming less and less able to compete with the economics of Japan and the European Economic Community. Employers at large and small companies alike are showing mounting concern at the lack of skills possessed by high school graduates. In a December 1988 technical memorandum report, "Elementary and Secondary Education for Science and Engineering," issued by the Office of Technology Assessment, it is stated, "broader applications of basic skills in mathematics and science would benefit the entire U.S. workforce."

The work environment is complex and is becoming even more so. Many workers do not have the appropriate education to cope with it effectively. New developments in many technologies means a workforce with new skills, and the nature of work may be redefined. Automated assembly lines, networking, sophisticated software programs, etc. are expected to result in more productive workers but will require a better and different kind of educational preparation. Even the jobs requiring the least skill will need higher abilities in reading, mathematics and reasoning.

The number of manufacturing jobs traditionally filled by less-educated people is in steady decline. The factories of the future will employ more sophisticated technology and will require fewer but more highly skilled workers. The trend is already upward and is gaining momentum; its effect is to emphasize the development of "learning" skills. Careers and jobs requiring new skills are being generated faster than schools and universities can prepare students to fill them.

There is no simple answer. The problem cannot be solved by moving the responsibility from school authorities to the corporate boardroom, as has been suggested by some. What is needed is greater commitment and concentrated efforts toward better education at all levels -- federal, state and local, and public-business partnerships.

The emerging workforce must be educated at greater breadths and depths. To accomplish this will require a multiplicity of partnerships among parents, educators, business, industries and legislators. Among other things, the partnerships should press for the legislation and funding needed to achieve the necessary changes in our educational system. Learning opportunities must be provided at all levels of

education to ensure the development of the skills, attitudes and reasoning capabilities required in a technological society.

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STEPS IN DEVELOPING AN EXPERT SYSTEMS MODEL

If you are interested in developing an Expert System the following steps taken by BlueCross to build an "Expert System To Process Claims " can guide you :

- Evaluate expert-system development environment and determine hardware platforms.
- Interview nurses who review claims to determine what information they need to make decisions.
- Compile a computerized list of all diagnoses and medical procedures recognized by the medical profession and the insurance industry.
- Develop a knowledge base that incorporates all of the nurses' decision-making rules with diagnosis and medical-procedure codes.
- Set up procedures to download claims from the mainframe to the PC-based expert system, and vice-versa.
- Test the application with the users.
- Port the system to workstations to gain optimum performance.
- Use the system to prototype similar applications for other departments.

GRAPHICS UPDATE

NEW BOEING PROGRAM REPRESENTS DATA IN STACKED 3-D IMAGES

Boeing Computer Services has introduced Boeing Graph, a 64-color 3-D business graphics and charting program that can stack images from consolidated spreadsheet data and graphically represent them in 3-D. The $350 package displays 20 types of stacked 3-D images from 16 preset viewing angles, as well as 33 standard 3-D graphs and 16 two-dimensional types. The axes scales can be stretched or compressed by rotating and distorting images, dictating label size and location, and designating colors. With stacked 3-D graphs a user can display results from multiple pages of data at the same time from 3-D spreadsheets or consolidate 2-D spreadsheet products such as 1-2-3 in 3-D graphics form. Limited only by available hard disc space, the Data Manager part of Boeing Graph supports up to 15,000 rows, columns, and pages of 3-D information using a virtual-memory scheme. The package reads files in eight formats, including Lotus WKS and WK1, ASCII, DIF, 3DT, SYLK, and Boeing Calc. The program also prints graphs on supported printers to the maximum resolution the printer provides.

Boeing Graph requires an XT, AT, or compatible with MS-DOS 2.0 or higher; 512KB of RAM; at least 1.5 megabytes of hard disk storage; and an EGA. For further information, contact Boeing Computer Services, Box 24346, M/S 7W-01, Seattle, WA 98124, 800-551-0800.

CHIP TECHNOLOGY UPDATE

THE 486 SUPER CHIP

Mainframe on a desktop. Some are predicting that at the turn of the century we are likely to see a mainframe in a box the size of telephone if not in the telephone itself. But in either case the day of the mainframe at a work or job site is not far off. The first push in this direction is INTEL's 80486 microprocessor -- a kind of chip that acts as a computer's brain -- that will push computing power up three to fourfold. The chip will give a small desktop box the data-crunching clout of a room-sized, low-end mainframe computer (by early 1990).

Before this happens, however, some predict excitement in the workstation and minicomputer markets -- the first likely destinations for the "486." Its initial $1,500 price tag is too hefty for personal computers, costing $10,000 or less. By contrast, workstations and minicomputers range from $6,000 to $100,000. PCs will be next. Microprocessor prices drop as production increases, so the 486 chip should be affordable for desktop computers no later than early 1990.

This turbocharged chip will mean new levels of computing in ever smaller boxes. The real beauty of it could be invisible because the extra power might be tapped to make the computer simpler to use. The implications for the workplace and vocational training is that this could mean a PC with 3-D graphics and real-life images that one points to or responds to rather than the intimidating cryptic codes of today. It also could mean libraries of information at one's fingertips -- in seconds. A 486-based computer will be able to scan 200,000 chunks of information -- such as book pages -- in 15-20 seconds before fetching the requested data. It will mean computers that understand voice commands.

