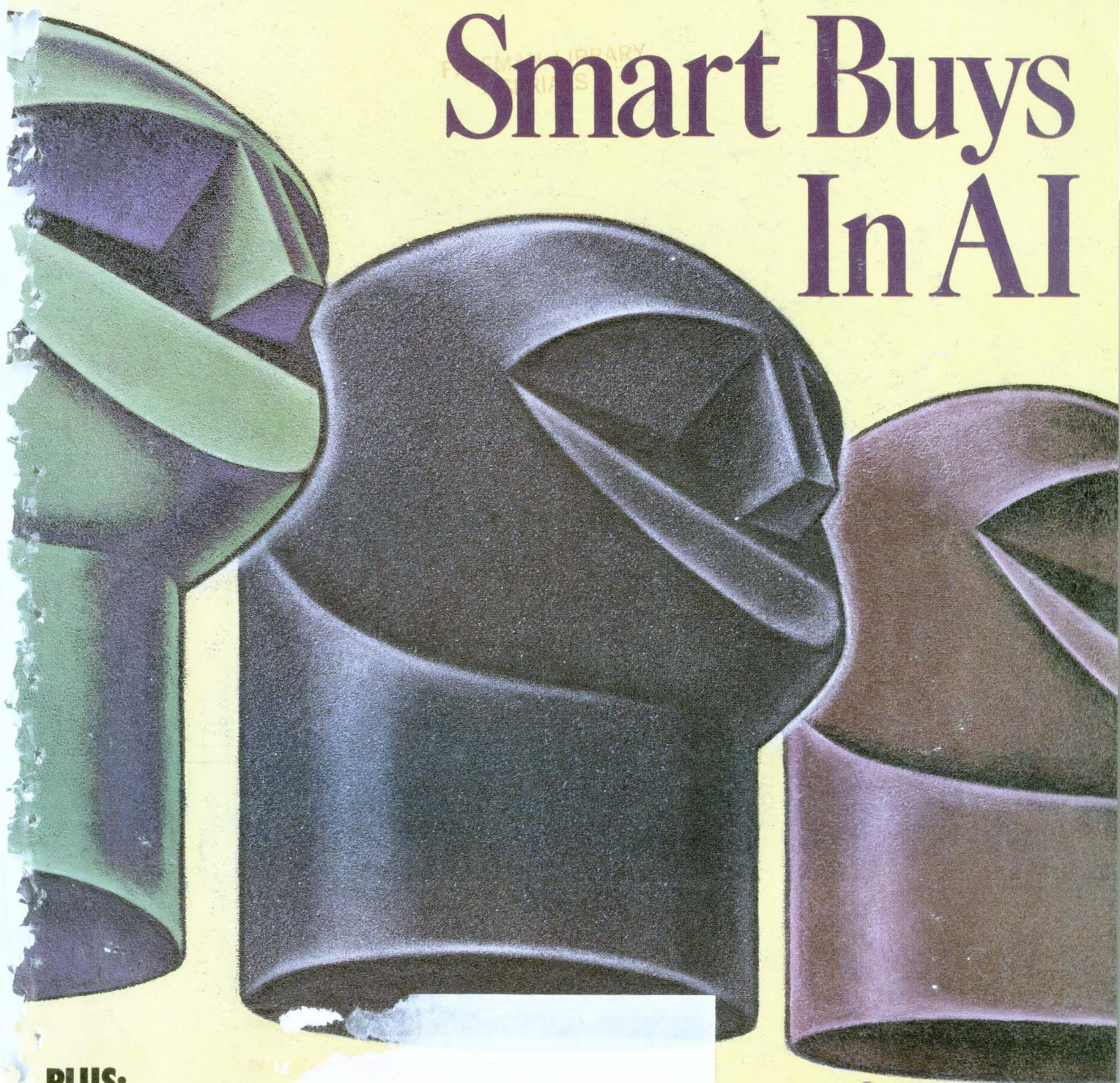


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Smart Buys In AI



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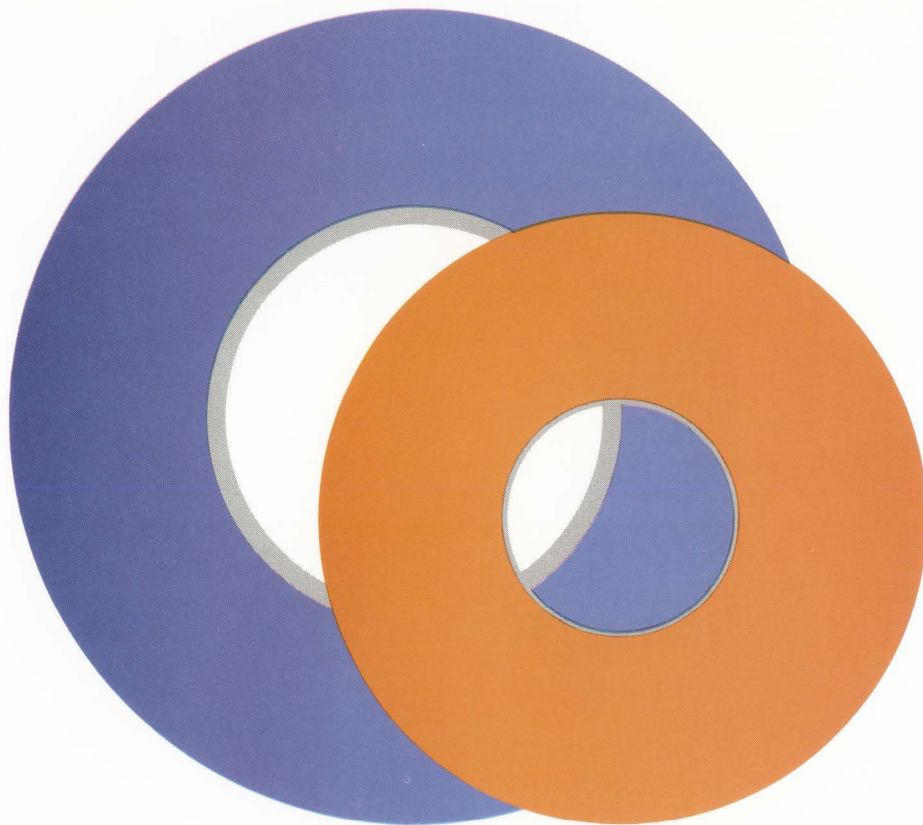
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THE EUROPEAN 25: HOT COMPANIES IN A HOT MARKET

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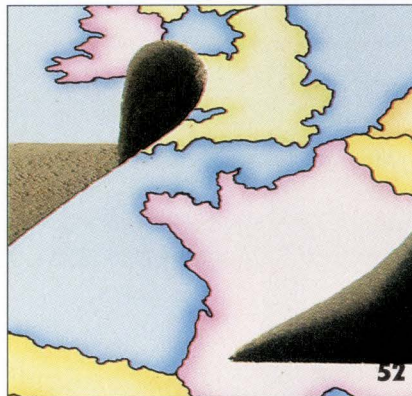
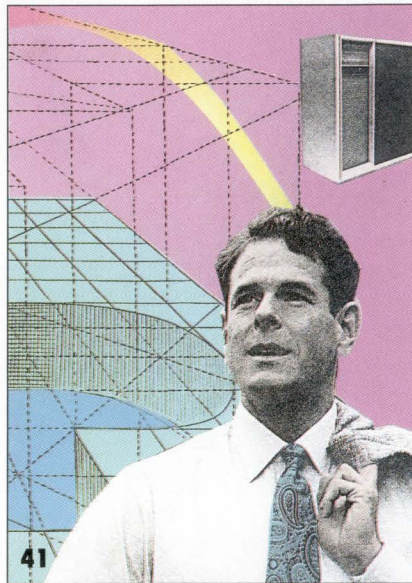
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NCR and MCC announce an AI product.

41 **Behind the News**

It had been thought that by now the industry would be talking about minicomputers only while passing exhibits of them in museums of ancient computer history. Gary McWilliams reports that the news of their demise was greatly exaggerated, and asks what lies ahead for "The Mini at Middle Age: Just a Future Niche Role?"

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BY SARAH UNDERWOOD AND PAUL TATE

The top 25 dp companies in Europe had combined revenues of \$44.5 billion last year, a 29% increase over 1985. The European data processing market—valued at over \$70 billion—excited the interest of U.S. dp companies. Strong demand—and the weak dollar—provided fertile ground on which to boost sagging state-side revenues. Europe's computer companies maintained growth. IBM was champ again, but stumbled in major markets.

62 **Smart Buys in Artificial Intelligence**

BY PAUL HARMON

MIS managers can now choose among any number of AI wares—from small expert system shells to large expert system building tools. Not one of them, however, is a tool to advise on how to buy AI. That knack can be acquired by studying four strategies fashioned by companies that use AI successfully.

71 **Six Steps to AI-Based Functional Prototyping**

BY RANDY WEISMAN

When Arthur Andersen & Co. set about developing a mainframe-based oil and gas accounting system, the accounting firm saw it as a prime candidate for AI-based functional prototyping. Described here is the development process integrating the use of this technique.

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Does not appear in all copies.

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GATT has opened negotiations to set rules on international services trade, including telecom. What worries many major telecom players and some users is that the process will bypass, and threaten, the existing regulatory structure.
- 12 **Cashing In on the Currency Game**
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The weakened dollar has presented leasing companies with the opportunity to buy IBM equipment in the U.S., then offer the machines to European and Japanese customers at very competitive prices.

Cover Illustration by Douglas Fraser

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Editorial

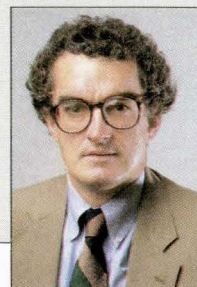
Year of the Customer

This is indeed the year of the customer in the information technology industry. End-user companies large and small are having more say in the direction of their suppliers of systems and software than ever before. They have gone beyond merely asking for solutions to their complex business problems; they are demanding answers—today.

It's no surprise then that the DATAMATION staff devotes more and more of its reporting efforts finding out exactly what customers want—need, really—from their strategic suppliers. Here, for example, are some of the customers with whom our correspondents in Boston, San Jose, and Los Angeles touched base in the course of their travels for this issue:

- Chevron Corp., Dow Chemical, Hughes Aircraft, and Syntex all were more than willing to share their thoughts about IBM's NetView SNA management products with San Jose-based Susan Kerr, who specializes in communications. In fact, Chevron's general manager William Houghton told Kerr, "If promises meet expectations, this could be a best-seller."
- The Bank of New England and the Texas Commerce Bank discussed their impressions of IBM's SolutionPac strategy with Jeff Moad, our San Jose bureau manager. Moad's impressions are that Big Blue's attempt to offer vertical software, service, and support hasn't had much of an impact—in banking or anywhere else.
- AT&T, Citizens Fidelity Bank, and Owens Corning Fiberglas Corp. explained to our man in Los Angeles, Tom McCusker, why they are investing in software tools to measure their existing computers' performance.
- The Bank of Boston, Guardian Industries, and Life of Virginia all had something to say to Boston bureau manager Gary McWilliams about the future of minicomputers, the subject of our Behind the News section. Situated in Newton, Mass., McWilliams is in a perfect position to have tackled the assignment—the headquarters of many of the leading minicomputer vendors (Digital Equipment Corp., Wang, Data General, and Prime) are within a short drive of his office.

That's not to say we ignore suppliers these days. Our bureau reports, as well as international editor Paul Tate's DATAMATION European 25 feature, are based on numerous interviews with executives from top vendors such as Digital, IBM, and Uccel (now part of Computer Associates). We feel quite comfortable bridging the gap between customers and suppliers—especially this year. After all, that's our job.



Tim Mead

TIM MEAD
EDITOR-IN-CHIEF



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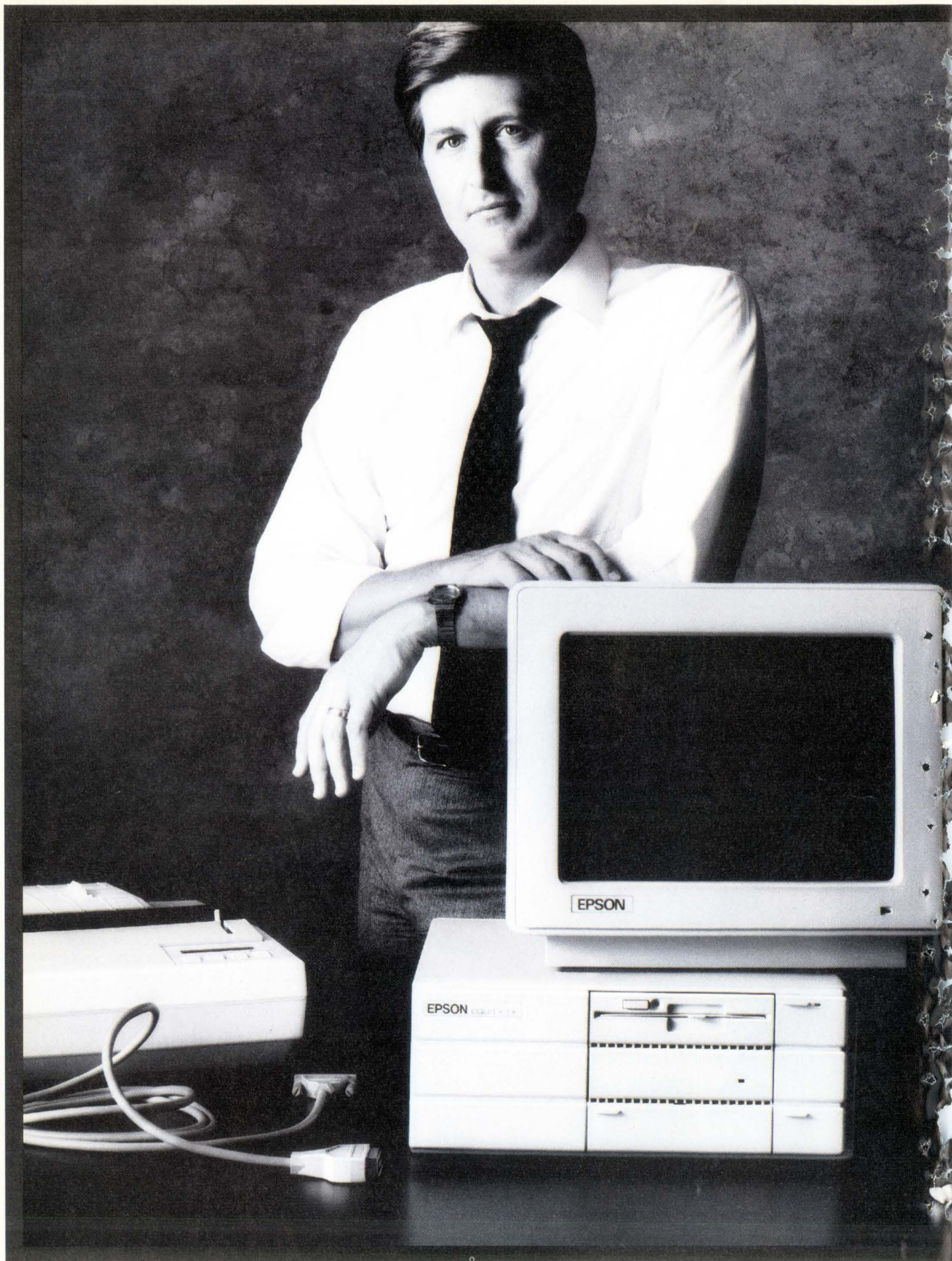
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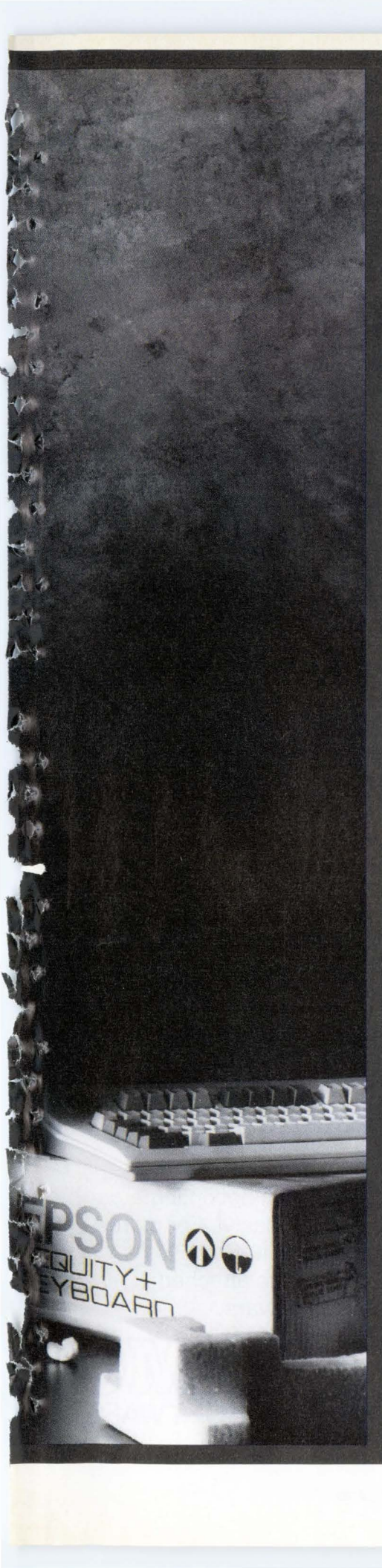
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Look Ahead

IMS BREAKDOWN IN AUSTRALIA

SYDNEY -- IBM is desperately reviewing version 2.2 of IMS after a massive network failure at the Westpac Bank, one of Big Blue's Australian test sites for the system. Though both the bank and IBM are refusing to comment in detail, the ATM and branch network apparently collapsed because of the large volume of traffic hitting the IMS system. Even though IBM set up an on-line support link between the bank's Sydney dp center and its U.S. development labs to solve the problem, the level of customer fraud soon ran into millions of dollars and the bank had to close down parts of the net. Westpac has replaced the 2.2 software with the old IMS version 1.1. Westpac's general manager Reg Hornsby describes the crash as the worst electronic banking crisis in the bank's history.

VENDORS FIGHT IT OUT FOR CHINA PACT

BEIJING -- Sources within one of China's government departments reveal that Unisys, Hitachi, IBM, Siemens, and other Western suppliers are already battling to win a major strategic deal to set up China's first joint venture mainframe assembly plant. The plant, part of the nation's five-year plan to improve its dp industry, will probably be run by the newly formed Chinese Computer Development Corp. and it is expected to become one of the primary sources of mainframe systems for the Chinese industry over the next decade.

CENTRALIZED TO DISTRIBUTED

CLEVELAND -- Sohio, a subsidiary of Standard Oil Co., has replaced its centralized data processing facility with a distributed system consisting of 92 minis and micros. Sohio information systems manager Donald Feldman says IBM systems were replaced largely with Digital Equipment Corp., Prime Computer Inc., Tandem Computers Inc., and Hewlett-Packard Co. systems networked using DECnet and Baton Rouge, La.-based Communications Research Group's Blast networking software.

NISSAN'S VAN, AND WE DON'T MEAN A TRUCK

TOKYO -- This month, Japanese auto giant Nissan will start operating a value-added network (VAN) connecting its dealers as part of a drive to get into the local VAN business. This is one of the latest moves by a traditional Japanese manufacturer to diversify into high tech in an attempt to alleviate the pressure on profits caused by the appreciating yen. It follows a corporate tie-up with Tokyo Telecommunications Network earlier this year. Over the next few months the network team will be looking for new external users to add to its network.

Look Ahead

ANOTHER LEASING MERGER?

WESTPORT, CONN. -- At the conclusion of a sumptuous lunch at one of our favorite Chinese restaurants the other day, a fortune cookie arrived with an interesting tidbit inside. The message said, simply, that Technology Finance Group Inc. (formerly Alanthus Corp.) is in "very preliminary" talks to be acquired by an East Coast bank. The acquisition of the computer leasing company, which garnered about \$7 million in revenues last year, certainly would be in keeping with a merger trend that is sweeping through the leasing industry.

NEW CLOTHES FOR ROLM IN EUROPE

PARIS -- After a long wait, Europe is about to see the first results of IBM's link with Rolm. A new division of IBM Europe has been established called Integrated Services Switching Systems (ISSS) that incorporates the underactive Rolm Europe group. Rolm Europe was set up in 1984 but never managed to announce any products and it has now been moved from its Swindon, England, base to IBM's facility at Havant. The ISSS mission is to coordinate all IBM Europe's development and manufacture of its voice and data switching systems and other telecom equipment. Heading the new operation is Frank Onians, vp of ISSS and also a vp of Rolm Corp. A Rolm PBX has, in fact, been in the U.K. approval process for many months now and the first announcement of a European Rolm PBX is expected at the Telecom 87 show in Geneva in October.

HONEYWELL BULL'S DPS 6 PLANS...

BILLERICA, MASS. -- Honeywell Bull Inc. is shooting for an October unveiling of a low-cost DPS 6 Plus departmental computer. The DPS 6 Plus model 200, initially available as a uniprocessor supporting from 2MB to 8MB of memory, is believed to be priced starting under \$20,000. The model 200 is a reengineered version of the 32-bit DPS 6 Plus model 400 released more than a year ago. The computer was expected to have been available in July but engineering delays pushed back initial availability, sources say.

... AND AT THE AT-CLASS LEVEL

In addition, Honeywell Bull is testing a plug-in board that enables its Personal Computer Advanced Processor, an IBM AT-compatible workstation, to run GCOS 6 model 400 applications. Developed here by the company's customs and special systems group, the board comes with 2MB of memory and turns a pc into a single-to four-user DPS 6 computer. Users may get their first glimpse of the AP 6 board at the fall North American Honeywell Users meeting this month.

(continued on p. 12)

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Look Ahead

REALISM, JAPANESE STYLE

TOKYO -- The thought behind the development of TRON, the first made-in-Japan computer architecture, may not be as idealistic as it seems. What is being promoted as Japan's contribution to the advancement of computer design may end up producing a flood of high-performance Unix workstations for export as well. Fujitsu and Hitachi are also creating a version of Unix to run on the superfast TRON microprocessor that will be the nucleus of the new products.

LOOKING FOR MR. BETA SITE

SANTA CLARA -- 3Com Corp. is in the process of choosing 10 beta sites for the twisted pair Ethernet networking technology that it announced in February. Among those users interested in the new Ethernet is Salomon Brothers in New York, a possible beta site, says a 3Com manager. He adds that 3Com has already patented key elements of the technology, and sees it as a "definite threat" to AT&T's Starlan.

WAITING AT THE GATE

TOKYO -- NEC has made clear that it is more than ready for the lifting of the U.S. semiconductor-related trade sanctions against Japan by announcing a 32-bit pc for the U.S. market. The Power Mate 386 uses an Intel 80386 chip and is AT compatible. It is aimed at the desktop publishing, scientific calculation, and CAD/CAM markets. NEC will wait to launch the product in the U.S. until the trade duties are reduced.