The new chip will make it possible for a desktop computer to scan the Encyclopedia Britannica -- its 29 volumes of 29,000-plus pages -- and pluck out the single bit of information you want in just two seconds.

How does that compare with past microprocessors:

- Intel's 80386, introduced in 1986 can read the same encyclopedia set in seven seconds.
- Intel's 80286, unveiled in 1984 and then put into IBM Corp.'s PC AT, took 45 seconds.
- Intel's 8088, which debuted in 1981 and hit the market in IBM's first personal computer, took a full five minutes.

The leap in speed, says Microsoft Corp. Chairman William Gates, means desktop computers "haven't run out of gas." To bolster this two months ago INTEL announced the : The i860 Chip !

The i860 chip is a one-million transistor microprocessor which has gained endorsements from IBM Corporation, American Telephone and Telegraph, Prime Computer, Ing. C. Olivetti, and Microsoft.

The i860 design, initially called the N-10, was described at a technical conference in New York in early March. The chip gets additional power because it incorporates graphics and number crunching components, once spread out on many chips, into a single piece of silicon.

At the same time Data General introduced a line of computers based on a similar chip, called the 88000, designed by another semiconductor maker, Motorola Inc.

Both new chips are examples of more powerful microprocessors based on a design approach known as reduced instruction set computing (RISC). RISC is a combination hardware and software strategy that simplifies the number of instructions that a computer executes and attempts to execute each instruction as quickly as possible.

The new approach to computer design, (IBM research during the 1970's), has already had a tremendous impact on the computer industry with most major companies either offering or planning to offer RISC

computers. It has also dramatically accelerated the switch from proprietary software systems to the Unix operating system.

The new chip design is also rapidly shifting the industry's growth from large and expensive mainframe and minicomputers to sleek desktop work stations. By using the RISC technology it is possible to put the processing power of a room-size computer into a small, inexpensive box. The size of a telephone answering machine.

The new computer design approach has touched off a performance battle known as a "MIPS war" in the industry, with different manufacturers announcing computers built on ever-faster chips on an almost monthly basis. MIPS (millions of instructions per second) is a rough measure of the performance of a computer. In January Digital Equipment introduced its first RISC computer (DECstation 3100). Capable of 14 MIPS, it is based on another RISC chip priced at $7,450 for Data Models.

In contrast, the new Data General computers which were introduced two months later are capable 17 MIPS. Prices start at $7,450. Other versions of the same computer offer as much as 40 MIPS and cost up to $94,000 for the fastest machine.

The fourth wave (of computing) has arrived and the dynamics of the industry are going to start to change very significantly. Much like the personal computer changed the industry in the early 1980's, this technology will change it more dramatically in the 1990's.

Sun Microsystems has designed its own RISC ship called SPARC. The company plans to introduce a new line of SPARC-based computers, designed to counter the new products.

IBM is also reported to be close to introducing a higher-performance version of the IBM PC/RT, IBM's RISC-based work station that grew out of the company's original research effort. The IBM approval of the i860 is significant because the chip is ideally suited to add graphics processing power to the company's PS/2 computers using the Micro Channel, a design for hooking together several different processors in one desktop PC.

It is still unclear whether the new Intel chip will have a dramatic speed advantage over its competitors but it does appear that the i860 will have a dramatic price advantage over its competitors, perhaps costing less than half as much given previous track records.

The important implication for Workforce 2000 and use of technology in the workplace and training environments, however, is that computer designers are working to erase the remaining distinctions between large mainframe computers and desktop systems. While microprocessor-based systems have matched mainframe computers in pura processing speed, or MIPS, mainframes still lead in their ability to quickly move huge quantities of data. But, computer scientists who did pioneering research in RISC microprocessor designs are presenting papers detailing new strategies for using arrays of low-cost disk drives to match the data moving power of large mainframe computers. These are the serious and healthy implications for the future of ETA programs!

DIGITAL PAPER?

We have had CD-ROM and SOFSTRIP and LASER CARDS and now we have Digital Paper --- a new high density storage technology that we will be tracking in the CALS.

DIGITAL PAPER is a write once optical storage media--(WORM). Itdiffers however from traditional WORM devices in that it is flexible, can be produced in large sheets and reels and therefore it can be can be cut, stamped, and built into a variety of products such as floppy Bernouilli disks, tapes, and even credit cards.

The PROMISE is that digital paper will make for SMALLER and CHEAPER WORM drives --- as available as floppy disk drives are today.

Bosco is developing a product that combines Bernoulli technology with digital paper. The marriage of these two technologies is a natural one. It is a good example of synergy because the biggest advantage of digital paper, by far, is its mechanical flexibility. The technology allows us to use digital paper for flexible disks, a process that so far none of the competing technologies can imitate. By making digital paper into flexible disks. BOSCO is exploiting its existing Bernoulli expertise to produce a high-performance optical disk cartridge drive.