COMMITMENT TO ORACLE

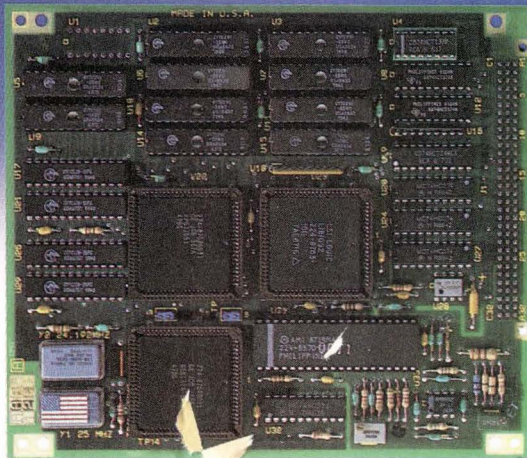
CAMBRIDGE, MASS. -- Project Software and Development Inc. (PSDI) will announce this month that its mainframe/mini project management software, Project/2, will integrate the Oracle relational database in a fully functional way. The product has offered limited Oracle functionality since 1983. Additionally, the next release of QuikNet Professional, PSDI's recently introduced project management program for IBM ATs, XTs, and compatibles, will include interfaces to Ashton-Tate's dBase and Lotus's 1-2-3, says the company.

RUMORS AND RAW RANDOM DATA

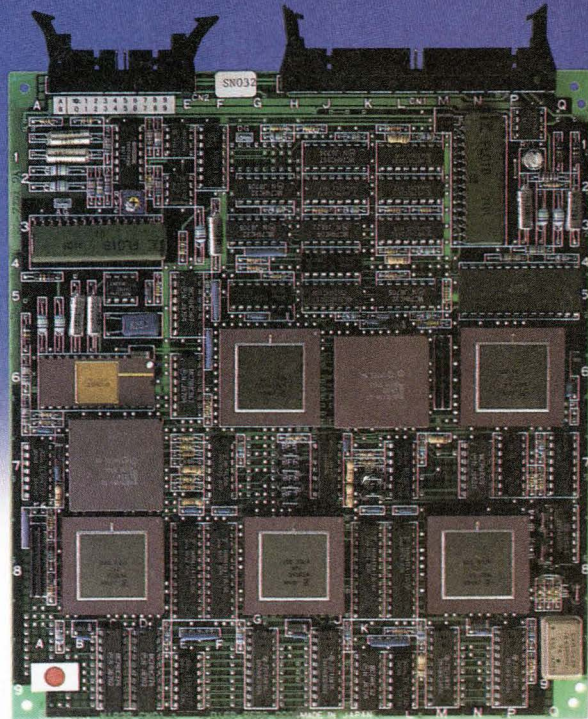
IBM's commitment to Ethernet networks, which took a big shot in the arm with last year's announcement for the 9370, still has a lot of holes, report third-party vendors. Lambert Onuma, president of IBM and DEC connectivity vendor Interlink Computer Sciences, says that the 9370's Ethernet channel uses proprietary code, making it difficult for other vendors to offer products. But Onuma also says that IBM is looking selectively at outside vendors, including Interlink, and will decide during the next six months to whom it will make these details available.

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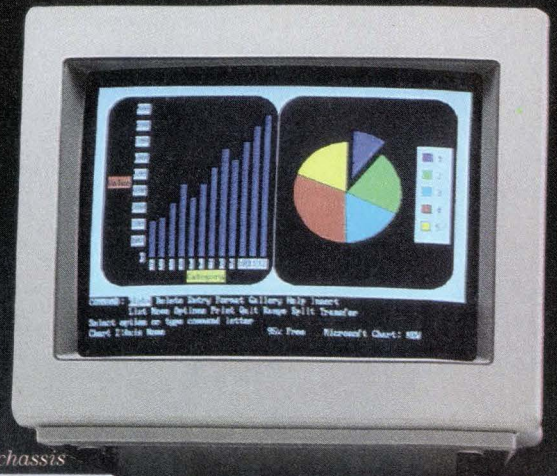
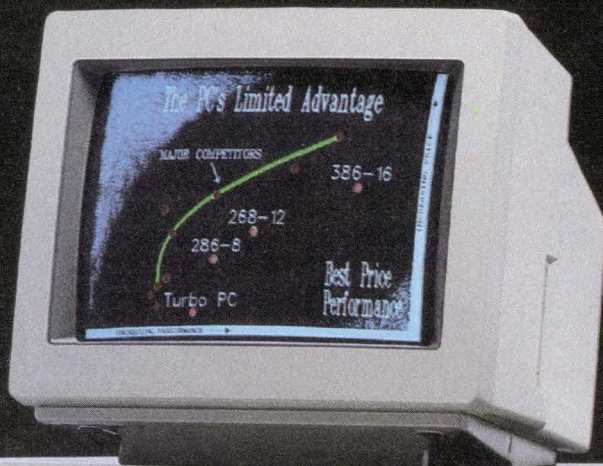
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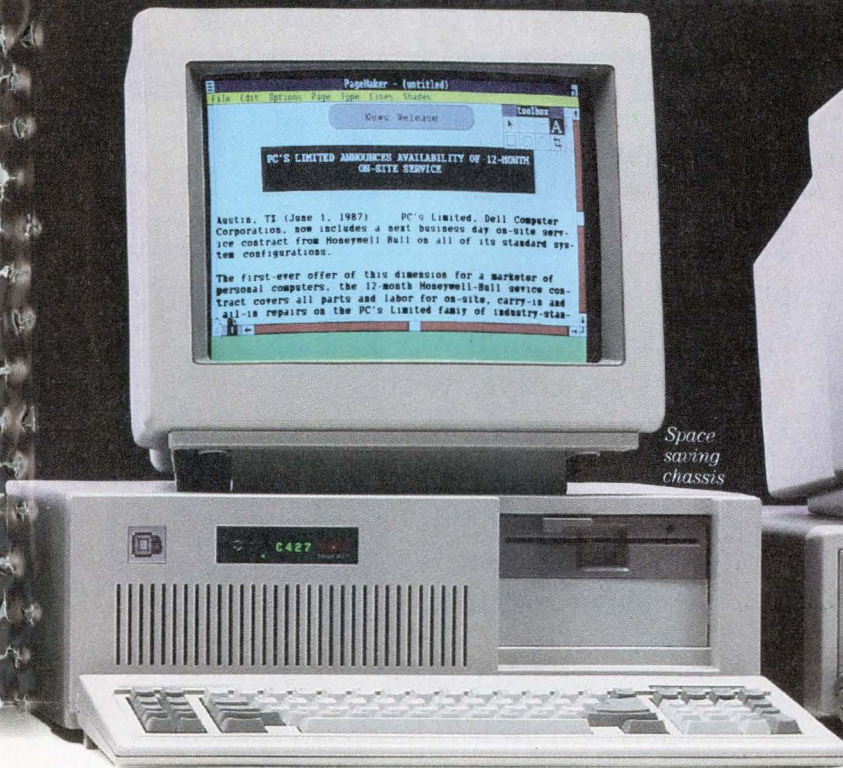
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EGA High Resolution Monitor

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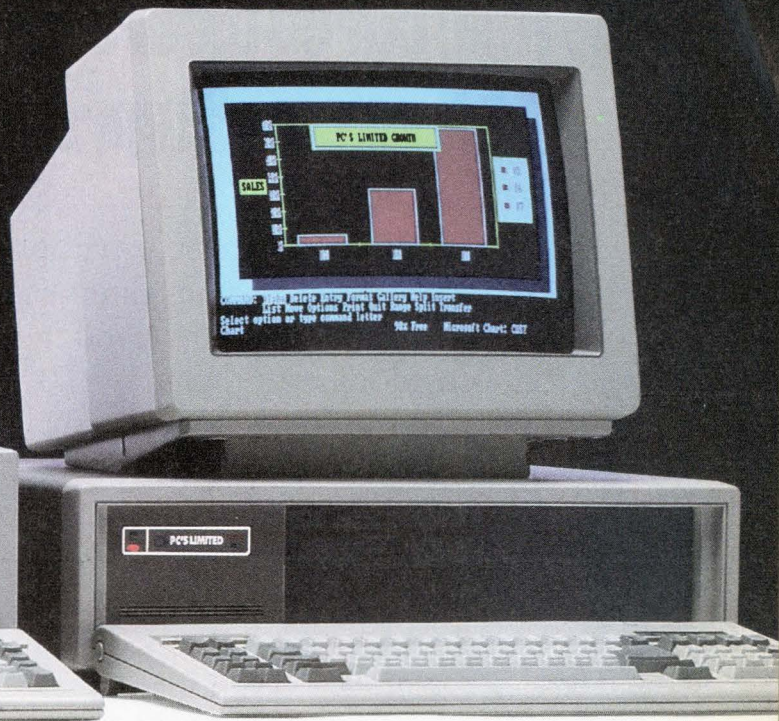
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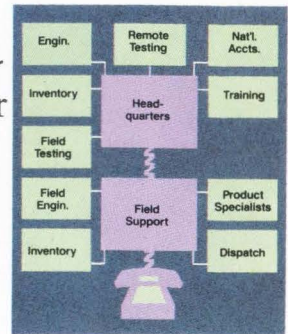
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News in Perspective

COMMUNICATIONS

IBM NetView Enhancements Stir Interest of MIS Shops

An increased capacity for centralized network management as well as the software's potential as a strategic product seem to be the draws for users.

BY SUSAN KERR

It may be too early to credit IBM's NetView SNA network management software with cult status, but all signs point to the existence of plenty of potential devotees.

"IBM's long-term push is to get everybody to worship at the throne of NetView," laughs Hughes Aircraft Co. telecom manager Doug Taylor. While Taylor may not be ready to distribute NetView pamphlets at airports, he admits that the Long Beach, Calif., company is very interested in the capabilities of the IBM product, particularly in light of the latest release announced in June.

"If promises meet expectations, this could be a best-seller," predicts William Houghton, general manager in the communications technology department of Chevron Corp., San Ramon, Calif.

The promise and enticement of centralized network management is certainly inherent in NetView even if all the pieces aren't in place yet. At its unveiling in May 1986, NetView was primarily an amalgamation of older IBM management products, pulled together under a common control structure. Last September brought forth NetView/PC, a PC-based program that allows multivendor voice and data products to be managed from a central site. IBM has sold 1,500 NetView licenses overall and says that at least 25 third-party vendors plan to incorporate NetView/PC into their networking products.

This June's NetView release 2 took the concept of centralized network management a step further. IBM announced the ability to run distributed 9370 systems unattended (for example, by forwarding warning alarms to a host); it also announced two new programs—NetView/Access Services, through which users can monitor network access, and the NetView Network Definer, a program that automatically distributes changes from a central site to networked VM systems.

With the latest crop of products, IBM has begun to move from merely providing alerts to automating simple but critical tasks.

"Strategic" Emphasis for Dow

Still, the significance of NetView lies in its potential, according to some IBM mainframe customers. Dow Chemical USA, Midland, Mich., plans to install NetView by the year's end, says corporate telecom manager James Sullivan. "Nothing in the announcement knocks our socks off," he comments, but "we're interested in the strategic direction."

These days, strategic means IBM's Systems Application Architecture. Announced in March, SAA is a blueprint for consistent software across the System/370, System/3X, and PC families by means of common programming interfaces and communications support. NetView has been added to the SAA group, underscoring its importance.

Dow Chemical currently uses a wide range of network management systems, including products from Avant-Garde Computing Inc., Mount Laurel, N.J., which Sullivan says are more "mature" than NetView. Then why his interest in NetView? One reason is that the company uses Rolm PBX gear; a key part of the most recent NetView/PC release is the availability of two Rolm software products that track PBX status and merge call detail information into one location.

Support for Rolm seems to attract the attention of a number of IBM users. Chevron's Houghton says, "The promise that we may have an umbrella product to collect various and sundry tools is very appealing."

Syntex Inc. in Palo Alto does not use NetView yet, but it probably will, according to telecommunications director Don Herriott.

Typically, various segments of networks have been

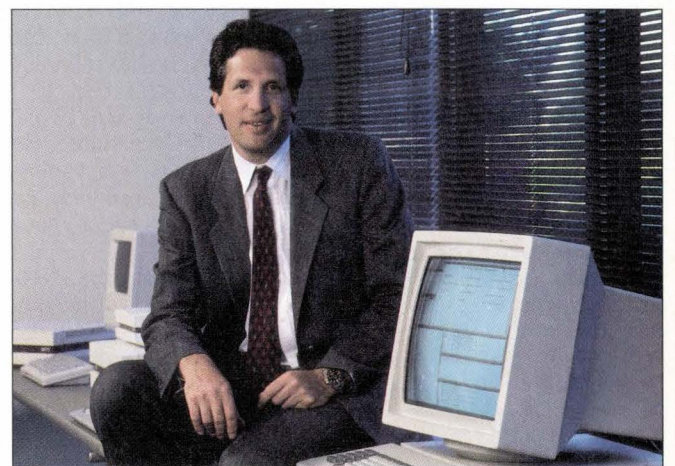
managed independently. "With this system we address all the network, end to end," proclaims Bill Warner, business and systems management director at IBM's Raleigh, N.C., Communications Product Division. "As we reach out over time, carriers are being added to the end-to-end management, as well as other vendors' equipment and IBM products."

T1 equipment is among the non-IBM gear now included under the IBM umbrella of network management. IBM plans to remarket T1 multiplexors developed by Network Equipment Technologies Corp. (NET), Redwood City, Calif. The two are expected to enhance the integration of NET's T1 mux into NetView.

Role for Expert Systems

Although IBM is picking away at the pieces, some doubt that end-to-end management is achievable, given the diversity of equipment. The potential for doing more than crossing one's fingers is beginning to be seen, however, particularly in such areas as automated recovery. MIS executives see hope in the evolving expert systems technology.

Still, users should not sit around waiting for the operatorless network, according to



UNGERMANN-BASS'S MILLER: "NetView/PC is really primitive now."

IBM's Warner. IBM has yet to get out the NetView products it's already announced. Many of the release 2 offerings won't be available until the year's end, at the earliest.

"NetView/PC is really primitive right now," says Darrell Miller, marketing director for Ungermann-Bass Inc., the Santa Clara-based networking company, which last September announced plans to support NetView/PC. Mostly, he says, it sends alarms, "but it will grow. It's a start." No product is expected this year, however, since Ungermann-Bass must develop a new set of protocols and access methods.

IBM has by no means taken over the whole task of network management. There's still room for third-party network management solutions,

IBM HAS BEGUN TO AUTOMATE CRITICAL TASKS.

hopeful outsiders say, because IBM has to keep much of the NetView product generic.

Take Cincom Systems Inc., Cincinnati, which has sold 500 licenses of Net/Master, a head-on competitor to NetView. A big selling point has been Net/Master's application development tools written in Cincom's Mantis 4GL, as opposed to NetView's usage of C or assembly language. Nevertheless, Cincom has bowed to IBM and, if customers so desire, they may use NetView/PC with Net/Master.

One happy Net/Master user who may do so is David Burns, senior vp of data ser-

vices for Affiliated Banks Service Co., Thornton, Colo. "Prior to the announcement [in June] we saw nothing in NetView/PC that made us want to have it," he says. That's changed. "The PBX support whets our appetite."

DEC Remains Aloof

Despite the apparent user enthusiasm, there are still holdouts in the vendor community, most noticeably Digital Equipment Corp. Networking is a big selling point for Digital and it's unlikely to walk meekly into IBM's camp. "We're going to have to figure out NetView," concedes Digital vp William R. Johnson Jr., but he doubts that Digital will actually conform to NetView. "NetView won't be inherent to our strategy, but if someone wants to poll us, we'll answer."

As the Digital example shows, IBM's attempt to attract third-party vendors into its network management scheme is a double-edged sword. The concept of a distributed, open network is a new and conceivably vulnerable strategy for IBM, but it's a scheme in which the company appears to maintain a great deal of control.

The impending OSI networking standard, still years away, may offer a clue. IBM participates in OSI work, but Warner carefully differentiates between NetView, the product, and the International Standards Organization (ISO) OSI definition of a network management "structure." He adds that the ISO "won't specify NetView as a product, but maybe [they will specify] our architecture."

In the meantime, NetView shows signs of becoming a de facto standard in the SNA world. Driving that point home, Warner notes that there's a "whole bunch of vendors standardizing on NetView before ISO hits the street." ■

MARKETING

SolutionPacs Making Little Impact So Far

But despite the slow start, users are expressing an interest in the packaging approach.

BY JEFF MOAD

Last October, when IBM introduced and started shipping the first of its SolutionPac software, service, and support offerings, the reaction from competing software vendors was immediate and loud.

They accused IBM of attempting to use its marketing muscle to take unfair advantage by bundling applications and promoting a one-stop-shopping approach.

Undeterred by the outcry, IBM in the ensuing months has continued to unveil new SolutionPacs—28 to date—to run on hardware spanning from 3090 mainframes to the new PS/2 personal workstations. But the outcry from independent software vendors has not increased along with the SolutionPac proliferation. If anything, the protests have faded in volume and frequency.

The main reason is that, after the first 10 months, SolutionPacs, far from dominating their markets, simply haven't had much of an impact. While IBM officials say they are encouraged by the number of users planning to install SolutionPacs by the end of this year, actual SolutionPac users seem to be few and far between.

"When IBM first announced the SolutionPac for banking applications, we were concerned," admits Don Steele, financial division general manager for Uccel Corp. (now part of Computer Associates). "But since IBM started shipping the product, it

really hasn't had much impact. I'd have to say we've been a bit relieved."

IBM declines to say just how many SolutionPacs have been sold or to say whether, overall, the number of SolutionPacs sold has been above or below expectations. "Like anything else, the experience has been varied," says Howard Witzel, the IBM group director for business services in charge of SolutionPacs. "Some packs have exceeded our expectations, and most are meeting our expectations."

But Robert F. Berland, IBM vice president for strategy requirements and quality assurance, says that it is too early to judge whether the approach has been successful. "The acceptance of the concept has been good," he notes. "Several companies have come to us and said, 'This is the approach I'm interested in.'"

Hogan Furor Declines

The SolutionPac that initially aroused the most concern among competitors was what IBM calls its Integrated Banking Applications, a package of eight such applications with service and support, selling for between \$200,000 and \$675,000. Consisting primarily of integrated banking software licensed by IBM on an exclusive basis from Hogan Systems of Dallas, the Integrated Banking Applications SolutionPac was seen by some as an attempt by IBM to lock out banking competitors such as Uccel and Westwood, Mass.-based Cullinet.

To date, though, while many banks have added the Integrated Banking Applications SolutionPac to the list of banking automation offerings they will be evaluating, few if any have actually purchased the package. IBM declines to identify users of the banking SolutionPac.

"We haven't even looked at [the banking SolutionPac]," says Ray Dwyer, senior vice president at the Boston-based Bank of New England. "We may look at it eventually. Having IBM on the label does give an assurance that the product will work and will be supported. But right now we are trying to consolidate the number of deposit systems we use."

In banking, observers point to three reasons for the apparently slow start that IBM's SolutionPac has had: many large banks are involved in long-term plans and need a year or more to make a new buying decision; SolutionPac selling is new to much of IBM's field sales force; and the Hogan-based product may require some improvements.

Some IBM officials admit it's taking time to get the sales force used to SolutionPac selling. According to Berland, while "the acceptance of the [SolutionPac] concept has been good," it may take a year or more for the IBM sales force to get up to speed with the product.

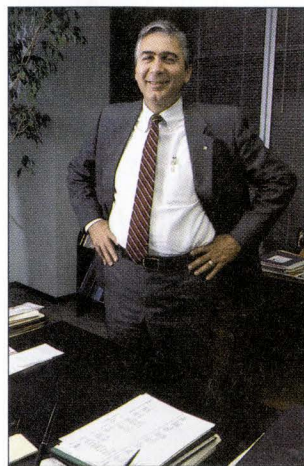
In the meantime, though actual sales of the banking SolutionPac seem slow, the IBM logo on the product has certainly expanded the number of users willing to at least consider it. "A number of banks are taking a fresh look—and a harder look—at the product," says William Synnott, a senior director at the Boston-based Yankee Group and formerly the head of information systems at the First National Bank of Boston. Among banks considering the Hogan-based package

for the first time is Manufacturers National Bank in Detroit.

If those evaluations of the banking SolutionPac are going to translate into orders, Synnott and others feel some upgrading of the integrated product will be required. Specifically, they say the product needs to be streamlined and simplified.

Current and prospective users say IBM has indicated that improvements are in store for the banking SolutionPac. According to one user who requests anonymity, IBM officials have said they may provide interfaces from the integrated banking SolutionPac to IBM's DB2 relational DBMS. Under its agreement with Hogan, in addition to getting exclusive rights to market the integrated banking product in the U.S., IBM can make any changes to the product that it wants to or pay Hogan to make changes.

Whether or not the security provided by the IBM logo and the possibility of product upgrades will attract new customers to the banking SolutionPac, those factors are making current users of the Hogan integrated product happy. The Texas Commerce Bank in Houston already is a Hogan customer and, according to MIS vice president Tom



TEXAS COMMERCE'S VICKNAIR:
"Our comfort level has increased."

Vicknair, the bank is considering becoming an IBM SolutionPac customer. "IBM getting involved has certainly increased our comfort level," says Vicknair.

But observers say IBM's other available SolutionPacs haven't sold much better than the integrated banking packages. Of the packages announced so far, only seven have been available for any significant period. Outside of the banking programs, IBM has been shipping SolutionPacs for expert systems applications, VM software engineering, local area networking, and plant automation/material tracking for Series/1 systems.

According to David Ferris, chairman of the San Francisco-based local area network consulting firm Ferrin Corp., IBM's LAN SolutionPac has had little impact on the market. "We just haven't seen it," he says. Likewise, Sheldon Breiner, president of Sunnyvale, Calif., expert systems vendor Syntelligence Inc., says he knows of no customers for the IBM Expert Systems Assistance SolutionPac.

Some Worried About Trend

The underwhelming performance of the SolutionPacs hasn't completely calmed the fears of independent software vendors. Although an ADAPSO ad hoc committee so far has made no recommendations about how to deal with SolutionPacs, some industry figures are still concerned. According to Bernard Goldstein, a partner with Fort Lee, N.J.-based Broadview Associates and one of the SolutionPacs' harshest critics, "Just because SolutionPacs haven't made much of an impact so far doesn't mean they don't have the potential to do so. The issue is still bundling, and that can hurt everyone."

Nor is IBM at all discouraged by the early perfor-

mance of SolutionPacs. The company has continued to look to outside vendors for key applications that can be bundled with service and support, recently announcing and shipping a construction package for the PS/2 from Timberline Software Corp. and a doctors' office package from Manac Systems International

IBM SAYS THE PACKAGING CONCEPT HAS BEEN ACCEPTED.

Ltd. IBM's Witzel says the company is looking for more outside software to include in the SolutionPacs program.