Although the Bernoulli drive may be of the greatest immediate interest to PC users, the first commercially available product based on digital paper will be a tape system designed by Creo Products, Inc., of Vancouver, British Columbia. One 12-inch reel of this 35-mm-wide digital paper tape can store 1 terabyte (1000 gigabytes) of data. To help you grasp how much storage this is: within 1 terabyte, you could store 1 billion typed sheets of paper, the contents of 1600 compact disks (remember that each compact disc carries as much information as1500 floppy discs or 250,000 pages of text), at a cost of around a half a cent per megabyte. This tape system is designed for mainframe applications where huge volumes need to be stored, such as in seismic data logging, satellite image-processing applications, and medical imaging and document archiving.

For you technical buffs the Creo 1003 Optical Tape Drive uses a small-computer-system interface (SCSI) and can sustain a data transfer rate of 3 megabytes per second. It takes an average of 28 seconds to select any single byte from a full 1-terabyte tape. The drive uses a novel method of recording, in which 32 LED laser recording heads scan across the width of the tape from left to right, then from right to left in discrete chunks, rather like the frames of a photographic film. Each "frame" or physical record is 32 bits wide by 20,000 bits and holds 80K bytes of data. The first drives are due to delivered in mid-1989 to the Canadian Department of National Defense and the Center for Remote Sensing.

WHAT KIND OF TESTING FOR ETA AND VOCATIONAL TRAINING?

Occasionally, a principle rooted in the heart of instructional systems technology is articulated by a layman non-technologist who has a lot of common sense. This point was brought home recently as we read an article on "Corporate Classrooms", by William Raspberry. (Washington Post.)

He pointed out that when we test and evaluate high risk students in a traditional training and education setting raises many questions with respect to validation. Raspberry, unlike many educators, was responding favorably to Lauren Resnick's research at the University of Pittsburgh. Over the years, Resnick worked closely with Omar Khayamm Moore, inventor of the responsive environment process and the talking typewriter. We think it's important here that we reprint excerpts from Raspberry's column.

> Some years ago, a group of minority students took a standard pencil-and-paper examination as part of their training at Temple University's medical school. Most scored below average on the exam.
>
> Then they were tested again - by the same professor, for the same knowledge - this time not in a classroom but in a hospital setting, using the tools that doctors use. Most scored well above average.

Lauren Resnick may not be familiar with the Temple experiment, but she would not be surprised by the results. It would simply underscore the point she hadbeen making: that the learning needed for success on school examinations and the learning needed for on-the-job success are different things.

> School learning, says this University of Pittsburgh scholar, is individual and relies heavily on symbol manipulation and "pure mentation," while learning on the job ivolves other people and relies on tools and objects in context.

Thus, neither law school admissions tests nor bar examinations (which do not allow the use of such lawyers' tools as reference books and collegial discussion) are very good predictors of success in the legal profession.

> Does Resnick's conclusion have implications for restructuring schools? She believes so. But unfortunately, from her point of view, the trend is the other way.

Most relevant to our concerns in ETA are the following comments:

> Hands-on experience, using the setting and the tools of the profession, was the norm when apprenticeships were the principal method of gaining professional competency. Now, she says, on-the-job training - in business, in the military, in the professions - looks more and more like school.

"Corporate America", it is estimated, spends at least $40 billion per year on education and training its employees, mostly for management functions," Resnick notes. "But when we examine the situation closely, we discover that in corporate education programs people typically go to classes, take tests, and proceed through a sequence of school-like activities."

> In short, business, for all its rhetoric about "corporate classrooms," typically does not use the work place itself as a learning environment for training professionals.
>
> What is needed, Resnick suggests, is a synthesis between the two approaches, for both school learning and work learning.
>
> "Ways must be found to reintroduce key elements of traditional apprenticeship in forms appropriate to modern work. Since the technological and social complexity of modern work sites often makes it impossible to observe and practice in the traditional ways, special forms of 'bridging apprenticeships' that use simulated work environments and specially designed social interactions may be beneficial."
>
> But thinking skills - the ability to manipulate abstractions as though they are realities - is vital, too.
>
> "Such education is essential to prepare people to function when breakdowns in the customary structure of activity occur. When breakdowns occur, people have to do exactly what machines cannot: step outside the system and reason about it. People using various mechanized and computerized systems need to be equipped to recognize breakdowns, to work around them temporarily, to repair them, and, ultimately, to design better systems."

But what would a school restructured to incorporate both scores of learning look like? Resnick thinks she may have gained a glimpse of the possibilities when she studied a number of school programs designed to teach so-called thinking skills.

> The most successful programs, she said, share three features. First, they involve socially shared intellectual work, "organized around joint accomplishment of tasks on meaning in the context of the whole." Second, like apprenticeships, they encourage student observation and commentary, allow skills to be built up bit by bit, and "make usually hidden processes overt."

And finally, "the most successful programs are organized around particular bodies of knowledge and interpretation - subject matters, if you will, rather than general abilities."

What our schools ought to be imparting, Resnick believes, is neither purely abstract knowledge nor training for particular jobs.