In addition to providing generic applications solutions, Witzel says SolutionPacs increasingly will become strategic tools that play into IBM's overall plan to standardize application and communications interfaces. "As SAA [System Application Architecture] comes along, SolutionPacs will be a way for us to help users map their code into SAA," says Witzel. One example of that is IBM's VSE-MVS Migration Assist SolutionPac, designed to help users migrate their applications from VSE environments—which are not included in SAA—to MVS/XA, which is.

But most important, say IBM officials, SolutionPacs allow IBM and its field sales and service force to get more intimately involved in solving user problems and in understanding user needs. According to IBM's Berland, "Professional services are becoming a more and more crucial part of the strategy. SolutionPacs get us in the door." ■

SOFTWARE

Users Seeking Precise Measure Of More Complex VM Systems

IBM's introduction of VM/XA as well as the 9370 have accelerated this trend, boosting the prospects of independent software suppliers.



CANDLE'S KANAFCHIAN: "VMRTM could not warn you of impending problems, nor of those that have occurred."

BY TOM McCUSKER

It was "a little bit of fear" that prompted Citizens Fidelity Bank of Louisville, Ky., to launch a serious performance measurement program on its VM-based 3033 system two years ago. Until then, says Kelly Vogt, the bank's senior systems programmer, "we weren't doing any significant measurement work," other than using IBM-provided measurement products. "Nobody complained about response time and we didn't have excessive overhead problems. . . . Nevertheless, we were worried that we didn't have a handle on it."

Software tools for monitoring computer performance and helping data centers plan for future capacity or manage current capacity more efficiently have always had a high profile in larger shops running all the variants of the MVS operating system. But IBM's

recent moves seem to indicate that the computer colossus may want one operating system—VM—to run across its entire line.

Early next spring, IBM will make available an extended architecture for VM, called VM/Extended Architecture System Product (VM/XA SP), which is intended as a powerful upward growth path for its 10,000 VM users, providing better use of capabilities and enhancements to its interactive CMS (Conversational Monitor System). VM/XA in effect will make VM the single OS capable of running across the entire IBM 370 line.

In addition, some computer analysts indicate that the interactive CMS under the new XA product ultimately may support from 2,000 to 3,000 users, compared with as many as 1,200 at present. And on higher-level machines, the new OS can run as many as four guest operating

systems concurrently.

The prospect of such complex VM systems is likely to inspire users as never before to obtain accurate measurements of their VM systems.

Furthermore, the recent tax reform legislation has put the lid on investment tax credits, meaning that in order to fully realize existing tax credits, users must extend the life of equipment.

IBM Has Dominated Market

What's more, VM is also the OS of choice in the 9370. Advance orders for the mid-range processor, which IBM began shipping last month, are estimated in the 10,000-to-40,000 range. Taking all these VM factors into account, it's easy to see why vendors of computer performance measurement tools envision a large demand for their products in the VM market.

Until recently, IBM has dominated the measurement market in the VM field with three products: VM MAP (Virtual Machine Monitor Analysis Program), a \$4,000 data reduction and analysis program that provides reports and graphs on a system's performance; VMRTM (VM Real-time Monitor), a \$1,000 product that provides real-time performance monitors and debugging; and VMPPF (VM Performance Planning Facility), a \$30,000 modeling product used to forecast the effects of additional users and equipment on a system.

But in the last three years, independent suppliers that offer alternatives to the

IBM products for the VM systems have been gaining ground. "VMRTM could not warn you of impending problems, nor of problems that already have occurred," claims Mehrdad Kanafchian, VM product manager at Candle Corp., Los Angeles, a software house that sells a competitive product called Omegamon/VM. There are 500 users of this Candle product, which is priced from \$7,500 to \$17,500, depending on hardware configuration.

David Gauck, development manager for VM performance products at IBM's Information Services Division in Cary, N.C., declines to comment on the product shortcomings voiced by Kanafchian and others. But he says that IBM's recent VM/XA announcement "may enhance the use of all [performance] products."

Union Tank Car Co., Chicago, has been using Candle Corp.'s Omegamon product for two years to prolong the life of a heavily overloaded 4341 Model 2 after IBM's VM MAP and VMRTM products were found to be inadequate. "We needed a product that could pinpoint performance problem areas and with which we could bring up English-like screens," explains Rick Schauer, the company's manager of technical services.

Owens Corning Fiberglas Corp., Toledo, Ohio, turned to a VM version of MICS (MVS Integrated Control System) offered by Marino Associates, Vienna, Va., to set up a more efficient chargeback procedure. Previously, the procedure had used "crude" VM MAP reports, according to Philip Karns, an Owens Corning analyst.

At present, Owens Corning's main goal is to determine the nature of jobs being run on the company's Amdahl V8 and IBM 3033 machines (soon to be replaced with a 3081K). "Until recently,"

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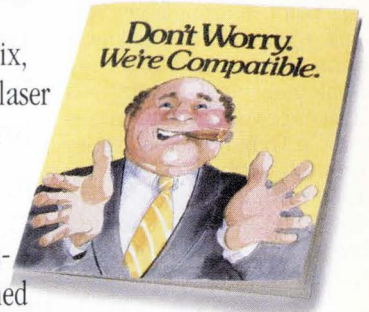
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TAXATION

Murky IRS Ruling Won't Stop Opponents of 1706

Independent contractors opposed to the new tax law intend further action at the congressional level, but some are already feeling negative effects on business.

BY WILLIE SCHATZ

The long-awaited Internal Revenue Service Revenue Ruling on Section 1706 has done little to calm the furor over the new tax law.

Although ruling 87-68 establishes procedures for revenue agents and auditors concerning the treatment of technical service workers, the IRS's pronouncement did little to heal the split over 1706 between independent contractors and large professional service companies. That split concerns who is an employee and who isn't, and the IRS ruling on how to define that status didn't clarify the issue, say contractors.

"The IRS ruling is totally unrealistic," charges Guy Scharf, president of Software Architects Inc., Mountain View, Calif., and the legislative chairman of the Independent Computer Consultants Association. "They asked us for examples of how independent contractors do business, then totally ignored them. They invented their own examples. Now everybody—us, the brokers, and the clients—has to live in fear of what the IRS might do."

Jack Courtney, a member of ADAPSO's professional services section and president of Computer Task Group, Buffalo, counters, "The revenue ruling confirms the ADAPSO position that what the opposition has been saying is erroneous, misleading, and not helpful. These folks [independent contractors] continue to churn up problems and create confusion in

the marketplace. This ruling is about as clear as we expected. It should shift the debate to compliance."

Well, maybe. Like every other word the IRS has uttered, the clarity of revenue ruling 87-68 remains murky at best. And many people are going to have much more to say before this issue is put to rest.

Ironically, that was precisely what the IRS intended to do through this ruling. The sound and fury surrounding 1706 had diminished considerably in recent weeks as independent contractors, brokers, clients, and besieged congressional offices waited for the IRS's pronouncement (see "Putting Their Heads on the Tax Block," March 15, p. 32, and "The Battle Over 1706 Enters a New Phase," May 1, p. 24).

Settling Uncertainties

"It is my hope that the ruling will settle most of the uncertainties that the industry has been subjected to during the first several months of 1987," says a statement from Sen. Daniel Patrick Moynihan

(D-N.Y.), who got this whole thing started.

Sorry, senator. Despite its best effort, the IRS apparently has made the worst of a bad situation. Not that Section 1706 was anything to write home about. Passed in the midnight hour of the 99th Congress, Section 1706 removed tax-exempt status for technical service workers. Those workers were made tax-exempt because Congress was less than thrilled about the IRS's interpretation and application of a 20-factor common-law test to determine whether a person was an employee or was self-employed.

The agency outlined three factual situations in which an individual worker, pursuant to an arrangement between one person (firm) and another person (client) provides services for the client as an engineer, designer, drafter, computer programmer, systems analyst, or other similarly skilled worker engaged in a similar line of work.

The degree of control

says Karns, "we could not determine what programs were running under VM; all we knew was on a session basis."

Some shops, however, stick with the IBM products for most tasks, while they supplement their operations with other vendors' offerings. AT&T's Orlando, Fla., telecommunications facility installed Omegamon VM two years ago strictly to do performance troubleshooting on Amdahl and IBM systems, ac-

IBM MAY WANT ONE OS TO RUN ACROSS ALL MACHINES.

ording to performance analyst April McManus, but uses the IBM real-time and historical products for all other performance applications.

While experienced systems programmers could ease the performance measurement and capacity planning burden, they are in short supply. And expert systems, which could be instrumental in helping users understand and act on performance data more easily, have not yet arrived. Most vendors tend to agree with Neal Ater, vice president for product development at Goal Systems, Columbus, Ohio, who thinks that expert systems are at least three years away.

All this adds up to great VM measurement product demand. Whatever is offered, users soon should have a rich variety of software products tailored to their needs, with much of that output originating among independent suppliers. ■



SCHARF OF SOFTWARE ARCHITECTS: "The IRS ruling is unrealistic."

Photograph by John Trotter/Block Star

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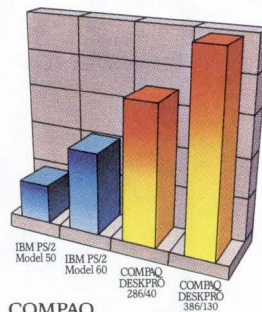
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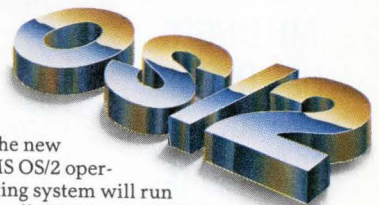
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that the firm has over the individual and the degree of independence written into the contract between the individual and the firm (if there is a contract at all) differ considerably in each case. But none of those factors determine whether the individual is an employee for federal employment tax purposes. The answer to that question, my friend, is blowing in those top 20 common-law rules that

MELLINGER HAS DENIED WORK TO 300 PEOPLE.

have determined the employer-employee relationship since the Magna Carta. Non-believers and other heretics can find guidance in Sections 31.3121(d)-1(c), 31.3306(i)-1 and 31.3401(c)-1 of the Employment Tax Regulations.

According to the IRS, an employer-employee relationship exists when the person or persons for whom the services are performed have the right to control and direct the individual who performs the services, not only as to the ends but also as to the means. In essence, an employee is subject to the will and control of the employer not only as to what shall be done but how it shall be done.

Those sections also provide that individuals who follow an independent trade, business, or profession in which they offer their services to the public generally are not employees. Enumerated as members of that elite are physicians, lawyers, dentists, contractors and subcontractors.

Just for further clarifica-

tion, the degree of importance of each of the 20 factors varies depending on the occupation and the factual context in which the services are performed. The IRS further reminds you that the top 20 are only guides. One should not forget that special scrutiny is required to assure that formalistic aspects of an arrangement designed to achieve a particular status do not obscure the substance of the arrangement. In other words, substance whips form every time.

Right or wrong, weak or strong, the mere existence of the revenue ruling shuts down one possible reform road for those who would put on hold or wipe out Section 1706.

"The IRS ruling is dead wrong," says New York attorney Jonathan Wallace, a member of the Independent Computer Consultants Association 1706 Working Group. "It twists the common-law tests far out of shape. The law says that termination for cause supports independent contractor status. The revenue ruling's first example treats a broker's right to terminate for cause as a sign of an employer-employee relationship.

"This is going to put 1706 back into the minds of people who had other things to think about since March. I think the independents will go back in force to Congress now. They can wave the revenue ruling and say this is what they waited for and the IRS did exactly what 1706 was designed to prevent. There's a much better chance that Congress will pass a moratorium or repeal the law than there is that IRS will amend the revenue ruling."

Since the chances that the IRS will modify its stance run from nil to zilch, the appeal route has shifted to Congress. The most likely source is Rep. Judd Gregg (R-N.H.), whose bill, H.R. 792, was in-

troduced shortly after the 100th Congress took the oath of office last January. The proposal calls for a two-year moratorium on Section 1706 to allow Congress to examine the correct employment tax status of independent contractors. Gregg had lined up 94 cosponsors at press time, including 15 members of the Ways and Means Committee, and two announced presidential candidates, Reps. Richard Gephardt (D-Mo.) and Jack Kemp (R-N.Y.).

Rep. Gregg has minced no words in explaining his position. His initial "Dear Colleague" letter to fellow House members asks, "Are you aware that we adopted a provision of the 1986 Tax Reform Act that is strangling small businesses in the computer and engineering fields, and that we did so based upon claims by a few large national firms that these small businesses and independent contractors had a competitive advantage over them?"

THE IRS MADE THE WORST OF A BAD SITUATION.

"Not unexpectedly, the result of this 'reform' has been to jeopardize the existence of hundreds of thousands of independent contractors and brokers in the computer, engineering, and related technical service industries."

Gregg calls the IRS ruling "the latest event in the demise of the independent technical service workers."

A bit dramatic, perhaps. But not if you're on the receiving end.

"We helped develop the independent contractor business," says Kathy Kazienko, a partner in Mellinger & Associates, Hawthorne, N.Y. "We've been one of the largest independent providers to the marketplace for the last 13 years.

1706 Scares Clients

"Now we are literally going out of business. Why? Because 1706 and the revenue ruling have scared the hell out of our clients. They don't know how the government views our operation. We don't even know what we are anymore." Kazienko estimates that the company's decreased business is denying the government somewhere between \$5 million and \$10 million in taxes.

Pursuant to the revenue ruling, which speaks only in terms of "brokers," Mellinger & Associates is now a broker. This news may come as a surprise to the consulting firm: in New York, a broker is someone who buys and sells stocks.

Whatever its current status, Mellinger has terminated its market staff for the rest of the year. It is accepting no new business and is serving only current clients under contract who want to extend the expiration date. It has denied 300 consultants work so far this year.

"There is no guarantee that the Internal Revenue Service won't come to us and say, 'We want your tax dollars.' And they can get them," Kazienko says. "So the 1706 and the revenue ruling leave us nowhere. We can last this way through 1987. Can we rebuild? I don't think so. Now we're going to have to go back to Washington and let the legislators know how devastating 1706 has been. If we lose, we'll at least have given it everything we've got."

It could be that they have not yet begun to fight. ■



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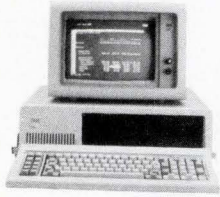
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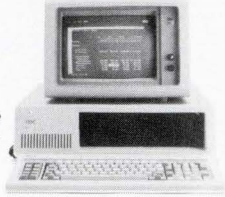
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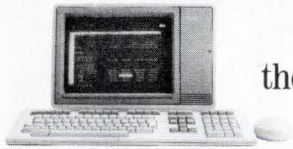
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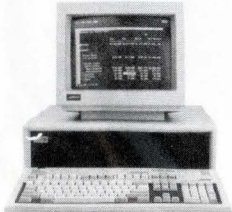
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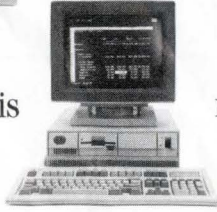


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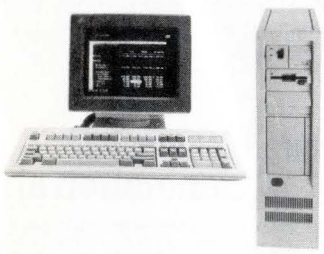


of connectivity and increased

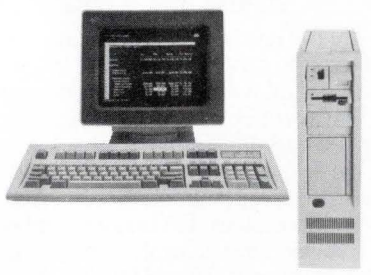
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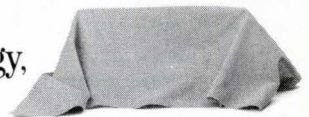
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LANGUAGES

MIS Still Sees Too Many Bumps with MUMPS

But graphics, new programming tools, and interfaces to other languages might help spur the use of the health care originated language in the commercial world.

BY GARY McWILLIAMS

It's always been an uphill climb for the MUMPS programming language. In the U.S., where the text-oriented language was developed for health care applications, non-medical use has been limited. Although recent developments promise to orient the language more toward MIS needs and help it reach a wider audience, the jury is still out on whether MUMPS will be embraced to any large extent by dp managers.

There are positive signs, however. For instance, the first MUMPS implementations for IBM VM/370 mainframes have become available. Honeywell-Bull Inc. and Tandem Computers Inc., Cupertino, Calif., also plan new MUMPS versions for their machines this year.

Proponents say the language merits MIS attention because of its fast and efficient applications development. Its integral data handling, portability, and flexibility have encouraged some banks, credit unions, libraries, and even oil companies to build applications using the language.

"It's a good alternative [to COBOL] especially for development," says Mitchell Bell, a systems manager at Republic National Bank, New York, and a longtime MUMPS user. Largely via third-party banking packages, MUMPS is used by more than 200 bank trust departments across the U.S., says Bell.

"It's the best language around for databases that are

largely text oriented," adds Richard F. Walters, a professor of computer science at the University of California, Davis. Under an IBM grant, Walters is developing a mainframe implementation of the MUMPS data structures, called Globals. Walters says that "the heightened interest on the part of IBM is going to have a major effect down the road."

Outside the U.S., MUMPS is widely used for commercial dp applications. "Europe hasn't had the infatuation with COBOL and tended to have the mentality of doing a lot with a little," explains Steve Koerper, MUMPS program manager for Hewlett-Packard's Health Care Information Systems Group, Andover, Mass. Walters says that 25% to 30% of all applications in Brazil are written in MUMPS.

A Federal Designation

So, on the surface, the promised features and heightened activity by vendors and third parties suggest that it's time for a new look at MUMPS. Last year, it became the sixth programming language designated as a Federal Information Processing Standard.

Supporters have even called for a reappraisal of its name, an acronym derived from Massachusetts General Hospital Utility Multi-Programming System. The medical connotation is seen as restricting the appeal to commercial users.

"I think of MUMPS as a disease," says Donald L. Gross, president of MUMPS applications developer Vista Computer Inc., Elmford, N.Y.

"You don't go out and buy a disease."

This medical connotation has not been a problem among software development houses, which have used the language for applications. Vista develops inventory and warehouse applications for such customers as J.C. Penney, McGraw-Hill, and the U.S. Navy—few of whom know what language the application employs.

Whether all this says that MIS should take a new look, however, is debatable. The flexibility and ease of programming, which proponents say recommend the language, is but a part of the story. Some of the larger commercial users that are typically cited as evidence of the language's MIS penetration aren't so enthusiastic. Several are moving away from the language,

citing a lack of packaged commercial applications and security and data interface problems.

"We're debating whether we'll continue using DSM [Digital Standard MUMPS]," says David Naim, MIS vice president in the New York office of Zim Lines, an Israeli shipping company. Learning new ways of programming is difficult, as is retaining MUMPS programmers, he says, because of the relatively small base of commercial MUMPS shops.

Part of Naim's frustration stems from the evolution of MUMPS. The Zim Lines' Digital Equipment Corp. PDP-11 computers run a version of MUMPS that does not use an operating system and so cannot support applications written in other languages. Newer versions for 32-bit computers such as Vista Computer's VSM for Data General Eclipse/MVS and DEC's VAX DSM run with the vendor's traditional operating system.

The limited selection of off-the-shelf applications for his existing systems has soured Naim on the language. "We're looking at 4GLs and databases like Oracle [from



ZIM LINES' NAIM: "We're looking at 4GLs and databases like Oracle."

Photograph by Giorgio Palmisano

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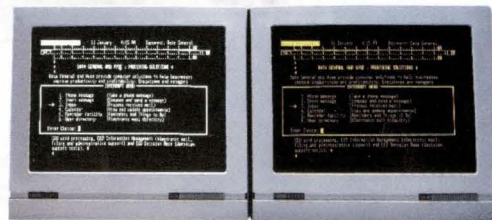
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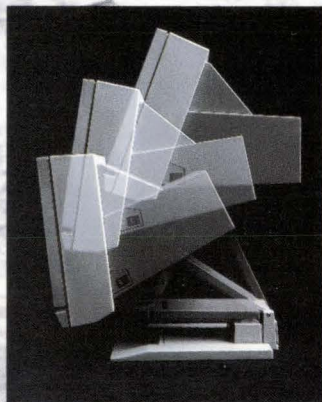
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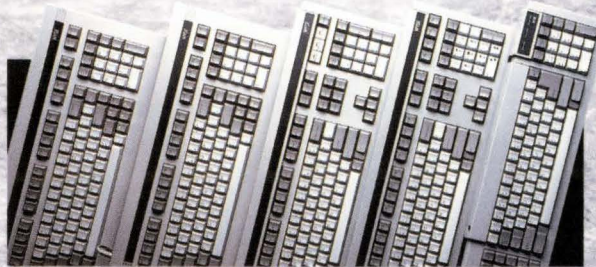


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Oracle Corp., Belmont, Calif.],” notes Naim. He plans to argue for a migration to a 4GL this summer at a Zim dp managers’ meeting. “We’ve many years of applications working on [MUMPS] and it’s very hard to convert, [but] I think we should step into the most modern system.”

The difficulty of MUMPS applications’ interface to IBM databases has prompted General Motors’ Delco-Remy plant in Anderson, Ind., to curb its use. GM’s Electronic Data Systems, which runs the computer operation, is committed to migrating from the language eventually. It had built 150 applications running

MORE THAN 200 BANKS NOW HAVE MUMPS.

on about 12 DEC PDP-11 and VAX computers with it, according to a systems manager who requested anonymity.

“Our direction,” the manager says, “is to maintain existing systems with enhancements where needed and migrate away. The interface problem with IBM COBOL and PL/1 systems is very time-consuming and [presents] a lot of chance for error.” He also called MUMPS’ ease of programming a dubious benefit because programmers fail to document their applications, preferring to write new applications rather than modify the old.

Tom Fitzgibbon, a vice president with software consulting company Multidata Computer Systems Inc., New York, says, “We’ve seen quite a few companies where one or two people get excited

about MUMPS, install it, and everything is fine. Then that person leaves and in comes a person with a traditional background and tries to go to a traditional language.”

Addressing the Faults

Proponents acknowledge some deficiencies but say that developers are addressing those faults. Walters denies that documentation is a concern, saying MUMPS is self-documenting. Robert D. Atlas, sales vice president at Boston-based InterSystems, which is a MUMPS language compiler and tool maker, adds that general purpose software tools intended to provide better applications are on the way. “Today,” he says, “we’re convinced we need applications tools, a relational database, applications generators—the whole 4GL approach.”

One of the reasons cited for recent vendor interest is the regard U.S. government agencies have for the language. Contracts specifying MUMPS have been released by the U.S. Navy, the Bureau of Indian Affairs, and the Veterans Administration. The VA is evaluating 32-bit upgrades for its original MUMPS-based hospital information system. Hardware vendors see a major opportunity here.

Walters says that, until recently, MUMPS was virtually ignored by computer makers because its conciseness did not contribute to the selling of large numbers of computers. “What turned it around was the VA Hospital Information System,” he says. “The appetite for hardware and software was enough to change the interests of IBM and Burroughs.”