"School should focus its efforts on preparing people to be good adaptive learners, so that they can perform effectively when situations are unpredictable and task demands change."

HYPERTEXT UPDATE

OWL INTERNATIONAL recently announced IDEX a hypertext-based document-management software. IDEX combines high-speed hypertext browsing, database searching, and SGML-compatible structured document formatting. It is a complete document management system for text and graphics, with automatic conversion of existing documents to hypertext structures and page-layout specifications. IDEX makes it possible for work groups to efficiently organize and quickly access huge collections of tens of thousands of documents.

An extension of OWL's GUIDE, IDEX is designed for departmental work groups that use large-scale structured documentation, such as technical, administrative, regulatory, research, and educational organizations. Running under Microsoft Windows on the IBM PC/AT and and update massive amounts of information. Using separate templates (style sheets) for page printing and screen display, IDEX combines typeset-quality paper output with screen-based display, as well as freeform browsing and structured information retrieval, overcoming theweaknesses of each.

The program organizes information in a library of documents, rather than traditional files. Readers (users) start out in a shell document - - typically a menu of choices. The reader can then search for relevant documents, using personalized search templates (with predefined keywords, document type, etc.), or advanced readers can use standard Boolean-logic databasesearch techniques. Once in a document, the reader can quickly reach the desired information with HYPERTEXT browsing, clicking on highlighted text to explore linked chains of information.

Readers can use any of the standard Guide hypertext tools, including "replacements" (accessing a deeper level), "references" (branching to another document), "notes" (pop-up explanations), and "commands" (interfacing with other applications or controlling external devices). Authors can specify a "display template" (specifying document layout on the screen) for each "document type" (letter, manual, specification, etc.) Unlike WYSIWYG desktop publishing software, screen design is optimized for screen readability, using a "flow to fit" scheme (text wraps to fit the window rather than emulate a printed page).

Where printed documents are required, authors can also specify "page templates" (similar to style sheets) to predefine the position of page-layout elements, such as page numbers, headers, and designed for hierarchical numbered outlining (1.1.1, etc.),

Of importance to ETA'S technical documents, IDEX recognizes SGML "tags" (Standard Generalized Markup Language is an international standard for structured technical publications) making it possible for authors to automatically convert large existing documents (manuals, regulations, reports, technical specifications, etc.) into hypertext structures and page elements.

For example, an author can specify that an imported cross reference automatically becomes a hypertext link on the screen. For printing, tags can be converted into text and graphics elements, such as headings and typographic specifications.

Other authoring tools include a "glossary" function for global definitions (clicking on a specific definition button in any document pops up the same definition, such as an explanation of a technical term), "catalog

cards" (for organizing documents), and predefined hypertext structures (a skeletal set of buttons, text, and graphics at various levels for creating menus, etc.).

Documents can contain buttons that control external devices (such as a videodisc or modem) or that interface with other programs. IDEX also accepts graphics in vector and bitmap formats. Graphics are automatically scaled to fit the document window and automatically flow onto printed pages.

IDEX also includes advanced document management facilities, including the ability to specify security levels for individual readers and authors, design default document screen and page templates, assign document status (draft, published, etc.), and design "card catalogs" for classifying documents.

IDEX can import files from Guide 2.0. It works with all printers supported by Microsoft Windows 2.0, including PostScript printers, the Hewlet-Packard LaserJet series, etc. IDEX requires an IBM PC AT with 640k of RAM and is compatible with MS-Net-based network software.OWL International, Inc., 14218 NE 21 Street, Bellevue, WA 98007 (206) 747-3203, Fax (206) 641-9367.

CD-ROM REVIEW

REPORT ON PC-SIG CD-ROM Vol. 6

The newest version of the PC SIG Shareware Library on CDROM is truly a step forward. This CD boasts 1240 diskettes full of PC Shareware programs. These disks run the full gambit from game and educational programs to programming languages and templates for business and home use. The product allows you to copy any or all of these disks and use or distribute them.

All of the preceding volumes of this product have been valuable. Volume 6 has a two very new and useful features. The first feature is a program called Word Cruncher. Word Cruncher is a software program that allows the user to search quickly and efficiently the over 2 MB file that contains indexed information about all of the programs on the CD. You simply enter the sort of program you are looking for, like GAMES and Word Cruncher brings up a screen full of information on the location and description of programs that might interest you.

After you have uncovered your software treasures you may exit Word Cruncher into the second new feature on Volume 6. The Copy-Access program provides a much needed addition to the PC SIG CD. In the past a user needed to do a fair amount of MSDOS maneuvering to get a magnetic copy of the diskette desired. This often resulted in the need to unarc an archived diskette. Users were greeted with tomes of syntax not seamless transfer. The Copy -Access program soars away from mundane malaise of syntax and runs like a menu program. You identify the diskette you desire and it copies it for you. If the information needs to be unarced the program does it, the user need never know. If you are a DOS purist (and I know you lurk out there) the disk may still be accessed in the original fashion. It comes to the user in the MSDOS extensions format so that a DOS afficinado can address it just as any other disk device. The disk sells for $495 and can be purchased from PC-SIG INC., 1030D East Duane Ave., Sunnyvale CA 94086, or through the Software Express at Radio Shack stores.