Without a similar payback for MIS managers, use of the MUMPS programming language—in the U.S. at least—appears destined to languish in niche applications and the health care market. ■

BENCHMARKS

MCC, NCR Announce AI Product

NCR Corp. and Microelectronics and Computer Technology Corp. (MCC), Austin, Texas, have announced the first commercial product based on technology developed at MCC. The product, called the NCR Design Advisor, is a software system that uses artificial intelligence to aid in the design of integrated circuits. NCR, a founding member of MCC, has invested some \$6.2 million in the four-year-old research consortium, which is owned by 20 U.S. technology companies. NCR chairman Charles E. Exley Jr. says the product benefits both NCR and the semiconductor industry because it will allow faster and more efficient circuit design and increase U.S. competitiveness. Similarly, at a press conference in New York to announce the product, U.S. Secretary of Commerce Malcolm Baldrige said the development “gets us back into the competitive ring.”

ADAPSO-IIA Merger?

Having spurned each other twice before, ADAPSO and the Information Industry Association may finally become one entity after all. The two groups have formed a joint task force to investigate the possibility of a merger. The task force plans to develop a proposal by Dec. 1.

House Passes Security Bill

The Computer Security Act of 1987, recently passed by unanimous voice vote in the House, restores to the National Bureau of Standards control over all computerized government files except those containing classified national security information. The Reagan administration, through National Security Decision Directive 145 and a memo issued last fall by then-national security adviser John Poindexter, had been expand-

ing Defense Department control over private sector computerized files. The bill still has to pass the Senate, where its prospects are uncertain.

StorageTek Out of Chapter 11

Storage Technology Corp. has received final approval from the U.S. Bankruptcy Court for its reorganization plan. The pcm storage equipment vendor will emerge from Chapter 11 and repay about \$800 million worth of debt with a combination of cash, notes, and common stock. StorageTek says it plans to start making payments to its creditors in July. StorageTek has operated profitably for the last six quarters. In the first quarter of this year, the company reported \$14.3 million in earnings on revenues of \$161.5 million.

Microsoft-3Com Deal

Applications software vendor Microsoft Corp., Redmond, Wash., and LAN maker 3Com, Mountain View, Calif., have formed a partnership whereby they will codevelop and jointly market Microsoft’s OS/2 LAN Manager, Microsoft’s networking environment for distributed applications. It’s scheduled for release in the first half of ’88, and a development kit is slated for availability this September. 3Com will distribute the product to its var channel and Microsoft will sell to its oems.

Honeywell Exec Resigns

Eugene Manno, a former Honeywell Inc. group vice president, has resigned. His departure follows a seven-month stint in a post designed to boost DPS 6 systems sales for Honeywell Bull Inc., the spin-off of Honeywell Information Systems to France’s Bull Group and Japan’s NEC. Earlier, Manno headed the company’s entire small systems operation. ■

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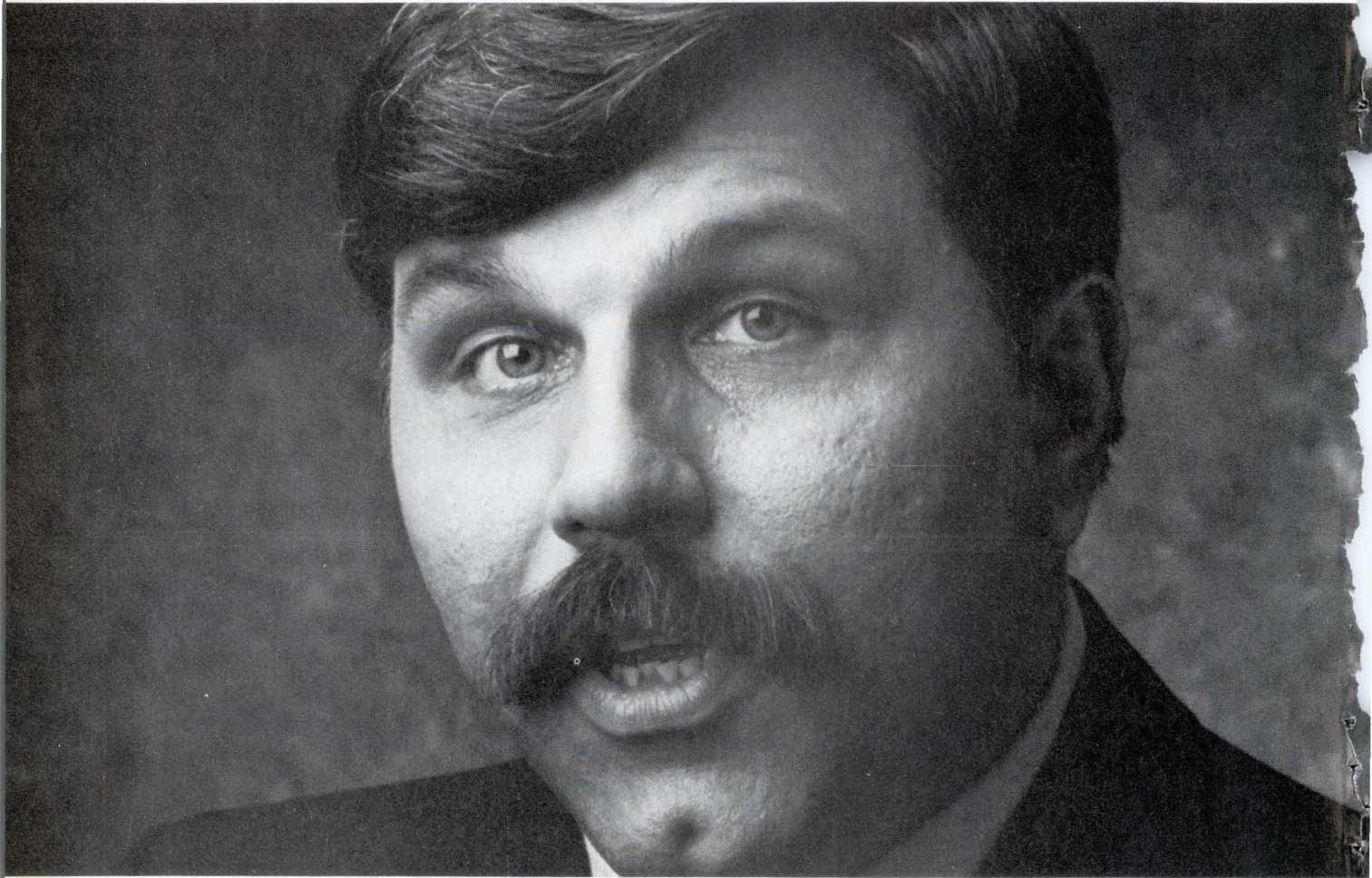
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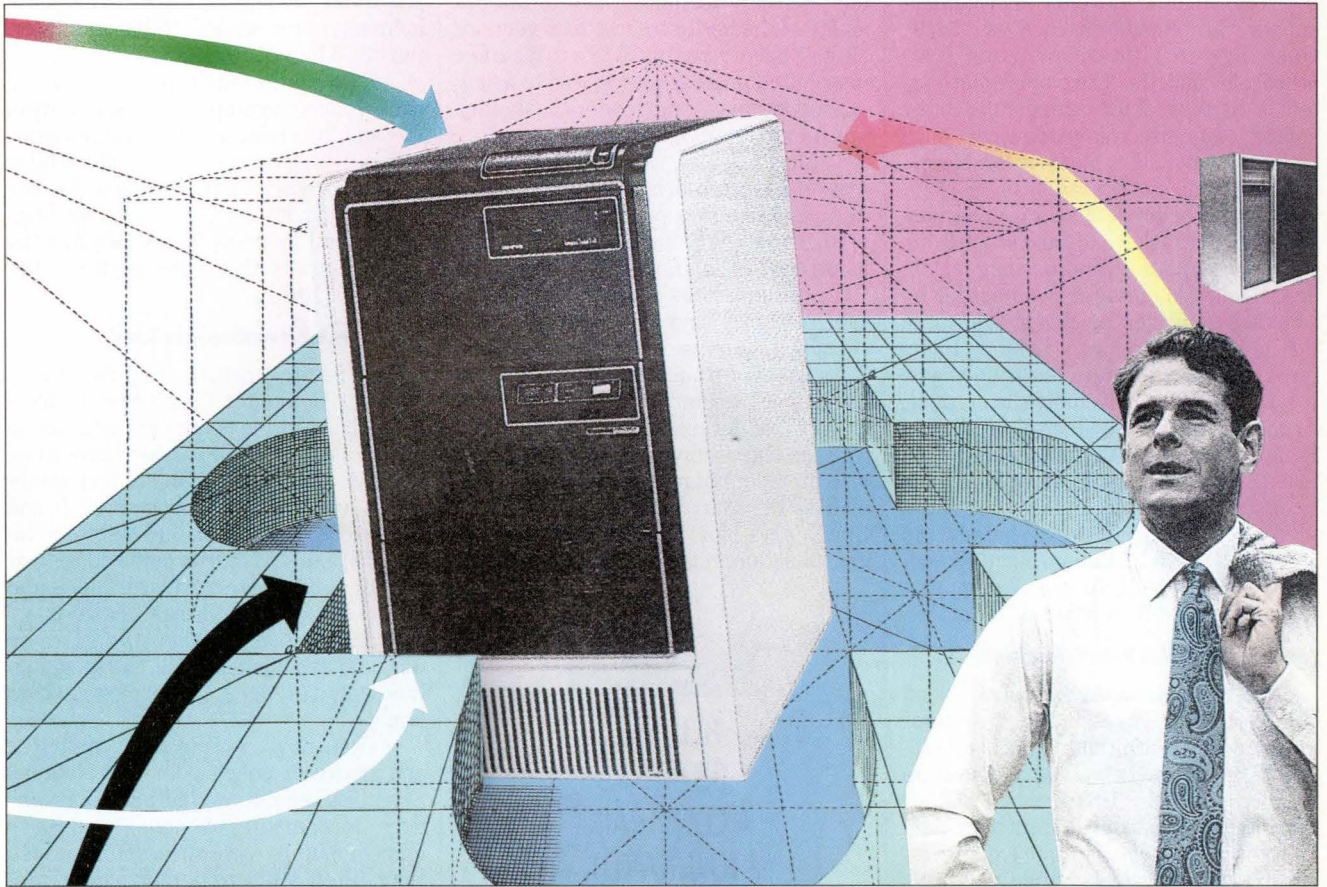
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Behind the News

MIDRANGE SYSTEMS



The Mini at Middle Age: Just a Future Niche Role?

Networks, broad standards, and distributed processing have spurred the use of minis, but a debate is under way over their future place.

BY GARY McWILLIAMS

Only a few years ago, the minicomputer was being described as the computer industry's dinosaur. Larger micros and smaller mainframes were like glaciers threatening to send minis on a path to extinction. Or so it seemed.

Recent history has taken a different path. The vast majority of micros today lack a robust operating system. Difficulties in adapting mainframe operating systems to smaller machines have also curbed the expected encroachment. While micros and small mainframes continue to be seen as a threat, they haven't turned out to be the mini's nemesis.

And the minicomputer has survived very nicely, thank you. IBM's three-tier approach to linking desktop and mainframes, and both an upward and downward expansion of the mini, have offered it new life. Today, there's even a new name in vogue—midrange system—that recognizes its place in the hierarchy.

What happened? User requirements changed, for one thing. Distributed computing, which was once heavily microcomputer oriented, is involving a larger and larger proportion of minis. Distributed systems are predicted to have an 18% compound growth rate by 1989, according to the 1987 Computer and Telecommunications Survey con-

ducted by DATAMATION and Cowen & Co. Respondents with plans to use minicomputers for distributed applications grew from 17% in 1985 to 32% in the latest survey.

"The LAN initially was to connect desktop devices," says John Doggett, director of telecommunications at the Bank of Boston, which uses a variety of minis and mainframes. "But it [the LAN] is a technology popularized by the midrange manufacturers. Consequently, the horizontal connection between desktops has tended to go through the midrange, and it's acting as a concentrator for the mainframe."

The combination caused minis to proliferate as users sought to automate local departments and remote offices. "It was the [mainframe] communications expense that pushed us in the direction of minis," concurs Terry Jones, vp and systems manager at Life of Virginia in Richmond, which uses Data General minis and IBM mainframes. "We felt the mini environment gave us a competitive edge in supporting the producers in the field; it was really a strategic decision."

Behind the News

Information systems management support for standards such as TCP/IP, Open Systems Interconnection (OSI) protocols, and the Unix operating system is another factor contributing to the spread of minis. Taken together, such support spawned a more favorable climate for mini vendors.

While the present seems idyllic, it's a good time to ask what's ahead. After all, the minicomputer is approaching middle age. It survived its first two decades by adapting to waves of change—such as the move from 16-bit to 32-bit architectures and from discrete to VLSI designs. It's clear that such change isn't over. Gordon Bell, the architect of the Digital Equipment Corp. VAX mini, is predicting that 32-bit architectures may prove to be a constraint in the not too distant future. "By the 1990s, we'll see 32-bit address space as a major limitation. That's something I didn't see becoming a barrier that early," he recently told a user audience.

Specialized Device Role Emerging?

So, what is the future role of—and MIS's plans for—the midrange system? Is the midrange as utilitarian as it now appears? Should users fear a shakeout similar to that of the 1970s, when vendor ranks thinned to about 25 from more than 100? If the pc and mainframe expansions haven't eclipsed minis, could networks shift the preference for general purpose minis to more specialized devices?

"We've asked ourselves," says Bank of Boston's Doggett, "Is there such a thing as a work group or departmental processor? Is it a short-lived trend if you can have all the power of a midrange on a desktop?" My feeling is yes, there are different functions. I distinguish between the individual's needs and the corporate needs." The need to consolidate data from multiple users will nurture midrange systems' growth, he says.

Life of Virginia's Jones envisions a different scenario. "The desktop and multiuser tiers are bleeding together," he says. "Are there three tiers? You bet. Will it be here for a while? Maybe for another year. But we've got to look farther than that." Partly due to the maintenance costs of minis, he says, the company is now testing networked micros in some offices.

Jones predicts that a world made up exclusively of micros and mainframes is near. "We're waiting on a multiuser operating system," he says. "As soon as it

hits and is powerful enough to tax the ability of the hardware, the mini vendors all will have a real problem." Whether distributed processing will lead to a new consolidation among vendors is another question.

Marty Gruhn, vice president of the market research firm the Sierra Group, Tempe, Ariz., says predictions of another shakeout in the midrange rests on an incorrect view of the industry as mature. "The computer business is far from a mature market," says Gruhn. "It's inconceivable that technology will cease to be a market opportunity in our lifetime. The low barriers to entry will keep this a free-for-all in the foreseeable future."

On the other hand, Craig Symons, vice president of midrange systems service at the Gartner Group, Stamford, Conn., says bluntly, "The industry is in consolidation. IBM and Digital are at the



BELL SEES 32 BITS AS A CONSTRAINT TO GROWTH.

top. There is a second tier of four or five players and after that everyone else is scrambling to survive."

Consolidation is being spurred on by users looking to narrow their list of suppliers, Symons says. "A lot of it is coming from large corporations trying to come to grips with what they've got. The fewer vendors one has, the easier it will be to integrate."

What's new in that view? The distinct hierarchy has been around for a decade. In the 1960s, the big three mini vendors were DEC, Scientific Data Systems Inc., Los Angeles, and Computer Controls Corp. (AKA 3C). Only DEC continues as an independent entity. William Wolfson, a founder of Computer Controls, now a Wellesley, Mass., venture capitalist, attributes the early shakeout to a lack of perseverance.

Scientific Data Systems and 3C, then the first and third largest companies in the market respectively, were sold in the mid-1960s to Xerox and Honeywell. Digital, which was then designing 12-bit

and 18-bit computers, wasn't to meet the industry norm with a 16-bit computer, the PDP-11, until 1971.

"To some small measure, DEC's success in minicomputers resulted from SDS and 3C giving up their autonomous status to large corporations, which blew the opportunity," says Wolfson. "Xerox and Honeywell left a clear field for Digital. [Digital founder] Ken Olsen had the staying power that none of the other principals had."

No Big Tech Breakthroughs Seen

Yves Steger, marketing director at Modular Computer Corp., Fort Lauderdale, Fla., says the vendor rankings today are a reflection of the market share gains made in the 1970s. "Digital had established itself in the 16-bit market. It had the base and then went into 32-bit [architecture] and sold into its installed base. It was the immediate standard. The same situation existed with pcs before IBM," Steger continues. "When the PC came out, IBM established itself as the guideline. Only a few large companies could do that."

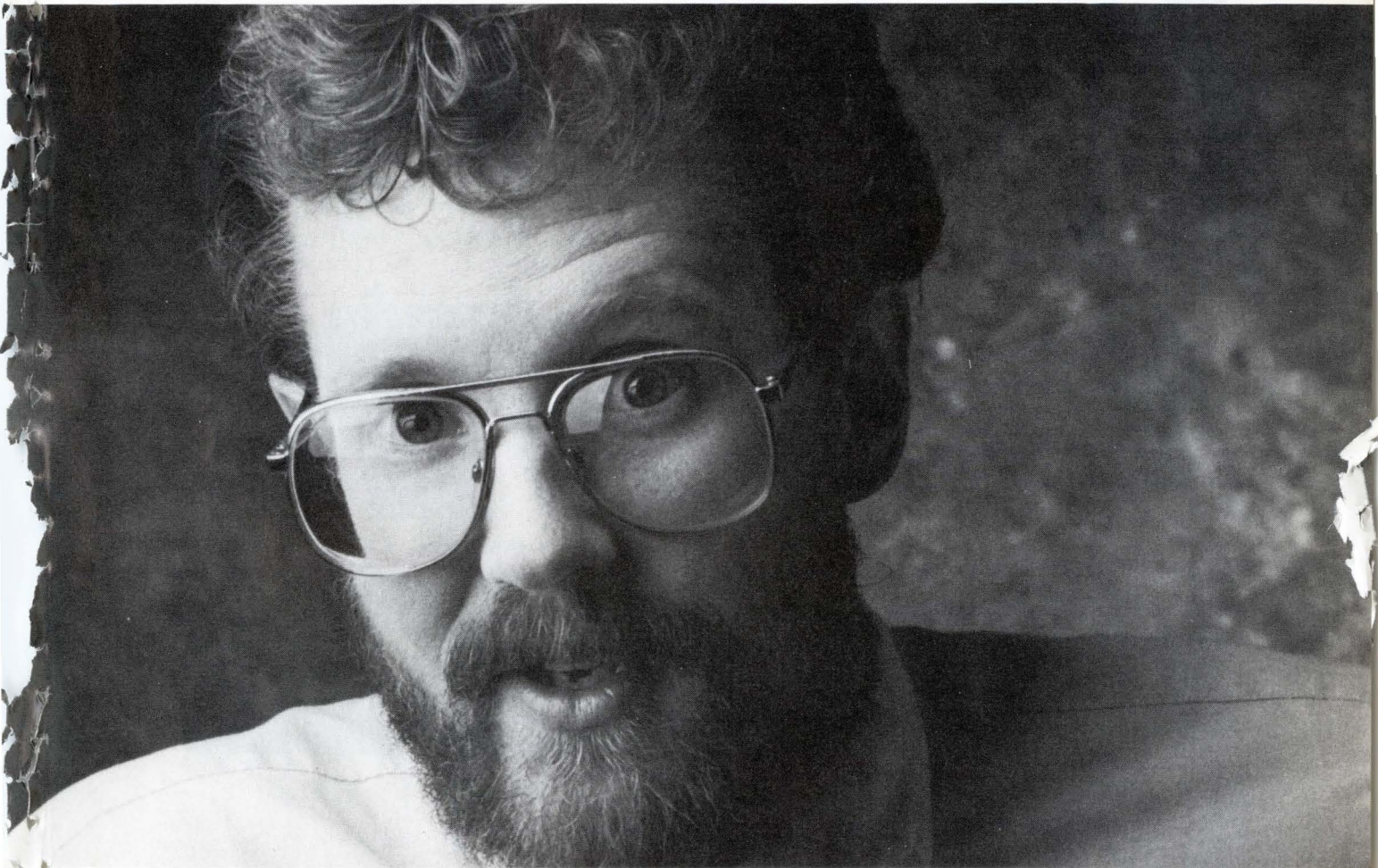
Bell, now coordinating computer and research policies for the National Science Foundation and advising vendors on computer designs, says early minicomputers were successful because they filled a price/performance gap. "What we have are price-range markets," Bell explains. "If a machine doesn't keep up and provide the right price/performance, another machine can come in and attack it."

Initially, minis thrived because of this gap and because users weren't acknowledged by mainframe companies as a distinct group. "They were the first machines that could be bought and used by a group of people as opposed to a central staff," says Bell. While today's minis are higher priced and more powerful, their use as the tool of a particular work group continues. "What's remained is the way machines are purchased and used," he says.

Bell, who views multiprocessors as successors to the original minicomputers, says users won't see any upcoming technological breakthroughs reshaping the market. Technology may change the face of the market but equal access precludes any single vendor from gaining exclusive use, he says. The Gartner Group's Symons agrees: "It's not so much who has the technology as who is able to use it to their best advantage."

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*Telequality Associates, *Data Communications*, January, 1987.

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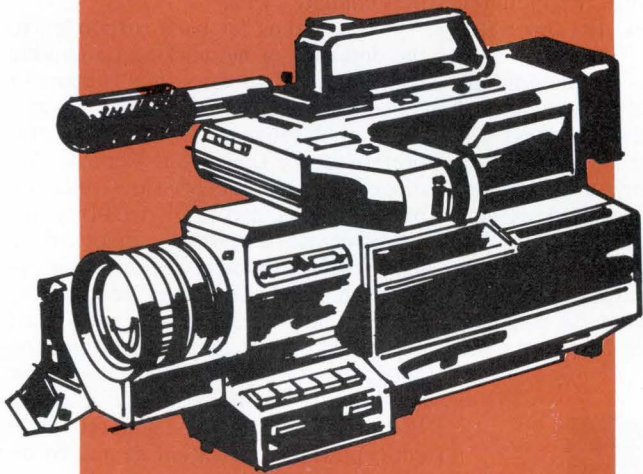
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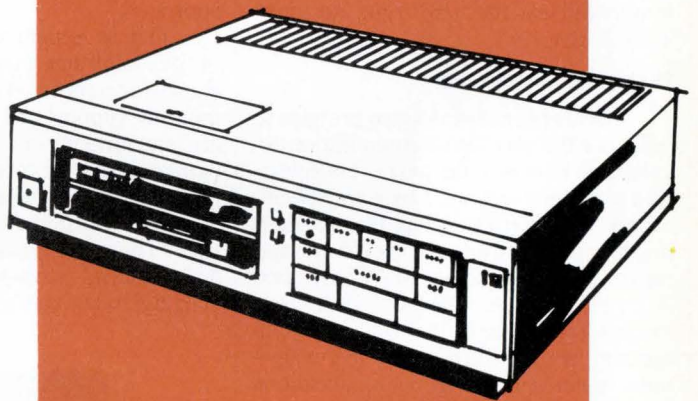
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Behind the News

The Sierra Group's Gruhn also says that, rather than challenge the mini, the microcomputer appears to be losing some of its allure, and is sharing the desktop market with low-end extensions of minis. The DEC MicroVAX and IBM 370 seek to become a solid alternative to the pcs based on Intel microprocessors, she says. "There is room for both technologies at the desktop," says Gruhn. She also predicts, however, that the networking strengths of desktop minis and mainframes will lead them to "come out ahead in the long term."