PC-SIG also has another shareware product. The Personal Software Library is a collection of 350 diskettes full of software and sells for $179.

VOICE RECOGNITION SYSTEMS UPDATE

The Apple Macintosh (Mac) is making steady inroads into the workplace. Witness a new system which enables the machine to respond to oral commands. Witness the following scenario : The executive, supervisor or instructor/trainer stands at the front of the meeting room. "Regional sales," she says, and a spreadsheet appears on the projection screen. When she says "bar chart" the numbers are replaced with a graphical representation that resembles the Manhattan skyline. She is talking to her Apple Macintosh computer, which is connected to the projection system and to a voice recognition device. The Mac responds to her commands without her hands ever touching the keyboard or the mouse.

The device that allows the executive to operate the Macintosh computer from across the room -- or from a telephone booth halfway around the world, is called Voice Navigator. The $999 voice recognition system for the Mac was developed by Articulate Systems Inc. of Cambridge, Mass., (617)876-5236). It was one of several voice application products exhibited at the recent Macworld Expo in San Francisco.

Voice recognition has long been the stuff of science fiction or highly specialized business and military activities. But IT'S IMPORTANCE TO THE WORKPLACE OF THE FUTURE CANNOT BE OVERESTIMATED. Voice recognition products now appear to be emerging as a viable commercial application for desktop business computer systems.

A recent study by the International Data Corporation, a market research concern in Framingham, Mass., found that computer voice applications account for $610 million in annual sales, primarily in the field of digitized voice systems. The International Data analysts expect the market to grow 40 percent a year through 1992, driven by greater reliability of products, the availability of more powerful computers at lower cost and the increasing appreciation of what voice technologies can do for businesses.

The two biggest applications today are voice mail, which converts speech into digital code that can be stored and replayed by a computer, and computerized phone systems. No doubt you've already encountered the latter: "If you know the extension of the party you want to speak with, press that number now," such a system might say. "If you want to order tickets to the opera, press 2. If you want to be put in an indefinite loop without any chance to speak with a human, press 3."

The Macworld demonstrations showed that two other computer voice applications--recognition and synthesis--appear near to breakthroughs in price and performance. Like most speech recognition systems, Articulate Systems' Voice Navigator has to be trained to recognize its master's voice. The user is provided with a list of the most common Macintosh commands, and each command is pronounced into a microphone. The entire device is small enough to fit under a standard Macintosh. The voice can be in any language, with any accent, providing that the individual speaker is consistent. (The implications of speech recognition for Japanese, whose Kanji characters are generally considered too cumbersome for keyboard entry, appear to be significant.) The speaker is urged to pronounce each command three times with different inflections.

Although the device is rated as having a vocabulary of 200 words, in practice its vocabulary is far larger, since at each level of command it can handle a new 200-word vocabulary. Most users will find they need far fewer words to use the program in the course of a day. Voice appears to have another important application in computer-aided design or paint programs, which require the user to reach constantly for special tools on the periphery of the screen. With Voice Navigator the user can simply ask for tools or actions. It is easier, faster and more productive.

The company is developing a device that combines Voice Navigator with both modem and facsimile capabilities. With such a device a traveling executive could call his computer from a phone booth, enter data in a spreadsheet, then call up a document and order it to be faxed to his hotel or to a client in another city, all by remote voice control.

In another booth at the Macworld Expo, Marc Sutton, a systems engineer, sat with a keyboard on his lap. As he moved the cursor keys a synthesized voice from within the computer pronounced each word, number, command and icon that he highlighted. Although Mr. Sutton is blind, he moved the pointer around the screen with almost the ease of a sighted operator using a mouse. Instead of viewing the commands on menu bars, pop-down menus, dialog boxes and icons, he heard the computer speak them. The voice would never be confused with Richard Burton's, but to a practiced ear the words were clear. "Re-jun-al sales," the Mac's metallic voice said. "Memo from New York office..." Mr. Sutton was using a prototype of a $395 utility program called Outspoken (Berkeley Systems Inc. Calif., 415-540-5535). Outspoken takes advantage of the Macintosh's built-in Macintalk speech synthesis capability to aid blind or visually impaired users.

Several programs in the character-based IBM PC world translate text int verbal or audio cues. One of the best is Flipper ($325 from Omnichron of Berkeley, Calif., 415-540-6455). But Outspoken appears to be

the first to be able to read the graphic-based Macintosh system. Some blind executives who depend on speech synthesis have found the Mac to be impractical because of its previously unreadable windows, icons and other non-text symbols. Some argue that character-based PCs will always be easier and more productive for blind users.

Mac VS IBM

Some feel that the Mac's common graphical interface was actually better suited for the needs of blind people than the DOS interface used by most computers. They maintain that the advantage of using speech with a Mac is that if you learn one program, you pretty much know how to use all the others. On other computers, by contrast, each new program might have a different and unfamiliar command structure. But since the IBM world is moving toward Presentation Manager, a graphic-based interface similar to the Mac's, Outspoken's technology will be increasingly important.