The Influence of the LAN

Local area networks also promise to influence the way the next generation develops. Whereas in the past users selected a machine solely on hardware specifications, that criterion has become less important as standard performance ranges have been achieved. With equivalent performance, selection has moved toward a measure of the available applications. In the future, some see evaluations again shifting to communications strength and how well tuned the computer is to run a particular application.

"There will be more special purpose devices as LANs make it easier to separate out the function you want," says Bank of Boston's Doggett. "Today, there is not a lot of evidence of that happening. LANs are very primitive and low capacity; you need lots of them to do a whole corporation." Whether such specialization will alter the evolution of general purpose systems is difficult to predict, he says.

Vendors promise to shape such demands into new features and functions in general purpose systems. According to Brian P. Fitzgerald, an engineering manager in Digital's microsystems development group, "The availability of commodity hardware and software says the value that people are looking for is in the next level up—facilities and applications. The distinction becomes, what do you have on top of the hardware? What are the communications, languages, databases? Later, that becomes the support layer to the next level up.

"The world is becoming more and more distributed," he continues. "People will use the resources in the next town or the other side of the world depending on what's available. And you really won't care where [they reside]."

Fitzgerald's view of the network becoming the system raises two issues:

how fast will such a model take over and will it lead to specialized machines that could make today's general purpose systems obsolete? The network model is not far away, according to Life of Virginia's Jones. "We're in the process of developing multiuser network applications on Novell [an Orem, Utah, network supplier]. The way the technology is changing, and with the growth and standardization of LANs, in time the industry as a whole will review the three-tier approach."

Just as expensive communications to the mainframe made minis the logical choice for remote offices, Jones says that monthly support and maintenance costs are encouraging a move to networked workstations. As databases and network protocols standardize, users are gaining increased freedom from a particular vendor. "There is a move toward vendor independence," says Jones. "A company starting today can gain hardware inde-

COULD A WORLD OF JUST MICROS AND MAIN- FRAMES RESULT?

pendence and have the advantage of taking a better price/performance machine for each [purchase]."

"No one machine does all of the things users require. The network model is the right one," asserts James R. Oyler, senior vice president at Harris Corp., Melbourne, Fla. As the network becomes the dominant factor, optimizing a computer for particular applications will create opportunities for niche vendors, he believes.

Douglas C. Spreng, vice president and general manager of Hewlett-Packard's Commercial Systems Business unit, challenges the view that networks will quickly usurp the role of the general purpose mini. "The mini will take on more of the role of the server and will function as the communications side," he argues. An environment made up of

purely specialized machines "is many, many years away. Customers don't move that quickly."

Both Bell and Gruhn see a future in which the mini remains a general purpose system. "There will be pinpoints of specialized servers but I don't think this is a specialized world," says Gruhn. "The commercial market user will stay with general purpose systems because they configure well."

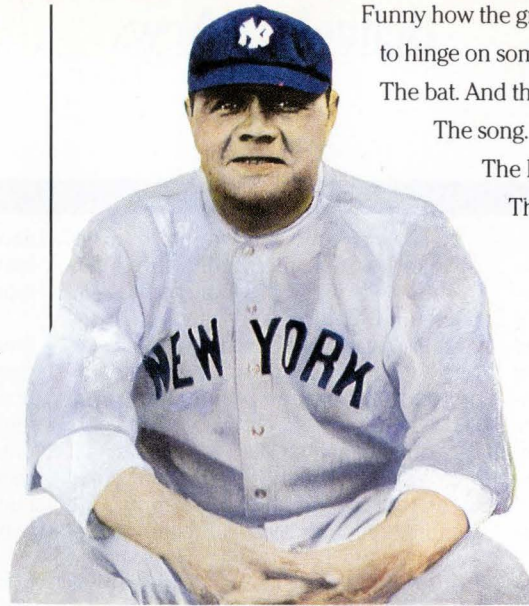
Users thus far have responded to the demands of networking by limiting the number of vendors they support or by setting standards for operating systems or databases. General Motors' preference for Unix is one example. Another is General Electric Co.'s selection of IBM, Digital, and Honeywell-Bull Inc. as departmental systems vendors. Both moves seek to protect investment in applications. The reliance on an operating system standard, however, could boost specialization by making multivendor networks more feasible. "That's where we'd like to be headed," says Bank of Boston's Doggett. "That's an attractive concept. The realization seems to be more difficult."

The Advantages With Unix

In response, many small vendors have made Unix the operating system of choice. The choice enables them to allocate scarce R&D money to applications or software tools instead of operating system development. Unix plays a role in the computer strategies of AT&T, Hewlett-Packard, Harris, Gould Inc., and the midrange lines of NCR Corp. and Unisys. At Prime Computer Inc. and Digital, among others, it's a strong second operating system.

Unix also enables some companies to become instantly competitive. For instance, mainframe maker NCR came into the midrange with its Tower family. More than 25,000 Unix-based Towers have been delivered in the past three years. Such demand spurred Honeywell-Bull, Prime, and others to add similar Unix multiuser systems to their product lines.

"Users who want to specialize further are now saying, 'We want you to standardize on things like Unix so we're not locked into proprietary machines,'" says Robert Mitro, who is vice president of marketing at Harris's Computer Systems Division. Vendors will have to provide specialized machines to better compete against the sheer number of



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Behind the News

computer makers, Mitro believes.

Typical of users turning to Unix is Guardian Industries, a Detroit-based architectural glass maker. Stan Mozeleski, director of information services, says the freedom from having to rely on a single vendor is a strong incentive. The company replaced its Datapoint Corp. systems with computers from AT&T, Pyramid Corp., and Harris. "We spent six months studying alternatives and picked Unix," says Mozeleski. "The [applications] catalogs used to be 20 pages thick and 80% was redundant. Now, one catalog—by *Usr/grp*—lists in excess of 3,000 products. The momentum is there."

Unix's appeal is not universal, however. Vaselenak Computer Services Ltd., Calgary, Alberta, recently switched from Texas Instruments to Prime. Staying with TI would have required a migration from a proprietary to a Unix operating system. "I need an operating system developed in a certain direction—for transactions—and I don't like Unix," says president Michael J. Vaselenak.

Unix isn't the only way to lessen dependence on a single vendor, says Jones of Life of Virginia. "I would pick Oracle [Belmont, Calif.-based Oracle Corp.'s database] over the [Unix] operating system if I were looking for vendor independence. It's stable, and runs on IBM, DEC, and DG," he says. "The only thing users care about is if it works."

Vaselenak balked at Unix and TI and went looking for another vendor. He wanted a supplier with a broad range of systems and felt Natick, Mass.-based Prime was more closely allied with his own size and interests. "There's a continuum from Atari to Amdahl," he says. "It's a ladder and we're trying out the next rung."

His view of a continuum aptly describes what's happened with minis, the description of which has changed with each generation. "There are all kinds of definitions of a mini," says Bell. "When it started up it was a machine that cost less than \$100,000. When it really hit stride in the early '70s, the basic machine was

about \$10,000. Today, it's from there to maybe \$500,000. The machines just got more powerful and more expensive."

Distributed computing promises more specialized machines as well as the general purpose computers and multi-processors available today. "The challenge," says Harris's Mitro, "is for vendors to provide a single tube to access these specialized capabilities. It gets to families of machines that do different capabilities tied to a network."

If in that network model the mini is just another connection among the dozens, it's still a far cry from the visions of obsolescence that once hung over it. ■

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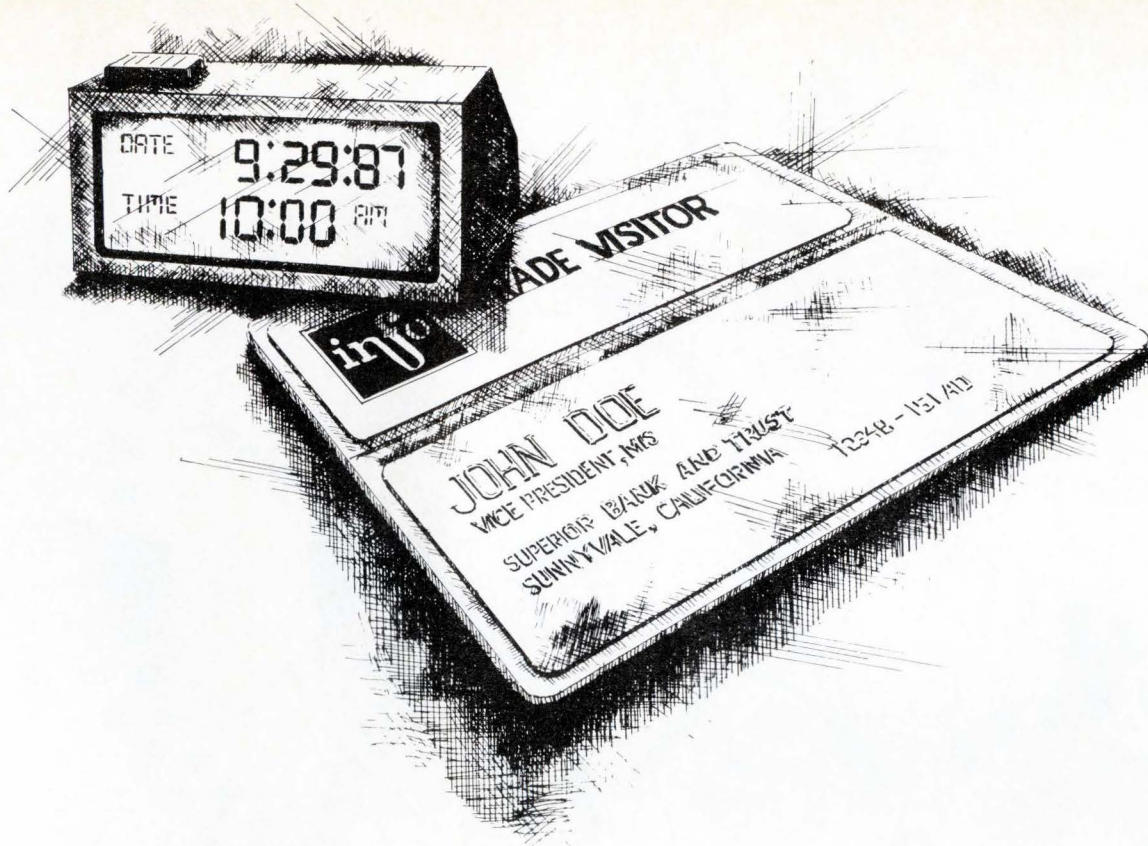
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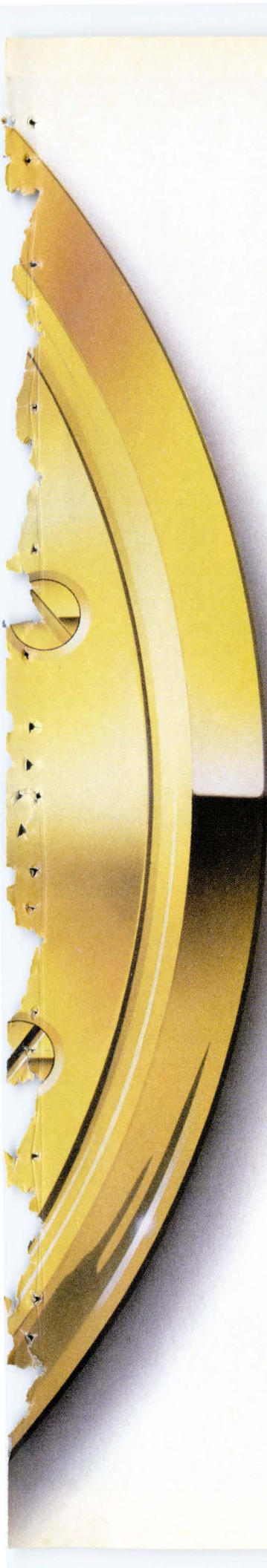
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I N T E R N A T I O N A L

The European



**DATAMATION Maps the Major Powers
In the European Dp Market**

Model by Kathy Jeffers and photograph by Walter Wick

A weak dollar and a steady demand for software, minicomputers, and pcs characterized the European dp market in 1986. These factors helped both U.S. and indigenous dp suppliers to maintain revenue growth. Although IBM had a rough time in some of its major markets, overall it was a good year for the high and mighty in European dp.

BY SARAH UNDERWOOD
AND PAUL TATE

The combination of the weak U.S. dollar and the continued steady growth in Europe's main markets helped the 25 highest and mightiest European dp companies smash through the \$40 billion barrier in 1986. The combined revenues of the top 25 companies in Europe last year—\$44.5 billion—represents an impressive increase of 29% over 1985.

For most of the U.S. dp companies facing depressed revenue increases in their home market, Europe provided a growth opportunity not to be missed in 1986. But while U.S. suppliers sought to bolster flagging corporate revenues with strong overseas sales, Europe's indigenous suppliers more than held their own. Last year, the European dp market—valued at over \$70 billion—helped firms from both sides of the Atlantic achieve revenue growth.

Though the mainframe market only showed modest increases in most countries, the demand for minicomputers, personal computers, and communications products was strong.

The 1986 DATAMATION European 25 survey also reveals a number of more specific trends. The revenue difference between the first- and last-place firms on the list was again considerable. While IBM, taking its traditional place in the number one position, recorded European dp revenues of \$15.7 billion in 1986, Data General was in the chart's basement with sales of \$283 million. That revenue threshold for entry to the top 25 is much higher than the \$219 million level in 1985, due, for the most part, to the effect of the weak dollar on currency conversions.

The weak dollar, however, does not account for IBM's changing fortunes in Europe during 1986. Big Blue's European sales represented 35.3% of the European dp industry's 1986 combined revenue total, compared with 39% in 1985 and 1984. In fact, IBM's performance in Europe last year was not at all impressive. Although the company recorded an increase of 21% in dollars for the year in Europe, that figure hides the real story—IBM suffered badly in many of its major markets. For example, in West

Germany, which is IBM's largest European market, the company's dp revenues fell drastically, by almost 13%, despite the market's overall growth of around 17% over the same period. In France, the second-largest revenue producer for IBM in Europe, sales were off by 9% (see Figure 2).

Despite these problems, the weak dollar helped IBM convert its modest achievements in Europe into an impressive 21% increase overall in dollars. This came as welcome relief in its Armonk, N.Y., headquarters, because the company's business at home had been even worse. This is reflected in the fact that Big Blue's European revenues accounted for 32% of its worldwide dp sales—up from 28% in 1985.

By contrast, most of the European companies had little trouble maintaining genuine growth rates either within Europe or worldwide. There are 14 European companies from seven countries on this year's DATAMATION European 25, compared to 13 in 1985. These European firms accounted for 41% of the combined revenue total of the 25 companies in 1986, up from 35.5% in 1985.

What's more, the combined worldwide revenues of the top 20 European-owned companies (see Figure 1) rose to \$23.4 billion—an increase of 36.6% over the previous year.

This healthy growth among the major European vendors did not affect the positioning of companies at the top of the European 25 table, however. With IBM still in its unassailable number one slot, West Germany's Siemens remained at number two, with 14.5% growth on 1986 revenues of \$3.9 billion. If its foray into the U.K. computer market, which began last year, turns out to be successful, then it can expect to do even better in 1987.

Meanwhile, Digital Equipment Corp. kept its number three position with another strong year, registering European revenues of \$2.8 billion, while Italy's Olivetti and France's Groupe Bull maintained their respective number four

**A BRITISH
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and number five rankings, with each recording growth rates of around 12% in local currency.

Data General reentered the list at number 25 after having been knocked off the chart in 1985. The minicomputer company's 31% increase in European sales reflected last year's strong growth of Europe's mini market. That trend benefited Digital and helped Norway's fast-growing mini maker Norsk Data enter the rankings for the first time, at number 23, with revenues of \$318 million and an astounding 84% sales increase, measured in local currency.

Xerox's European joint venture, Rank Xerox, also climbed back into the rankings during 1986 after dropping off the chart in 1985. Rank Xerox's 1986 dp sales of \$371.6 million were up by a hefty 48% over 1985, putting the company into the 21st position in 1986.

Falling off the chart in 1986 was the U.K.'s recently privatized telecommunications authority, British Telecom. The incorrect inclusion of dp revenues garnered from internal sales had placed it at number 15 in the 1985 ranking, but after the proper adjustments were made in the 1986 survey it dropped off the table. The merger of Burroughs and Sperry to form Unisys accounts for the second slot that was filled by a newcomer. Unisys grabbed the number six position on the 1986 chart, knocking West Germany's Nixdorf down one place to number seven, despite its respectable 18% increase in sales, measured in deutschmarks.

But the European company that really took a nosedive last year was Sweden's ailing telecommunications company, L.M. Ericsson, which fell four places to number 12 after a disastrous 9% drop in European sales. That fall follows a two-place slide in 1985, and while some say most of its problems are now sorted out on the dp side, Ericsson has an enormous task ahead of it to regain ground in the European marketplace.

Ericsson's continuing fall from grace, and the merger of Burroughs and Sperry, helped many other firms move up the rankings in 1986. The Dutch Philips group managed to rise one place to number eight despite only a modest 5% increase in sales. Also moving up one position was U.S. micro company Apple Computer Inc., which benefited from strong European demand for its Macintosh. Apple's European revenues were up by 42%, measured in dollars, to \$325 million. Office systems specialist Wang Labs also recorded a healthy growth rate of 34% and moved up one rung to the

FIGURE 1 **Leading European Dp Companies**

	COMPANY	COUNTRY	WORLD-WIDE DP REV (\$ MIL)	% CHG ACTUAL ACCTG CURRENCY
1	Siemens AG	W. Germany	\$4,387.1	10.5
2	Ing C. Olivetti & Co. SpA	Italy	3,865.2	14.5
3	Groupe Bull	France	2,568.0	10.4
4	Nixdorf Computer AG	W. Germany	2,075.1	14.3
5	N.V. Philips Gloeilampenfabrieken	Netherlands	1,763.3	-4.7
6	STC plc	U.K.	1,748.7	14.5
7	LM Ericsson	Sweden	1,344.2	-9.3
8	Compagnie Générale d'Electricité	France	1,025.0	7.6
9	BASF	W. Germany	520.7	7.6
10	Mannesmann Kienzle GmbH	W. Germany	488.9	1.4
11	Racal Electronics plc	U.K.	469.1	7.4
12	Rank Xerox	U.K.	458.8	70.0
13	Atlantic Computers plc	U.K.	431.0	67.4
14	Cap Gemini Sogeti	France	419.9	32.2
15	Ferranti plc	U.K.	351.5	8.6
16	Norsk Data AS	Norway	349.1	36.6
17	British Telecom plc	U.K.	330.4	44.9
18	Plessey Co. plc	U.K.	294.1	2.5
19	Nokia Corp.	Finland	273.4	2.7
20	United Leasing	U.K.	267.6	NA

NA: not available

FIGURE 2 **IBM Europe's Major Markets**

COUNTRY	1986		% CHG AAC	1986		NET INCOME (\$ MIL)
	LOCAL SALES REV (\$ MIL)	% CHG \$ U.S.		TOTAL REV (\$ MIL)*	% CHG AAC	
France	2,672.2	18.1	-8.9	5,285.3	-2.5	356.7
W. Germany	3,319.4	18.3	-12.7	5,540.6	-9.1	238.7
Italy	2,020.0	31.6	2.8	3,007.9	4.8	363.5
Netherlands	842.4	24.6	-8.1	1,313.1	-6.2	102.0
Spain	789.0	29.6	6.6	1,286.9	-6.2	154.9
Sweden	597.3	21.3	0.5	1,102.3	7.6	79.5
U.K.	2,420.6	29.2	12.7	4,526.5	1.2	385.3

*These figures include intercompany transfers. AAC = Actual accounting currency

number 15 position.

The big climber in 1986 was U.K. leasing company Atlantic Computers plc, which jumped five places to number 20 after entering the chart for the first time in 1985 at number 25. The company's 50% growth surge was largely a result of increased numbers of high-value leases for IBM 3090 mainframes.

Climbing four places to number 13 was France's telecom giant Compagnie Générale d'Electricité, which recorded dp revenues in Europe of \$943 million, up by 10% in local currency. This compa-

ny will not appear on the chart next year, however, due to the merger of its dp and communications interests with ITT.

Recording much stronger growth in its business last year was U.S. company Hewlett-Packard, which saw its European sales grow by 37% to \$1.5 billion, pushing it three places up the ladder to number nine. Five companies edged up two places in the 1986 survey: NCR, Control Data, and Commodore from the U.S., and Mannesmann and BASF from West Germany. Only six companies remained in the same position as last year.

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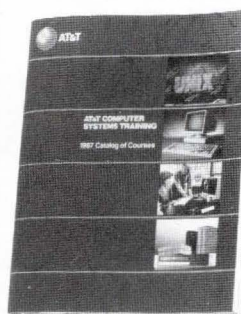
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Last year was also one of corporate partnerships, a continuing trend in Europe, which again affected many of the top 25 companies. Bull tied the conjugal knot with Honeywell Information Systems and Japan's NEC, while Olivetti broadened its horizons with the acquisition of Triumph-Adler from Volkswagen.

Siemens and BASF merged their pcm businesses into a new force in the European pcm world: Comparex Information Systems, which will focus on selling Hitachi-built mainframes to European customers. Troubled Ericsson, meanwhile, teamed up with DEC to supply banking systems, and French services house Cap Gemini Sogeti went to the U.S., West Germany, and Italy to acquire firms.

Companies breaking into the value-added network (VAN) services market were among the most ardent suitors. IBM France started discussions with the French bank Paribas and Paris-based services house Sema-Metra. Bull entered similar talks with GEISCO and, in the

already deregulated U.K. market, ICL also tied up with GEISCO. By the end of the year, Italy was also considering the potential of VANS, and IBM Italia was just weeks away from signing a deal to set up a service provider with Olivetti.

In the more traditional services sector—software, consultancy, processing, and training—growth remained strong through 1986. The European Computer Services Association says business grew 19% in real terms to a value of \$23.5 billion last year.

The European market is now more than half the size of its U.S. counterpart. In the European services market, packaged software accounted for 36%, custom software and consultancy for 29%, processing services for 31%, and training for the remainder.

On a country-by-country basis, the U.K., Italian, and West German markets showed growth in excess of 20%, while Spain was Europe's up-and-coming dp market, claiming 25% growth in its ser-

vices sector. The French market, home of Europe's biggest software and services suppliers, expanded just 16%.

On the hardware side, the 1986 mainframe market experienced only modest increases although the year was notable for IBM's additions to the 3090 line, the emergence of the new Comparex pcm company in West Germany, and the unrest among Sperry users following the merger with Burroughs.