These trends in voice technology are not only significant for the future workplace but most certainly for efforts to use the emerging technologies to assist in the training and education of the highly disadvantaged and functionally illiterate worker.
(Ref: Peter H. Lewis, New York Times/February 5, 1989)

INCIDENTALLY OR NOT NECESSARILY TRIVIA

NOTES FOR A WORM PRIMER

On one 5-1/4" WORM disk (Write Once Read Many [times]) it is possible to store 200 to 400 million characters or about 5,000 pages.

Information on the disks is stored in image form and a typical page takes about 40 to 50 thousand characters of storage, or more than 10 times the storage needed for a page of text. By storing information in image form it will be possible to convert far greater amounts of information to electronic storage in digital images. Image processing is the current breakthrough in advanced office technology and it promises major impacts on office operations and personnel, such as providing for paperless storage of documents and electronic document filing and retrieval.

QUOTABLE QUOTES

> We had pleased ourselves with the delectable visions of the spiritualization of labor. . . Each stroke of the hoe was to uncover some aromatic root of wisdom. . . But. . . the clods of earth, which we so constantly belabored and turned over and over, were never etherealized into thought. Our thoughts, on the contrary, were fast becoming cloddish. Our labor symbolized nothing and left us mentally sluggish in the dusk of the evening.
>
> -Nathaniel Hawthorne
> The Blithedale Romance

Without a doubt, the part of mankind which has advanced intellectually is quite under the spell of technology. Its charms are twofold. On the one hand, there is the enticement of increasingly comfortable living standards; on the other, there is a reduction in the amount of work which is necessary to do. . . The irresistible pull toward technological development . . is caused, we should remember, by the unconscious and deep-rooted desire to free ourselves from the material oppression of the material world.

-Folkert Wilken
The Liberation of Capital

What defines humanity is not the capacity to create a second nature--economic, social, or cultural -- beyond biological nature; it is rather the capacity of going beyond created structures in order to create others.

-Maurice Merleau-Ponty
The Structure of Behavior

CALENDAR

May 31-Jun 3, International Television Association, San Francisco, CA. ITVA, 214-869-1112.

Jun 1, Introduction Workshop on Interactive Video, London UK. National Interactive Video Centre, 01/387-2233 (UK) or fax 01/387-5373.

Jun 4-6, Interactive Healthcare 89, Alexandria, VA. Stewart Publishing and the Medical Disc Reporter Videodisc Consortium, 703-354-8155.

Jun 5-6, Interactive Videodisc Applications and Training Seminar, Boston MA. 3M, IBM, and Michael DeBloois, 800/533-3907 or 801/752-7700(info) or 612/733-6334(register).

Jun 5-8, Association for Information and Image Management (AIIM) Show and Conference, Moscone Center. Contact: Association for Information and Image Management, AIIM '89, 1100 Wayne Ave., Suite 1100, Silver Spring, MD 20910, (301) 487-8202 and ask for "conference hotline."

Jun 5-9, Interactive Video 1/Producing Videodiscs, Hollywood, CA.Sony Video Institute, 213-462-1987.

Jun 5-9, Lasertex Worktools, Lancaster PA. American Helix, 717/392-7840.

Jun 6-8, Anaheim, Calif. Computer Aided Facility Management (CAFM) Conference '89, Anaheim Marriott Hotel. Contact: Nancy G. Minni, Director of Education and Research Internation Facility Management Association, 11 Greenway Plaza, Ste. 1410, Houston, TX 77046, (713) 523-4362.

Jun 6-8, Presentation Expo, New York NY. Knowledge Industry Publications, 914/328-9157, fax 914/328-9093.

Jun 7, IBM InfoWindow Application Workshop, Atlanta GA. IBM Corporation, 404/988-2285.

Jun 8-10, Brooklyn, N.Y. Conference on Computing Across the Curriculum, St. Francis College Contact: Marlin Thomas, Director of Academic Computing, Conference, St. Francis College, 180 Remsen St., Brooklyn, NY 11201, (718) 522-2300.

Jun 9-11, San Jose, Calif. 1989 National Computer Graphics Association (NCGA) Arts Conference, San Jose State University. Contact: National Computer Graphics Association, 1989 NCGA Arts Conference, 2722 Merrilee Drive, Suite 200, Fairfax, VA 22031, (703) 698-9600.

Jun 9-10, Australian Optical Disc Conference, Melbourne. RMIT Libraries, 613/663-3440 (in Australia).

Jun 12-14, 1989, Interactive Video 2/Program Design, Hollywood, CA.Sony Video Institute, 213-462-1987.

Jun 12-16, 1989, Los Angeles, Calif. Video Expo 89, Los Angeles Convention Center. Contact: Knowledge Industry Publications, 701 Westchester Avenue, White Plains, NY 10604, 800-248-5474.

Jun 12-16, Video Expo, Los Angeles CA. Knowledge Industry Publications, 800/248-5474 or 914/328-9157.

Jun 13-15, 1989, Information Technology In Government, London, England. Blenheim Online, 01-858-4466 (UK).