Further down the power spectrum, the attractive price/performance ratings of Digital's VAX and MicroVAX won the hearts of both value-added resellers and users, while Hewlett-Packard booked orders for its Spectrum machines, and Norsk Data proved that its computer range could take its place with the best of the competition.

Unix was a hot topic during the year. Most of the European majors prepared new systems or launched Unix products in 1986, a trend that has continued this year. The X/Open group, boost-

The DATAMATION European 25

1986 RANK	1985 RANK	COMPANY	HEAD-QUARTERS	1986 EUR DP REV	% CHG \$ U.S.	% CHG AAC*	TOTAL DP REV
1	1	IBM	U.S.	\$15,688.7	21.1	21.1	\$49,591.0
2	2	Siemens AG	W. Germany	3,860.6	46.5	14.5	4,387.1
3	3	Digital Equipment Corp.	U.S.	2,776.7	27.4	27.4	8,414.3
4	4	Ing C. Olivetti & Co. SpA	Italy	2,705.6	45.2	12.9	3,865.2
5	5	Groupe Bull	France	2,413.9	44.6	11.7	2,568.0
6	—	Unisys Corp.	U.S.	2,263.4	NA	NA	9,431.0
7	6	Nixdorf Computer AG	W. Germany	1,909.1	60.1	18.1	2,075.1
8	9	N.V. Philips Gloeilampenfabrieken	Netherlands	1,534.1	42.3	4.9	1,763.3
9	12	Hewlett-Packard Co.	U.S.	1,485.0	36.9	36.9	4,500.0
10	10	STC plc	U.K.	1,422.5	37.0	19.5	1,756.2
11	13	NCR Corp.	U.S.	1,225.7	31.4	31.4	4,377.6
12	8	LM Ericsson	Sweden	1,196.3	9.0	-9.4	1,344.2
13	17	Compagnie Générale d'Electricité	France	943.0	42.5	10.0	1,025.0
14	14	Honeywell Inc.	U.S.	699.3	43.3	43.3	1,890.0
15	16	Wang Laboratories Inc.	U.S.	587.2	34.4	34.4	2,668.9
16	18	Control Data Corp.	U.S.	502.0	18.6	18.6	3,346.7
17	19	Commodore International Ltd.	U.S.	456.0	14.7	14.7	800.0
18	20	Mannesmann Keinzle GmbH	W. Germany	444.9	38.9	2.6	488.9
19	21	BASF	W. Germany	411.4	45.8	7.6	520.7
20	25	Atlantic Computers plc	U.K.	395.9	80.4	49.7	431.0
21	—	Rank Xerox	U.K.	371.6	70.0	47.6	458.8
22	23	Apple Computer Inc.	U.S.	325.0	42.6	42.6	2,031.0
23	—	Norsk Data AS	Norway	317.7	150.0	83.6	349.1
24	—	Cap Gemini Sogeti	France	293.9	51.8	17.2	419.9
25	—	Data General Corp.	U.S.	283.3	31.3	31.3	1,287.6

All currency figures are in millions. NA = not available. *Actual accounting currency.

The European 25

ed by the addition of Digital, Unisys, and Hewlett-Packard to its membership list, pressed ahead with its concept of a common applications environment and produced further specifications that will be adopted by its member companies in products to be launched this year.

In the European micro market too, standards became a point for discussion as rumors of IBM's 1987 launch of PS/2 began to circulate. In terms of market share, however, IBM took a beating last year at the hands of clone makers such as Olivetti and the U.K.'s micro upstart Amstrad. While IBM did not dominate the total pc market—from home computers to scientific and technical workstations—it did hold sway in the business and professional pc market sector. But it achieved no growth, reports International Data Corp., with unit shipments flat at 330,000 units. Compaq and Siemens were the star performers last year, turning out 65% and 150% more pcs, respectively.

These trends in the hardware sec-

tor seem set to continue during 1987, leaving IBM with some tough marketing decisions to make if it's to maintain its hold on the European market. The new PS/2 will definitely be a big help at the pc and departmental systems level, but with the strengthening of many European companies during 1986 at Big Blue's expense, with the continued rise of the minicomputer firms in Europe and the corporate mergers that got under way last year in the European mainframe and communications sectors, 1987 is going to be a critical year in European dp.

Methodology

For this survey, Europe includes Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, the U.K., and West Germany.

Dp-related revenue is defined as general purpose dp products and services generated by one or more of the

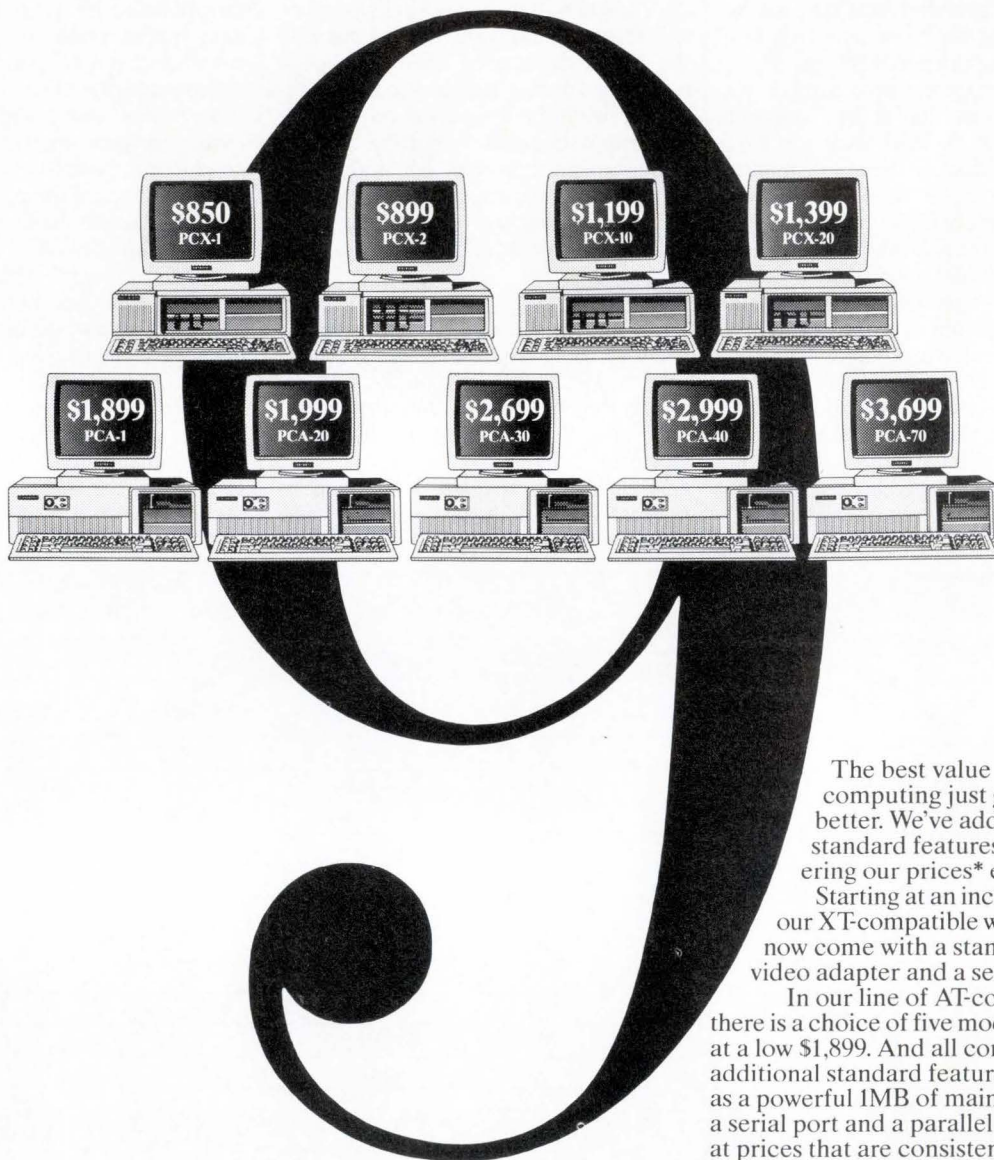
following categories or equipment: mainframes, minicomputers, office systems, data communications, peripherals and terminals, software and services, and maintenance and repair. Excluded are data transmission or "basic" services revenues from specialized common carrier, standalone electronic and mag card typewriters and standalone electronic cash registers, instrumentation, semi-conductors, printed circuit boards, automated test equipment, and dp supplies, with the exception of magnetic media for disk and tape drives.

All peripherals that attach to a system are included. For computer-based manufacturing systems, such as computer-controlled machine tools, only computer and hardcopy output devices are included and not the tools themselves. All revenue and earnings figures have been adjusted to calendar year calculations. All European company figures were converted to U.S. dollars, using OECD exchange rates. ■

TOTAL DP REV % CHG	1986 TOTAL REV	EUR DP REV AS % OF TOT DP REV	DOM REV AS % OF TOT DP REV	DP REV AS % OF TOTAL REV	NET INCOME	1986 EMPLS	FISCAL YEAR END
2.1	\$51,250.0	32	49	96.7	\$4,789.0	403,508	Dec.
49.8	21,669.6	88	65	49.8	679.3	363,000	Sept.
19.7	8,414.3	33	56	100.0	861.5	101,000	June
46.5	4,902.3	70	37	78.8	378.9	59,091	Dec.
10.5	2,568.0	94	66	100.0	39.1	26,804	Dec.
NA	9,536.7	24	69	98.8	254.3	98,300	Dec.
54.8	2,075.1	92	52	100.0	102.3	25,576	Dec.
29.1	22,464.1	87	NA	7.8	414.3	344,200	Dec.
12.0	7,102.0	33	53	63.3	516.0	82,000	Oct.
31.9	2,794.1	81	63	62.5	151.6	NA	Dec.
12.7	4,881.6	28	49	89.6	336.5	62,000	Dec.
9.4	4,444.4	89	NA	30.2	53.1	75,000	Dec.
39.4	11,673.9	92	48	8.7	248.2	150,000	Dec.
-3.2	7,268.2	37	55	26.0	-9.6	98,597	Dec.
9.9	2,668.9	72	64	100.0	-86.4	31,000	June
-9.1	3,346.7	15	70	100.0	-264.5	34,200	Dec.
6.7	837.7	57	32	95.5	-10.0	NA	June
37.4	627.6	91	65	77.9	NA	8,864	Dec.
45.8	18,650.2	79	NA	2.7	NA	131,468	Dec.
92.0	470.6	92	62	91.5	29.9	630	Dec.
70.0	2,832.4	81	—	16.0	202.0	NA	Oct.
15.8	2,031.0	16	74	100.0	155.3	5,940	June
58.8	349.1	91	55	100.0	468.0	3,618	Dec.
71.3	419.9	70	37	100.0	27.4	7,500	Dec.
7.4	1,287.6	22	64	100.0	-26.8	15,565	Dec.

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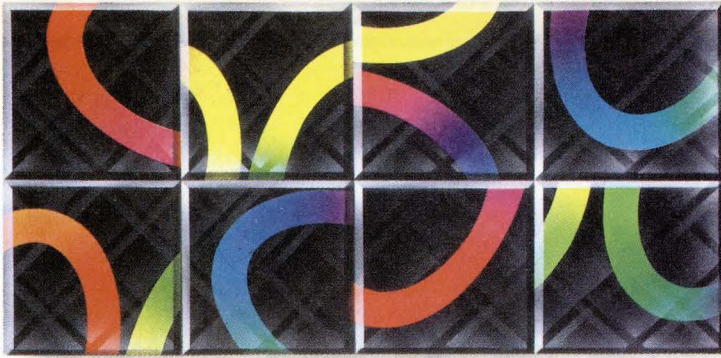
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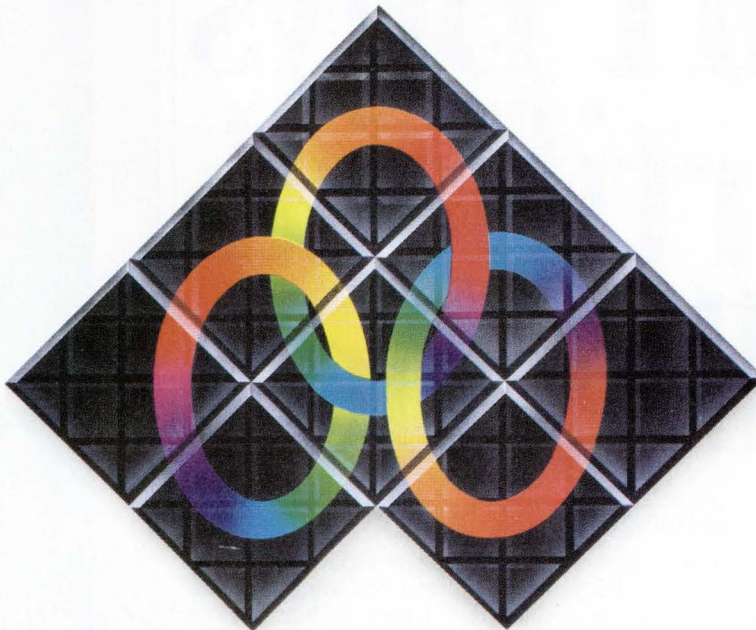
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Smart Buys in Artificial Intelligence

BY PAUL HARMON

At long last, artificial intelligence has found a home in the MIS department. On the most basic level, AI can be used today to trim maintenance costs and increase applications development productivity. In the bigger scheme of things, the fledgling technology can be used by clever companies to gain and keep a competitive advantage. MIS managers can make smart buys in a wide range of AI wares—everything from small expert system shells to large expert system building tools that speed up the development of more massive and complex applications. But to reap those rewards, you must begin learning about and using a technology that can help shape your company's future.

MIS managers seeking new ways to improve applications development and productivity can now turn to the artificial intelligence (AI) arena for some answers. There are a number of knowledge programming tools on the market and more are on the way. MIS chiefs shopping for these products can make smart buys in everything from small expert shells to large expert system building tools that speed the development of more massive and complex applications.

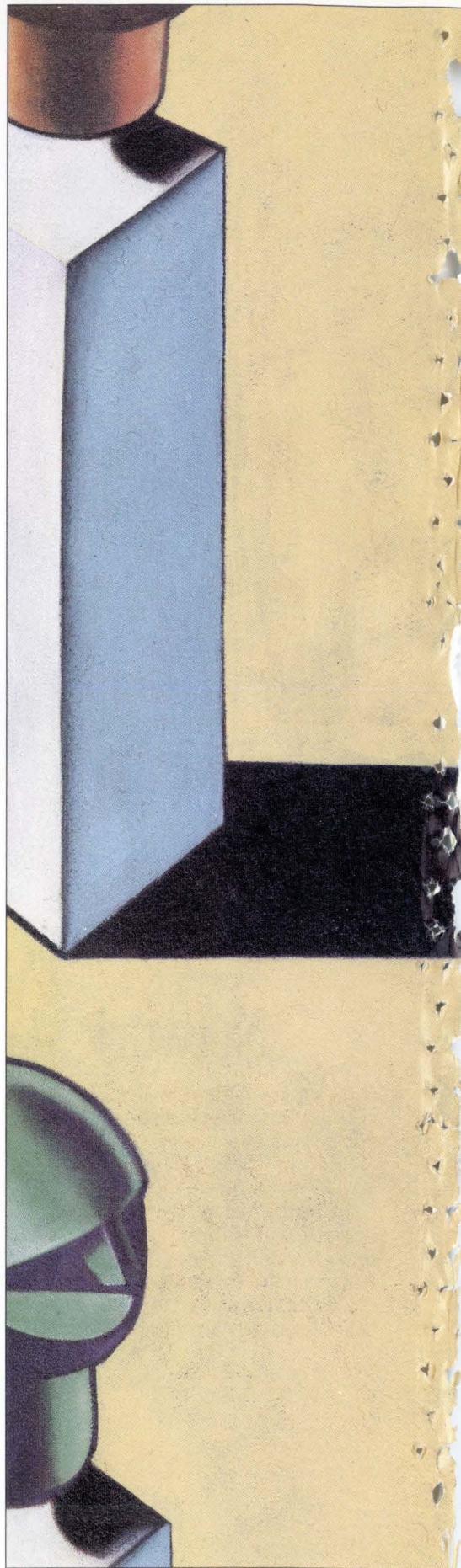
The most important thing for you to keep in mind when examining the alternatives is that AI is not a product. It is an academic discipline, just like physics or biology. Therefore, it's going to be around for a long time and will continue to spawn new developments. The current focus of commercial activity is on a set of concepts, techniques, and methods that have come out of AI labs over the past decade. While some of the techniques are linked, others are only loosely related.

At the most basic level, AI offers techniques to MIS that will aid application development and maintenance and ease user/computer interaction. On a broader scale, AI promises a competitive advantage to those companies that implement the technology in an effective manner.

Several industrial sectors will be changed in fundamental ways when some of the large strategic systems now under development become operational in the next two to five years. Those changes should be most apparent in the financial services world, where big improvements in productivity and in the quality of decision-making are expected as a result of the application of AI.

Before you can make a smart buy, you need to have a strategy. There are roughly four strategies that have been adopted, either individually or in combination, by companies that are actively and successfully using artificial intelligence techniques. They include using AI technology to

- improve conventional mainframe applications;
- improve or develop midsize micro or workstation applications;



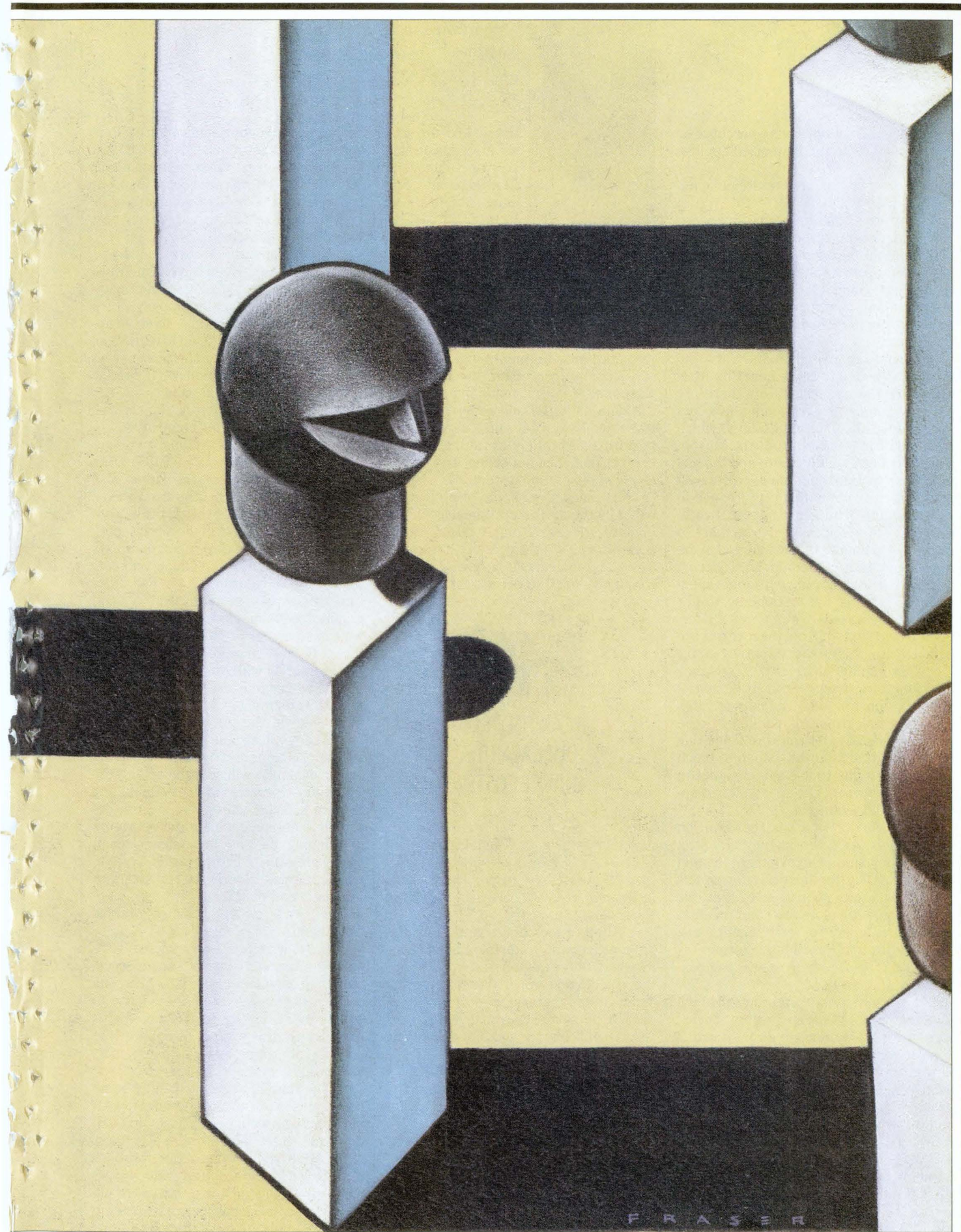


Illustration by Douglas Fraser

- support users who want to purchase or develop small- to medium-sized applications; and
- implement major new strategic applications that will transform the way a company does business.

A decision to focus on improving conventional mainframe applications allows MIS to control the introduction of AI technology. Since this strategy is aimed at leveraging applications that are already well understood, the risks are relatively low.

Up until about eight months ago, the products needed to implement this strategy were not available. Now there are several companies, including IBM and Westwood, Mass.-based Cullinet, which offer mainframe-based products. Most of these vendors would like to see the MIS community using mainframes to develop and deliver systems that capture significant amounts of human expertise. In other words, they'd like their customers to pursue an AI course that would lead to the implementation of medium-sized expert systems or to major new strategic applications. (Many practitioners prefer "knowledge-based system" or "inference-based system," but these terms are in fact synonymous with expert system.)

Developing large expert systems on mainframes may eventually become a viable option, but today the risks are high and a big investment is needed to reap real rewards. A safer route, and one that could yield significant benefits much sooner, is simply to use AI techniques to reduce maintenance costs and boost applications development.

One vendor that has zeroed in on this area is Aion Corp., in Palo Alto. Aion's Application Development System (ADS) is clearly the best buy for an MIS shop that wants to use AI to improve applications development and maintenance. Designed for IBM mainframes, ADS is written in Pascal but incorporates a core of COBOL code to assure full control over interfaces.

For example, ADS can run in its own CICS region as a VTAM application. Therefore, it can communicate directly with a transaction-processing application running in another CICS region, meaning that a CICS application can call an ADS program. An MVS version sells for \$70,000 and a VM version sells for \$60,000. The interface to IMS/VS is an additional \$25,000; for CICS/VS, it's an extra \$15,000. A pc version of ADS costs \$7,000. ADS programs developed on a micro can be moved to a mainframe.

To promote its product, Aion Corp.



Smart Buys in Artificial Intelligence

has linked up with several mainframe software suppliers. Management Science America, Atlanta, and McCormack & Dodge, Natick, Mass., are both developing systems in ADS. Several applications developed in ADS will become available within the next few months.

Boole & Babbage, Sunnyvale, Calif., used ADS to create the DASD Advisor, the first in its new series of mainframe performance measurement tools. The Advisor, a postprocessor for the firm's DASD Response Manager, reads and interprets the data gathered and reported by the DASD/RM. It then goes on to diagnose I/O performance bottlenecks at the channel, control unit, head-of-string, and device levels of the I/O subsystem.

MIS managers should also consider using Intellect, a natural language development package from Artificial Intelligence Corp., Waltham, Mass. If the managers and technicians in your company frequently need to access databases on

and then move your application to Personal Consultant Plus (\$2,950) if you need more power. Personal Consultant is written in Scheme, a dialect of Lisp, but applications can be delivered in either Lisp or C. The software runs on pcs, VAXs, and Lisp machines.

If your application turns out to be very complex, then you can transfer it to a special version of TI's Personal Consultant Plus that runs on the company's Lisp machine. In the near future, selected applications will be embedded in hardware, enabling TI to support customers who want to encode applications on their new Lisp microchip. The flexibility of TI's Personal Consultant product line is well suited for manufacturing companies.

For smaller applications, two safe bets would be Insight 2+ (\$485) from Level Five Research in Indialantic, Fla., and Exsys (\$395 to \$5,000) from Exsys Inc. in Albuquerque, N.Mex. Both products run on pcs and VAXs. For large applications that will be developed on a VAX, you should take a look at Object Nexpert (\$7,000) from Neuron Data in Palo Alto. This DEC-supported tool offers a good graphics development environment as well as a number of other advanced features. If your managers want an easy way to interact with Lotus 1-2-3, then the natural language front-end Hal from Lotus Development Corp., Cambridge, Mass., may fill the bill for only \$150.

There will also be a number of mid-size applications available before long. TI, for example, will soon be selling the Computer Operator Advisor & Training System (COATS), an expert system designed to assist console room operators in bringing up and maintaining mainframe programs. The pc-based system, which diagnoses hardware and software problems and makes action recommendations, was created using Personal Consultant.

COATS, which runs on a micro situated in the control room, has a voice generator that allows operators to hear and answer questions when they have to move away from the control console. TI plans to use this system to support the console room operators who maintain its worldwide communications network.

The third AI avenue taken by some companies is to concentrate on supporting users who want to purchase or develop small- to medium-sized applications. Many firms have arrived at this approach by default. Having acquired their own expert system building tools, end users and technical professionals began to develop their own applications. If the applications

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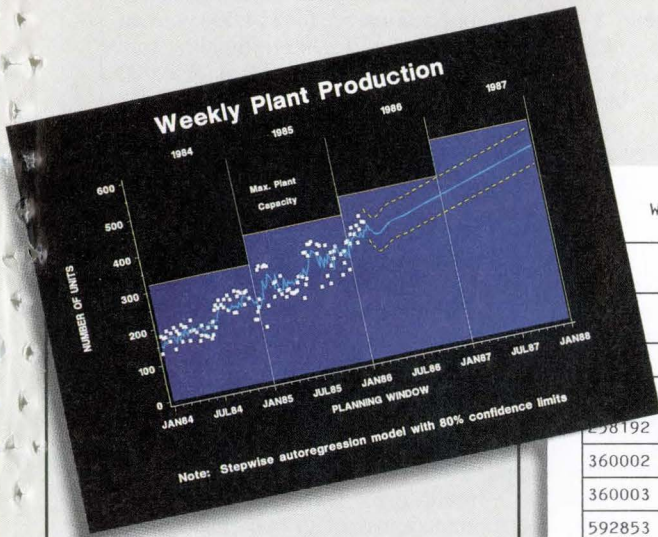
IBM mainframes or Digital Equipment Corp. VAXs to get reports, then Intellect may be a wise way to go. The package facilitates ordinary English access to these databases.

Another tack that some companies have pursued is to develop or enhance midsize, knowledge-based applications that can be run on micros or mainframes. This strategy, like the mainframe approach, puts emphasis on leveraging existing applications and on developing smart interfaces for data from spreadsheets or databases. The risks are low because you can use your own programming staff and your only costs are for software and training.

The technology needed to travel this path is readily available. Texas Instruments markets a family of expert system building tools known as the Personal Consultant series. You can start with Personal Consultant Easy (\$495)

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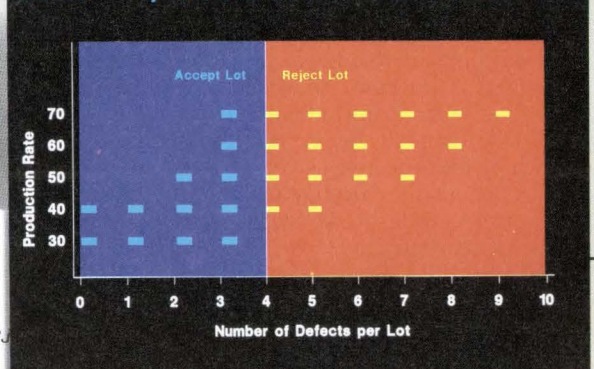
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40	6	1	6	3.5	33
50	6	3	8	5.5	66
60	6	4	9	6.5	83
70	7	4	10	7.0	85

Smart Buys in Artificial Intelligence



are small, then MIS managers can probably relax. But when the tool population reaches a critical mass, the MIS shop should provide help and training.

The vendors at the low end of the market sell easy-to-use products that nonprogrammers can work with. Small expert system building tools are analogous to spreadsheet packages. With a spreadsheet, users are, in effect, entering knowledge and letting the application manipulate it. The small expert system shell contains an "inference engine" that also knows how to manipulate some type of knowledge, usually in the form of if-then rules. The user enters rules about some analysis or decision process that needs to be communicated and then gives the system to someone who can use it to obtain recommendations. The first generation of small expert shells are being used by the same people who initially brought electronic spreadsheet programs into companies.

The second generation of small tools, which are just beginning to appear, are tailored to one specific task. One example is EnForm from Mind Path Technologies in Dallas. EnForm, which has not been released yet, is designed to help managers develop forms-entry applications. Other products that allow technical writers to quickly automate documentation manuals are in the works. Also on the drawing board are products that can be used by managers to create systems that will help staffers solve specific personnel problems.

There are minimal risks and costs in this approach because the applications are developed on existing pcs with tools that sell for no more than \$500. The potential gains in professional productivity, however, can be substantial.

One company that hopes to garner those gains is Du Pont. Ed Mahler, the head of the AI group in Du Pont's corporate MIS department, hopes to increase significantly the effective use of computers throughout the corporation by encouraging the widespread use of small expert system building tools. Du Pont currently has over 150 small applications in the works. Mahler estimates that the typical application, including hardware and personnel time, costs Du Pont about \$25,000. That same application, notes Mahler, is saving the chemical giant between \$250,000 and \$500,000.

Various products on the market can help users develop small systems. VP Expert from Paperback Software, Berkeley, Calif., is currently the best buy for most users. Selling for \$99, it is easier

to use and has more features than most of the products that sell for as much as \$1,000. Insight 2+, Personal Consultant

Easy, and Exsys are all popular, as is 1st-Class (\$395) from Wayland, Mass.-based Programs in Motion.

The fourth and final strategy is to implement major new strategic applications that will transform the way your company does business. This is a high-cost, high-risk approach that can result in increased profits and competitive gains for your company if you choose the right application, have the right development team, and have lots of support from senior management. This strategy also usually requires a major investment in Lisp programmers and hardware.

The main impetus for large strategic systems has come from the R&D departments of Fortune 500 companies. End users who learn about systems their competitors are working on push for similar projects.

The first commercial system in this top-of-the-line class was Digital's XCON, a large application that makes sure all the necessary parts arrive at a customer's site when a new VAX is delivered. As the word about XCON leaked out, other computer companies launched their own efforts to develop configuration systems.

One business sector that has invested heavily in these powerful, high-priced tools is the aerospace industry. The demand for large, standalone applications from the Department of Defense and groups such as NASA justifies the use of this complex and costly approach to application development. Within the next few years, other manufacturing organizations are expected to follow suit.

The development of large systems has not been a major concern of most MIS departments. It could become a concern of yours, however, when end users in your company perceive that the competition has achieved a breakthrough in productivity or quality as a result of an AI system. Then you may be asked to research and develop a system overnight. Therefore, some investment in products that keep you in the know about the high end of the AI technology market is probably a good idea.

The smart move for someone who wants to keep abreast of what can be done with large, hybrid expert system building tools is to go with GoldWorks from Gold Hill Computer in Cambridge, Mass. This newly released Lisp-based

shell, which costs \$7,000, runs on a pc in DOS. The micro must be equipped with a \$7,000 coprocessor, which comes with a 386 chip that is specially designed for Lisp applications. So, for \$14,000 you can get a large expert system building tool that would have cost you at least \$50,000 six months ago.

If you must develop a large, complex application fast, cost is usually no object. If that's the case, then the Knowledge Engineering Environment (KEE) from IntelliCorp in Mountain View, Calif., is probably the best buy available. KEE costs \$65,000 and you will need a Lisp machine or a very powerful 32-bit workstation that can handle Lisp. You also must hire or train a Lisp programmer. If you make the move to KEE, you will end up with a very powerful and flexible tool that enables you to develop large applications in a very short time.

IntelliCorp recently announced KEEconnection, a utility that enables KEE to access mainframe data via SQL. It also introduced KEEScope, a package that allows you to rapidly reconfigure mainframe data into an object-oriented format that can then be easily analyzed.

The wait-and-see approach has great appeal for many overloaded MIS managers. But procrastination can also be risky. While you're dallying, other companies could be getting a competitive edge with the help of AI.

So, the smart MIS executive, considering what has been achieved by several companies that have made only modest investments in AI, would be wise to start training some people in artificial intelligence techniques. AI is a new technology that's just beginning to be robust enough for use in the MIS world. The prices of hardware and software continue to fall as the quality improves. Several major vendors are preparing products that, once they finally hit the market, will lead to even better buys in the AI arena.

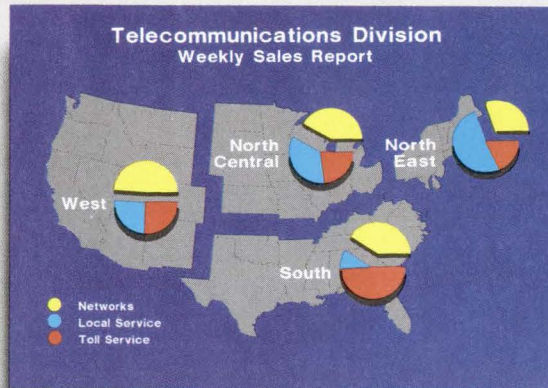
Artificial intelligence is here to stay. Users will be doing it. Competitors will be doing it. And sooner or later someone will expect you to be doing it. As the leader of the MIS department, you'll be asked to organize the corporate AI effort. When that time comes, you will want to have enough experience with the technology to recommend one or more strategies for using the tools that will help shape your company's future. ■

Paul Harmon, a specialist in expert systems, is president of Harmon Associates in San Francisco and editor of the Expert Systems Strategies newsletter.

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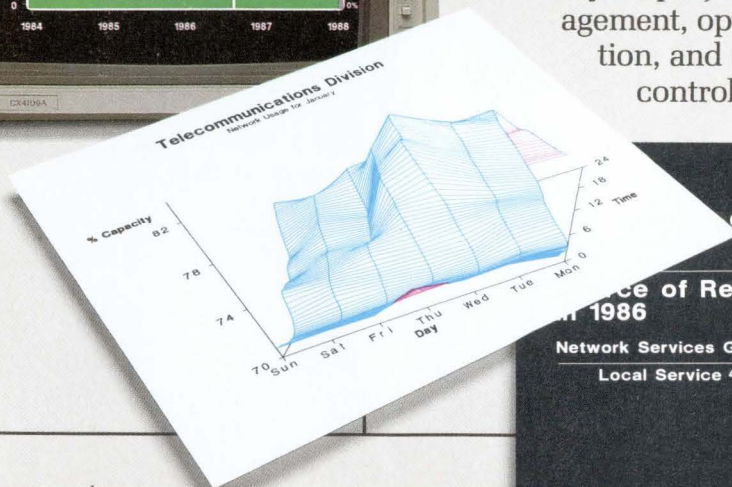
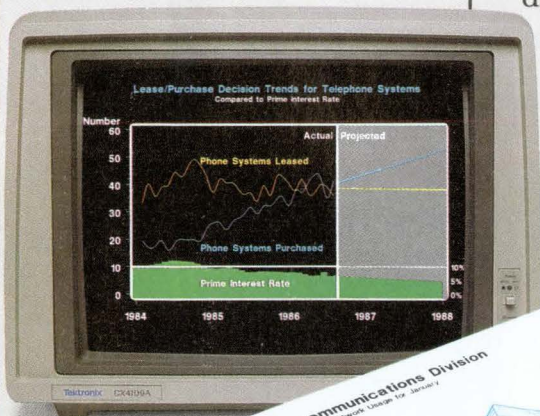
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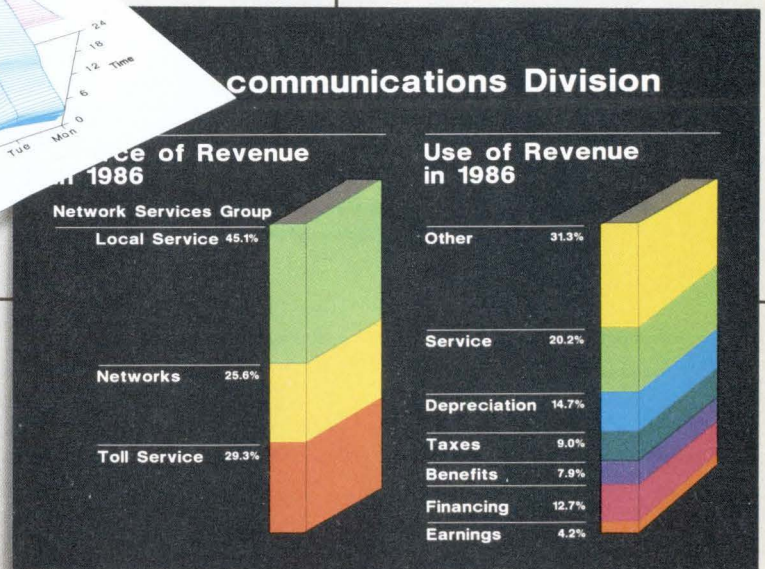
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The development of complex applications—like decision support systems—can benefit from techniques pioneered in AI research, in particular AI-based functional prototyping. In contrast to traditional prototyping, which focuses on such system externals as screens and reports, AI prototyping models the internal decision logic of a target system. The following case study breaks into six steps a development process centered around AI-based functional prototyping. The technique proved to be highly efficient and effective, both in terms of the time spent producing the system design and the quality of the ultimate design. The technique is best suited to development projects that are somewhat complex and easily modularized.

Six Steps to AI-Based Functional Prototyping

BY RANDY WEISMAN

Methods adopted from artificial intelligence research can be used to prototype the key processes of today's decision support systems. AI-based functional prototyping can be used to document the requirements of a complex application in a way that not only is easily communicated to users, but also helps developers estimate the implementation effort accurately. Both these points help ensure success by reducing the uncertainty that surrounds the development of systems based on complex logic.

The following case study is based on my experience with Arthur Andersen & Co., Chicago, developing a mainframe-based oil and gas accounting system for a major oil company. We viewed the project as an excellent candidate for functional prototyping for several reasons.

First, parts of the application, in particular the materials management function, involved complex internal logic. The material management function must account for the movement of equipment from one oil lease or warehouse to another. Complexities arise in accounting for these moves when properties are co-owned by more than one oil company. In all, there were about 35 different types of transfers and an additional number of permutations of exception conditions.

The second reason that functional prototyping seemed well suited to our development effort was that the new system was doing more than just automating a manual activity, and so even the experts had not fully formalized the new processing. Given the risks of implementing such a system, the development team needed some assurance that the process was well understood before any

programming would begin.

Functional prototyping proved to be useful both in formalizing the system's processing specifications and in communicating these complex processes to the programmers who implemented them. We used a six-step approach to develop the functional prototype.

1 *Interviews.* The oil company's functional expert spent one day discussing the application with the development team and walking through real situations where the application process was performed. The expert gave the team 10 cases that represented a variety of material-transfer situations and their resulting journal entries.

2 *Initial implementation.* The team used the case studies and a rule-based system shell to develop a system in less than a week that successfully processed all 10 cases. These immediate results gave credibility to the process in the eyes of the functional expert, who became eager to continue with the development of the model.

3 *Case analysis.* Actual documentation of more historical material transfers was used to identify other exception cases. Other supplemental cases were created for situations where documentation could not be found.

4 *Knowledge refinement.* The prototype model continued to be refined as new situations were identified. After five weeks, the model was correctly processing all 35 general categories of material transfers. Ninety-five cases were used to test the various situations.

Six Steps to AI-Based Prototyping

5 *User sign-off.* The output of the prototype system was a one-page report that reflected the parameters of the test case and the resulting journal entries. The functional expert reviewed each package for accuracy.

6 *Documentation.* Once the expert approved the cases and was convinced that the model was complete and working properly, the prototype's internal logic, or knowledge base, was translated manually to functional requirements. A conventional Warnier-Orr chart form was used to document the model's decision-making logic. This documentation was produced in four days.

In addition to a working pc-based model that correctly processed the full scope of material transfers, functional prototyping produced a set of design specifications, complete with 100 pages of charts, 12 module descriptions, and supporting data element descriptions; it also produced a set of test documentation, approved by the functional expert, which included conditions, cases, and expected results. These products would also be used to test the resulting COBOL program, and the model could be used to generate expected results for additional cases identified during program testing.

The prototyping approach was equally efficient in terms of time, requiring 60 workdays, an average of five days per module. The functional expert's time represented only 5% of the total effort.

The most important benefit of the use of prototyping was improved quality of the functional design, which was much better than one developed with conventional techniques could have been. An automated model also made testing of the design possible, which helped ensure that the resulting system would correctly process material transfers. Finally, better understanding of the application's design helped in estimating the amount of effort that would be required during programming and testing.

Techniques borrowed from AI were the keys to our success. Rapid prototyping has been the trademark of the AI research community. Prototyping in this context refers to the ability to model the internal workings of a process in a matter of days or weeks. In contrast to a set of dummy screens that may mask empty processing, AI prototypes are actually working applications. They are prototypes in the sense that they may not span the entire scope of the application, and they may have simulated interfaces to data or to other programs.

This AI approach to prototyping is the most appropriate technique for the complex-logic application and provides the basis for the functional prototyping approach cited in the case study. Specifically, we used three artificial intelligence techniques.

First, we used high-level languages (shell programs). AI expert system shell programs give the developer a language to specify only the logic rules and, in some cases, the control flow. These high-level languages allow the developer to represent explicitly the knowledge of how to solve the problem. The knowledge and decision logic, which is easily developed and modified, may be represented in a fairly natural manner.

Second, our prototyping was based on an incremental development process. Because the knowledge is represented explicitly and the shell software provides an overall system architecture, AI programming requires much less initial design work than traditional programming. Each pocket of knowledge can be considered complete on its own, so new ones can be added easily. This incrementally increases the scope of the application without affecting the integrity of the system.

The nature of the software shells also allows the depth of the application's knowledge to be increased incrementally. For example, the system's input can start out being relatively subjective and, in time, rules can be devised to drive it down to more factual information.

Third, we used a case-oriented development methodology. A characteristic of complex-logic applications is that they are often performed by knowledgeable individuals who seem to work instinctively rather than by following a formal procedure. While transaction-based applications can be easily defined by those who perform them, a common response by these subject matter experts is, "I can't tell you how I do it, but when I see this situation, I just know what to do."

The Expert's Rules of Thumb

The case-oriented approach used in AI development addresses this problem. Instead of using standard interview techniques to identify application requirements, the functional expert is prompted to describe the decision-making process by working through case histories. By looking at a variety of real situations, the developer ("knowledge engineer" in artificial intelligence terminology) can identify the rules of thumb and the over-

all approach used by the expert. The application logic is refined as more cases are processed by the system model. Randomly choosing a variety of cases will help ensure that all aspects of the problem are addressed.

Functional prototyping is appropriate under three conditions. First, the decision-making process must be complex, a condition that is met when there is a large amount of exception processing or complicated validation logic. Second, the decision-making process must be capable of being broken down to definable formalized rules. Third, the problem can't be overly complex.

Functional Prototyping Won't Replace AI

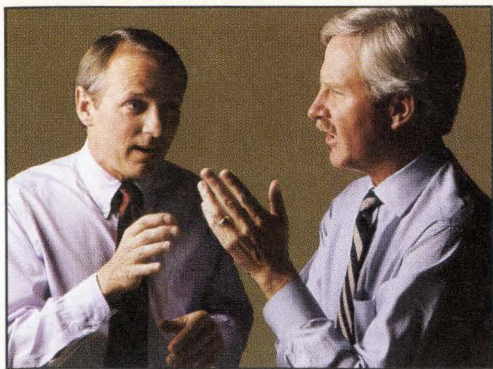
This last point is extremely important. Functional prototyping will not take the place of true AI technology. Some applications may be beyond the limits of pc-based tools and conventional implementation because they require especially sophisticated architectures. On a continuum that places conventional data processing at one end and true AI processing at the other end, functional prototyping is well suited to those applications that fall somewhere in between.

Functional prototyping addresses only the decision-making logic components of an application. Important considerations such as technical architecture, dataflow, and overall control must still be designed by conventional means and integrated with the requirements derived from the functional prototype. The functional specifications typically address the application logic that will be invoked once all the processing necessary to capture the data has been completed.

Finally, it is important to view functional prototyping as a design productivity technique that helps capture the functional requirements of a complex application. It can be performed by conventional functional analysts, simply upon learning how to use a pc-based expert system shell tool.

In fact, because changes may still occur between design and implementation, using functional analysts instead of special prototyping experts ensures that the true "keepers of the knowledge" will remain involved in the development as the application proceeds through to implementation. ■

Randy Weisman is a manager in the Management Information Consulting Division of the Chicago office of Arthur Andersen & Co., a Big Eight accounting firm.