Jun 15-17, Interactive Video 3/Authoring, Hollywood CA. Sony Video Institute, 213/462-1987.

Jun 19-17, Services 89: Building Mass Markets/A Business Development Forum, San Francisco CA. Videotex Industry Association, 703/522-0883.

Jun 20-21, Long Beach, Calif. Second Annual Tooling For Composites '89 Conference and Tabletop Exhibits, Hyatt Regency, Contact; Carol Anderson, Tooling Conference, Society of Manufacturing Engineers (SME), (3133) 271-1500, Ext. 294.

Jun 20-22, New York, N.Y. Second Annual National CASEcon running concurrently with the Seventh Annual PCEXPO, Jacob Javits Convention Center. Contact; H.A. Bruno, Inc., CASEcon/PC EXPO, 333 Sylvan Ave., Englewood Cliffs, NJ 07632, (800)922-0324 or in N.J. (201) 569-8544.

Jun 20-22, Boston, Mass. 1989 National Educational Computing Conference (NECC '89), Hynes Auditorium. Contact: NECC '89, International Council for Computers in Education, University of Oregon, 1787 Agate St., Eugene, or 97403-9905.

Jun 20-22, Gaithersburg, Md. COMPASS '89 Conference, National Institute of Standards and Technologies. Contact: Nettie Quartana, COMPASS '89, 2100 Washington Blvd., Arlington, VA 22204-5704, (703) 486-3500.

Jun 20-22, Communications 89, New York NY. International Communications Industries Association, 703/273-7200.

Jun 20-23, mplementing CD-ROM Technology, San Jose, CA. Knowledge Based Systems Inc., 703/481-3800.

Jun 25-29, Las Vegas, Nev. 26th Design Automation Conference, Las Vegas Convention Center. Contact: DAC Registration, 7490 Clubhouse Road #102, Boulder, CO 80301, (303) 530-4333.

June 25-29, 1989, Lincoln, Neb. Videodisc Design Workshop (intermediate), Nebraska Telecommunications Center. Contact: Nebraska Videodisc Design/Production Group, PO Box 83111, Lincoln, NE 68501, 402-472-3611.

Jun 26-29, Cambridge, Mass. Mathematics, Science and Technology in Education Summer Institute, "Issues in Elementary and Middle School Science Teaching," Lesley College. Contact: Amy Navin, Summer Institutes, Lesley College, 29 Everett St., Cambridge, MA 02138-2790, (617) 868-9600, Ext. 294.

Jun 29-Jul 1, Couer d'Alene, Idaho. Fifth Annual SPOCAD Conference & Exposition (SPOCADE V), The Couer d'Alene on the Lake. Contact: Rita Huebaschman, SPOCADE V. SPOCAD, East 502 Boone Ave., Spokane, WA 99258, (509) 484-6812.

Jul 6-8, Eugene, Ore. Technology in Education Conference, "Expanding Teacher Effectiveness," Eugene Conference Center/Hilton Hotel Complex. Contact: Terry Kneen, CATE, 1787 Agate St., Eugene, OR 97403.

Jul 9-15, Eugene, Ore. Leadership Development Summer Workshop, Eugene Conference Center/Hilton Hotel Complex. Contact: International Council for Computers in Education (ICCE), Summer Workshops, University of Oregon, 1787 Agate St., Eugene, OR 97403, (503) 686-4414.

Jul 11-12, Interactive Videodisc Applications and Training Seminar, Orlando, FL. 3M, IBM, and Michael DeBloois, 800/533-3907 or 801/752-7700.

Jul 11-13 Los Angeles, Calif. First Annual Desktop Presentation Graphics (DPG) Conference and Exposition, Los Angeles Convention Center. Contact: Jerry Goldsmith, DPG Conference, Cambridge Marketing, Inc., One Forbes Road, Lexington, MA 02173, (617) 860-7128.

Jul 11-14, Storrs, Conn. Sixth Annual Conference of Connecticut Special Education Network for Special Education (ConnSENSE '89), BishopCenter, Univ of Connecticut. Contact: Chauncy Rucker, ConnSENSE '89, Univ of Connecticut Special Education Center Technology Lab, 249 Glenbrook Road, U-64, Storrs, CT 06268, (203) 486-4031.

Jul 16-22, Eugene, Ore. Logo for Leaders Summer Workshop, "Beyond Turtle Graphics," Eugene Conference Center/Hilton Hotel Complex. Contact: International Council for Computer in Education (ICCE), Summer Workshops, University of Oregon, 1787 Agate St., Eugene, OR 96403, (503) 686-4414.

Jul 17-21, Cambridge, Mass. Mathematics, Science and Technology in Education Summer Institute, "Using Numbers: Statistics Activities for the Elementary Grades," Lesley College. Contact: Amy Navin, Summer Institutes, Lesley College, 29 Everet St., Cambridge, MA 02138-2790, (617) 868-9600, Ext. 294.

Jul 17-21, Chicago, Ill. Video Expo '89, Chicago Expo Center. Contact: Knowledge Industry Publications, 701 Westchester Ave., White Plains, NY 10604. (800) 248-5474.

Jul 18-21, Blacksburg, Va. National University Teleconference Network (NUTN) Summer Workshop, Virginia Tech University. Contact: National University Teleconference Network Central Office at (405) 744-5191.

Jul 19-21, Research Triangle Park, N.C. Fifth International Forum on Micro-Based CAD, "Productivity for the '90s," Sheraton Imperial Hotel & Towers. Contact: Thelma Hunter, CAD Forum, North Carolina State University, P.O. Box 7401, Raleigh, NC 27695-7401, (919) 737-2261.

Jul 24-27, Austin, Texas. 1989 Society for Computer Simulation (SCS) Summer Computer Simulation Conference, Stouffer Hotel, Contact: Office of the Society for Computer Simulation, Summer Conference '89, P.O. Box 17900, San Diego, CA 92117, (619) 277-3888.

Jul 24-28, Cambridge, Mass. Mathematics, Science and Technology in Education Summer Institute, "Teaching Critical Thinking in the Mathematics Classroom," Lesley College. Contact: Amy Navin, Summer Institutes, Lesley College, 29 Everett St., Cambridge, MA 02138-29790, (617) 868-9600, Ext. 294.

Jul 24-27, CD-ROM Strategies Workshop, Boston MA. Database Technology, 714/733-3378.

Jul 25-26, Interactive Videodisc Applications and Training Seminar, San Francisco CA. see July 11, above.

Jul 25-27, San Francisco, Calif. Third Annual Conference & Exposition on Optical Drive and Media Manufacturing, Hyatt Regency Burlingame at the San rancisco International Airport. Contact: Rothchild Consultants, 256 Laguna Honda Blvd., San Francisco, CA 94116-1496, (415) 681-3700.

Jul 27, Introduction Workshop on interactive Video, London UK. National Interactive Video Centre, 01/387-2233.

Jul 31-Aug 4, Cambridge, Mass. Mathematics, Science and Technology in Education Summer Institute, "Reasoning Under Uncertainty: Activities for teaching Statistics in the Middle Grades," Lesley College Contact: Amy Navin. Summer Institutes, Lesley College, 29 Everett St., Cambridge. MA 02138-2790, (617) 868-9600, Ext. 294.

Aug 10-13, MACWorld Expo, Boston, MA. Mitch Hall and Associates, 617/329-7469.

Aug 14-19, Association for Multi-Image, Dallas TX. AMI, 813/932-1692.

Aug 20-23, Sixth Symposium: American Veterinary Computer Society, Guelph ONT Canada. University of Guelph/Ontario Veterinary College, 519/823-8800, fax 519/767-1101.

Aug 23-25, Arlington, Va. 11th Conference and Exhibition on Interactive Videodisc in Education and Training, Crystal Gateway Marriott. Contact: Society for Applied Learning Technology 50 Culpeper St., Warrenton, VA 22186, (703) 347-055.

Aug 28-31, CD-ROM Strategies Workshop, Washington, DC. Database Technology, 714/733-3378.

Sep 6-8, Optical Information Systems 89, Arlington, VA. Meckler Publishing. Sponsored and managed by Meckler Corporation, 11 Ferry Lane West, Westport, CT 06880, 203/226-6967.

Sep 7, Introduction Workshop on Interactive Video, London UK. National Interactive Video Centre, 01/387-2233.

Sep 10-13,Information Industry Association Annual Meeting, New York NY. IIA, 202/639-8262.

Sep 12-13, Interactive Videodisc Applications and Training Seminar, Philadelphia PA. 3M, IBM, and Michael DeBloois,801/752-7700.

Sep 18-20, Data Storage 89, Fairmont Hotel. San Jose, CA. Disk/Trend, Inc. and Freeman Associates, Inc. Conference Management: Cartlidge and Associates, Inc., 3097 Moorepark Ave., Suite 202, San Jose, CA 95128, 408/554-6644.

Sep 20-22, Essentials of Interactive ideo, London UK. National Interactive Video Centre, 01/387-2233.

Sep 24-28, Videodisc Design/Production Workshop, Lincoln NE. Contact: Nebraska Videodisc Design/Production Group, P.O. Box 83111, Lincoln, NE 68501, (402) 472-3611.

Sep 25-29, Video Expo '89, Jacob K. Javits Convention Center. New York, N.Y. Contact: Knowledge Industry Publications, 7 01 Westchester Ave., White Plains, Ny 10604, (800) 248-5474.

Sep 25-28, CD-ROM Strategies Workshop, Chicago, IL. Database Technology, 714/733-3378.

Sep 26-28, International Symposium on Optical Memory, Kobe, Japan ISOM 89 Secretariat, 81-3/817-5831, fax 81-3/817-5836 (Japan).

Sep 29-Oct 6, Tokyo, Japan. International Study Mission to Tour Optical Disc Drive and Media Manufacturing Sites in Japan; tour begins in Tokyo. Contact: Rothchild Consultants, 256 Laguna Honda Blvd., San Francisco, CA 94116, (415) 681-3700.