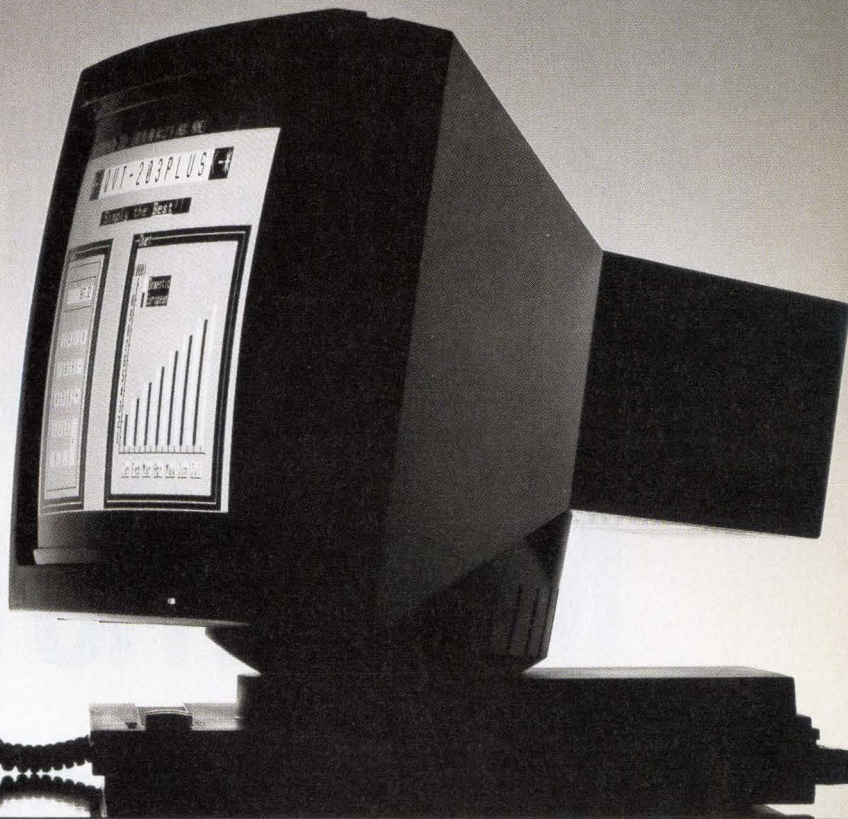


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Real Time

OFF-LINE

LOCAL AREA NETWORKING had as one of its earliest proponents the once dominant Datapoint Corp. of San Antonio. Datapoint began its fall from grace back in 1982, when it was forced to write off sales that didn't materialize. Then, in 1984, it was taken over by New York investor Asher Edelman, who pared down the business considerably. The company has been struggling to get out of the red ever since.

Datapoint officials recently completed a 17-city tour of the U.S. to spread the word that it is still very much in the business of connecting pcs. The company is also introducing a product that brings full-motion video to the pc network.

Two years ago, Datapoint introduced MINX (Multimedia Information Network Exchange), a full-motion, full-color video conferencing/data display system, which it geared toward the executive market as a productivity tool. On the recent tour, Datapoint announced that MINX, which previously could transmit only over a LAN, can now transmit over long distance lines; MINX uses a Codec device, which takes full-motion video, compresses it, and transmits it over T1 lines. Datapoint says that in addition to executives, who use MINX to confirm business deals, for example, the system is also being used in nonbusiness environments.

In Australia, which will have its bicentennial exposition next year, a system is being implemented at the expo to provide immediate translation services for attendees, who will see their translator on the MINX screen. The company says that in two years MINX will be capable of integrating video pictures into text delivered over long distance lines, in the same way pcs hooked up to a scanner and running desktop publishing packages do now. Datapoint says it is currently "playing with" a new AT&T scanner to do the job.

In addition to pushing MINX, which, Datapoint says, is installed in 100 sites (representing 1,000 screens), the company is now emphasizing its ability to integrate disparate products from many different vendors on its own ARC local area network. Datapoint introduced ARC as one of the first commercially available LANs nearly 10 years ago and claims it now connects half of all networked pcs.

Datapoint's new marketing thrust is being ushered in with its newly packaged systems, which offer prices as much as 40% below their previously unpackaged cost. A package with 10 MINX terminals and Starbuilder, which is a hardware/software package that allows non-Datapoint processors to access ARCNet, is priced at \$25,000.

HARDWARE

Altos Ships Multiuser 386 Running Xenix System V

The first in a family of systems accommodates up to 64 users.

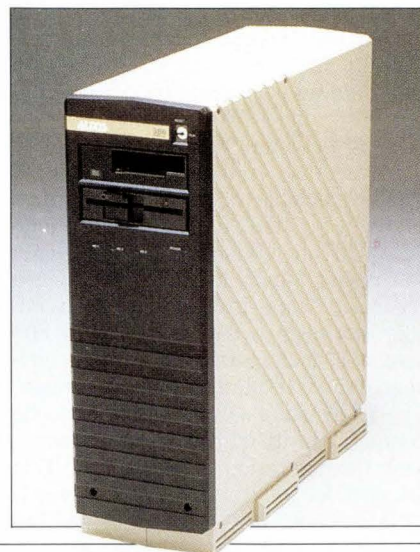
BY THERESA BARRY

Altos Computer Systems has introduced its Series 2000, an Intel 80386-based multiuser system running Xenix System V. The 2000, the first in a planned series, supports up to 64 users.

Altos says that the Series 2000 is compatible with its current family of Intel 80286-based systems running Xenix 3.0, and it will run all Altos 286-based application software. The Series 2000 is compatible with Unix System V, release 2, version 2, and conforms to AT&T's System V interface. The 386 processor runs at 16MHz with a 32KB data and instruction cache and SCSI intelligent file processor.

Products announced along with the 2000 include asynchronous communications, X.25, 3270 bisync, 3780, 3270 SNA, and the Altos WorkNet LAN. Ethernet, supporting ISO protocols, will be delivered in the fourth quarter.

Three configurations are available: the 2408S, the 2417M, and the 2817M. All include an intelligent file processor subsystem, a communications processor, a 1.6MB, 5¼-inch floppy disk drive, a 60MB streaming magnetic tape unit, and an Altos V terminal. The series is expandable to 16MHz in 2MB, 4MB, or 8MB increments.



A 65MB and a 142MB hard disk drive are optional. A 320MB drive is expected in the fourth quarter.

The 2408S supports 20 users, has 4MB of RAM, and a 54MB ESDI (enhanced small device interface) hard disk drive. The 2417M supports 64 users, has 4MB of RAM, a 142MB hard disk, and a Multidrop cabling system that allows 64 individual RS232 devices to be connected. The 2817M has 8MB of RAM, a 142MB hard disk, and Multidrop cabling.

An optional kit for upgrading existing Altos systems to the Series 2000 is available now, priced from \$5,000 to \$9,000, and a UPS will be ready in the fourth quarter. The Series 2000 ranges in price from \$25,000 to \$30,000. ALTOS COMPUTER SYSTEMS, San Jose. CIRCLE 250

T1 Multiplexor

Provides digital switching for T1 or international rates.

Paradyne has unveiled an intelligent networking T1 multiplexor, the 3230, capable of integrating over 500 voice, data, and video channels per node. The product is an addition to Paradyne's 3200 series of high-speed digital products. The product was developed with Spectrum Digital Corp., Herndon, Va., under a manufacturing rights and technology transfer agreement concerning Spectrum's T1 product.

The 3230 uses a software-defined bit-interleaved architecture. It supports 508 voice and data ports per node and eight nonblocking trunks at 1.544Mbps. Trunk aggregates may run at speeds from 48Kbps to 2.048Mbps in 8Kbps increments. Synchronous channel speeds between 1.2Kbps and 2.041Mbps are supported on a single card. Asynchronous speeds up to 19.2Kbps are also accommodated. Any channel can be assigned to any aggregate.

The 3230's network management control and diagnostic capabilities are built-in at both aggregate and channel levels. Monitoring can be orchestrated from one central location or distributed

Real Time

throughout the network using a multilevel, multifunction password feature. Under the current architecture, users can access a window into IBM's NetView network management system on a mainframe for control of SNA devices. Paradyme plans to allow the 3230 full access to NetView eventually, but this feature will not be available until next year.

It is priced at \$30,000 for a single chassis package with 20 voice and data ports and redundancy features. PARADYNE CORP., Largo, Fla. CIRCLE 252

Ethernet Transceiver

For Ethernet LAN transmission and reception.

American Photonics Inc. recently rolled out the RL3000 Ethernet transceiver to complete its line of Ethernet products. It features diagnostics, activity indicators for network monitoring, and a user selectable heartbeat signal for ensuring network station equipment compatibility. The RL3000 provides access to Ethernet LANs for transmitting and receiving data in 802.3 and Ethernet 2.0 specs for carrier sense multiple access/collision detect operation at 10Mbps. It can integrate with either thick Ethernet coaxial cable or thin-net coaxial cable.

The transceiver is priced at \$250. AMERICAN PHOTONICS INC., Brookfield Center, Conn. CIRCLE 253

Hayes Doubles Product Line

Four new modems, an enhancer, and communications software.

The new V-series modems recently announced by Hayes include the Smartmodem 9600, 9600B, 2400, and 2400B. All use the LAPB link level portion of X.25 for error control and adaptive data compression when communicating with another V-series modem. Another function of all the modems is automatic feature negotiation, which analyzes all options available for the modem link and selects the most efficient transmission combination. All feature auto dial/answer, call progress monitoring, enhanced diagnostics, compatibility with CCITT V.22 and V.22bis and Bell 103/212 standards, and a two-year limited warranty. The Smartmodem 9600 (external) is priced at \$1,299, the 9600B (internal) is \$1,199; the 2400 is \$899, and the 2400B is \$849.

The new V-series Modem Enhancer is a standalone unit that can be attached to any Hayes external modem to

give it X-series system capabilities. It's available through the end of September for \$199 and will be \$349 thereafter.

Smartcom III is a communications program for the IBM PC, Compaq, and compatibles that is designed to support the V-series modems. It includes all functions of Smartcom II and provides a new, flexible interface that allows both menu-driven activities and command-level operations, and provides the Simple Communications Programming Environment programming language. It's priced at \$249. HAYES MICROCOMPUTER PRODUCTS INC., Atlanta. CIRCLE 251

Lisp Machine

First of TI's products to incorporate new Lisp chip.

Texas Instruments has introduced its Explorer II and Explorer II LX workstations. Work on the microprocessor's design began in 1984 as part of a contract awarded to TI by the Defense Advanced Research Projects Agency. TI claims Explorer II delivers more than five times the performance of previous Explorers.

The new Lisp microprocessor is said to integrate 60% of the original two-board Explorer processor on a single chip, which has been fabricated in 1.2 micron CMOS technology. It's designed to support an Explorer-compatible superset of Common Lisp. The Explorer II processor consists of the Explorer Lisp microprocessor, 32KB words of writable control store, and two high-speed cache memories on one board. A plug-in floating point accelerator option is available. A pipelined architecture provides execution of microinstructions, and six on-board RAMs—totaling 114Kb—provide the bandwidth required for symbolic processing. Explorer II LX integrates Lisp and Unix by combining the Explorer II processor and a 68020-based processor running TI System V.

Memory configurations start at 8MB, expandable to 128MB. Mass storage devices for the Explorer II include 140MB 5¼-inch Winchester disks, 516MB SMD disks, ¼-inch cartridges, and ½-inch reel-to-reel tape drives. The system console is a high-resolution (1,024 by 808 pixels) 17-inch monitor, low-profile keyboard, and three-button padless mouse.

Application software is object-code compatible with all Explorer systems. A base configuration of Explorer II is priced at \$49,000, and a large Explorer II LX is \$99,900. TI says Explorer and Ex-

plorer LX will continue to be available. An Explorer II processor kit, which can be installed in the field, is available for users who want to upgrade existing Explorer systems. It is priced at \$20,000. TEXAS INSTRUMENTS INC., Dallas. CIRCLE 255

Multifunction Workstation

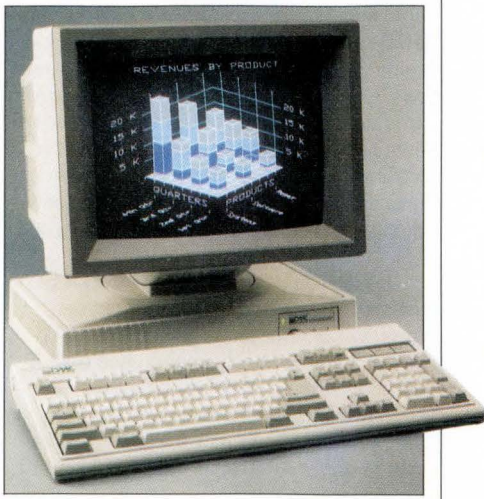
Datamedia unveils DOS/VT240 color graphics station.

The Colorsan/2 incorporates full PC and Digital VT240 or VT340 terminal functionality into one workstation with a small footprint. It allows users to switch, with one keystroke, from a VT240 session accessing a corporate database to a full-function MS/DOS personal computer.

It's built with an 8MHz Intel 8086-compatible NEC V30 microprocessor, 768KB of DRAM, 8KB or 32KB of CMOS RAM, 192KB of ROM, a proprietary EGA chip set with 256KB of DRAM, and two RS232 ports and two expansion slots. Colorsan/2 is available with up to 2MB of internal battery-backed RAM, called a RAMfile, and also features a removable battery-backed credit card-sized storage device, called a Cardfile, which provides up to 128KB of programmable ROM. AT- and VT200-style keyboards are available.

Colorsan/2 can function as either a standalone MS/DOS machine acting as a PC or as a standalone VT terminal. Graphics supported include VT240, Tektronix 4010/4014, and IBM's EGA. An optional 3½-inch floppy or hard disk file, called a Diskfile, can be connected to the workstation for additional storage.

Colorsan/2, with keyboard, monitor, and graphics card, is \$2,000. A RAMfile is \$750 and a Cardfile is \$150. DATAMEDIA CORP., Nashua, N.H. CIRCLE 254



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UPDATES

AS NETWORK MANAGEMENT becomes a bigger issue in the MIS world, vendors of network management systems are continually adding features. Cincom and IBM have announced similar new capabilities for their network managers, incorporating functions that manage the network's operating system.

Cincinnati-based Cincom has introduced Sys/Master, which can be purchased either as a single system or as an integral component of its network management system, Net/Master. "Sys/Master does for the OS environment what Net/Master does for the network environment," according to Thom Vollmer, product manager at Cincom. Sys/Master automates some of the tasks of operators working in an MVS environment. From one console, Sys/Master, in conjunction with Net/Master, can manage all operating systems, network systems like VTAM and NCP, and subsystems like CICS, TSO, JES, and IMS/DC. Using the MVS subsystem interface, Sys/Master screens all MVS console traffic; messages that need further processing can be routed to a Net/Master procedure.

Remote facilities can also be automated by Sys/Master, using Net/Master's communications link, allowing for their unattended operation. Cincom claims this capability will become important as more 9370s are implemented in an environment, since every cpu will not need to be attended to. Sys/Master supports SNA and has an open network architecture. It will have a controlled release in September and a general release in October. The price is \$35,000.

While IBM has not made available all the details concerning features of its new release of the NetView network management system, Big Blue says NetView release 2 allows central control for managing the operations of SNA and non-SNA networks. The product will enable distributed and departmental 9370 systems to run unattended and provide the ability to filter messages under the MVS subsystem interface, using its message processing facility. The NetView command list will be initiated based on operating system messages, according to IBM.

NetView for MVS will be available in the fourth quarter, and the price ranges from \$37,650 to \$60,240 for a one-time license. A VM version is scheduled for release in the first quarter of 1988; a VSE version will be available in the fourth quarter of 1988.

SOFTWARE

```
*1 CUSRPT.ESC                                L-1      C-1
                                                CI      OVERTYPE
                                                06-01-87 2:28

FOR EACH customer
FOR EACH order OF CUSTOMER
  DISPLAY cust-name city stat
  HEADER "Customer Report"
  OPTIONS REPEAT
  USING PANEL p1
  ADVANCE PANEL p1
ENDFOR
=====
                        BOTTOM
=====
LOOP
  SET choice = " "
  MODIFY PANEL mainmenu

  IF $KEY = "esc"
    LEAVE
  ENDIF

  REMOVE PANEL mainmenu

  SELECT choice
  WHEN "1" CALL sales1
  WHEN "2" CALL sales2
  WHEN "3" CALL sales3
  WHEN "4" LEAVE PROGRAM
  WHEN OTHER MESSAGE "Invalid Selection"
  ENDSL
ENDLOOP
```

ADR Unveils 4GL Development Tool

Migrates mainframe data to personal computers over local area networks.

BY THERESA BARRY

Ideal-Escort from Applied Data Research is a fourth generation application development tool that allows users on departmental IBM PCs running on the IBM Token Ring, PC Net, or Novell Network LAN to share mainframe data, query Ideal-Escort databases, and build applications.

Ideal-Escort's structured 4GL is modeled after ADR/Ideal, ADR's proprietary multiuser RDBMS, which provides recovery/restart and transaction back-out facilities, an active data dictionary, and a PC-based development workstation with a multiwindow editor, simultaneous window displays, compilation diagnostics, and PC/DOS interactivity.

Escort's database provides relational access through its language and supports multiple simultaneous users on a LAN. It features relational and arithmetic operators and built-in numeric, alphanumeric, and Boolean functions. Database integrity is controlled by logical transaction processing and a record-locking protocol. Data access is controlled by a multilevel security and data encryption process. Escort can download mainframe data and ADR/Datadic-tionary definitions into its database and

dictionary, and PC data from Escort can be uploaded to ADR's Datacom/DB RDBMS.

Ideal-Escort runs in PC/DOS on the IBM PC, AT, and PS/2, and requires 640KB of RAM and a hard disk. The price is \$1,000 per copy. APPLIED DATA RESEARCH INC., Princeton, N.J. CIRCLE 258

Desktop Publishing

Ashton-Tate announces its first product in this area.

Ashton-Tate has jumped on the desktop publishing bandwagon with its new micro product, Byline. The company says it's gearing the product toward users of spreadsheet and word processing packages who seek an enhanced appearance for their printed output but don't have graphic arts or typography backgrounds.

Byline runs on IBM PCs and compatibles with 384KB of RAM and a CGA, Hercules, or EGA graphics card. It features a menu- and command-driven interface and integrates files from popular word processors, spreadsheets, databases, and graphics programs. It does not need extra hardware or software to operate.

Byline can export changes to the original file without inserting extra code, provides access to DOS without quitting

Real Time

or loading, has a zoom feature as well as automatic dating and page numbering, and supports keystroke files for quick storage and recall of commonly used command sequences. Some of Byline's page design features are spec sheets for page, text, and photo formatting; Swiss, Times, Courier, Bookman, and dBase Elite type fonts; special characters such as bullets, hollow bullets, and symbols; and type sizes ranging from six to 72 points. Its price is \$395. ASHTON-TATE, Torrance, Calif. CIRCLE 259

386 Network Operator

Banyan announces Vines/386 for Compaq Deskpro386.

Vines/386, which will be available in November, is said to maintain full compatibility with Banyan's Motorola 68000-based network servers, the BNS and DTS.

Banyan says Vines/386 will offer complete access to network resources, including sharing of files, disks, printers, modems, and network applications. StreetTalk, Banyan's database for locating and controlling network access, is supported. The new software will include protocol support for communication with minicomputers and mainframes and with larger networks with Banyan servers. A Vines/386-based server will allow pcs in a network to emulate 3270 terminals over SNA/SDLC protocols. Communication with asynchronous hosts via VT100, VT52, IBM 3101, and tty emulation will be provided, as will file transfer through Kermit.

Vines/386 connects to a LAN by way of a LAN interface board attached to a slot on the pc. Banyan claims the server will be able to provide gateway capabilities between similar and dissimilar LANs while performing resource sharing. Vines/386 will cost \$3,995. BANYAN SYSTEMS INC., Westboro, Mass. CIRCLE 260

CASE Program

Startup company debuts with PS/2 graphics capabilities.

Visual Software, founded in 1984, recently announced its first product, vsDesigner. The computer aided software engineering (CASE) package has been in beta test at Pacific Bell. It offers native compatibility with VGA, the graphics device driver for the IBM PS/2.

Software designers using vsDesigner can communicate over a variety of LANs, including those of Novell and

3Com, and IBM's Token Ring and PC Net. The package provides a drawing editor, virtual display, integral word processor, attribute editor, and report generator. In an integrated environment, vsDesigner performs diagramming; the capture of associated text for requirements, definitions, and design specs; central storage of documentation and program information; project management; and quality assurance, tracking, and reporting.

Visual will offer on-line updates for its CASE tools through an encryption device that plugs into a user's PC.

A single unit is priced at \$7,500. Optional are vsObject Maker, which allows users to define symbols and attributes for each graphical object in a software design, and vsSQL Advanced Query/Report Generator. Both of these options are priced at \$995. VISUAL SOFTWARE INC., Santa Clara. CIRCLE 261

Banking Program

Internet and Tandem roll out on-line, real-time system.

Mercury is a continuous, fault tolerant wholesale international banking system developed by Internet for Tandem computers. Its preconfigured and predefined set of modules support foreign exchange and money markets, commercial lending, limits management, current accounts, dealer information, electronic funds transfer, and a SWIFT interface. It is a companion product to Atlas, Internet's integrated, fault tolerant, on-line, real-time banking system introduced in 1984.

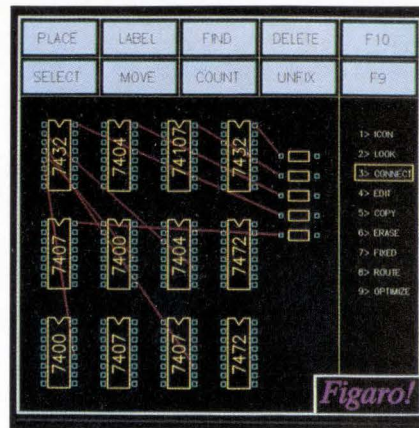
Mercury requires a Tandem CLX or EXT. Its license costs \$250,000. INTERNET SYSTEMS CORP., Chicago. CIRCLE 262

Workstation Graphics

Template offers new versions of Figaro.

Template Graphic Software (TGS) has announced new versions of Figaro, its implementation of Programmers' Hierarchical Interactive Graphics Standard (PHIGS), for Apollo, DEC GPX, Masscomp, Silicon Graphics, and Sun workstations. Figaro is a high-performance device and graphics standard designed for 2-D and 3-D graphics applications running hierarchical data structures, geometric modeling, rapid display modifications, and interactive input.

Enhancements to the new release include 4096 object classes, which allow applications to control object visibility,



detectability, and highlighting relationally; new geometric primitives for object definition, manipulation, and display; and more flexible object instancing for creating and modifying hierarchically defined objects. Figaro uses virtual memory facilities directly for graphics data storage, data manipulation, and data traversal for display, and it's integrated with resident workstation window managers. A Graphics Engine Interface (GEI) allows Figaro to use graphics accelerators that support four-by-four floating point matrixes and can transform and clip 2-D and 3-D line, polygons, and text specified in full floating point coordinates.

Prices for the new versions of Figaro start at \$3,000. TEMPLATE GRAPHIC SOFTWARE, San Diego. CIRCLE 263

C Compiler

Microsoft unveils version 5.0 of Optimizing Compiler.

Microsoft C Optimizing Compiler, version 5.0, is an advanced compiler for professional programmers. Microsoft claims the compiler is typically 30% faster than Microsoft C 4.0.

C 5.0 comes with an enhanced version of Microsoft CodeView debugger and has over 100 new library functions, including a full graphics library and BIOS and DOS calls, and enhanced documentation. Microsoft QuickC is included. It has an in-memory compiler, editor, MAKE, and debugger for fast prototyping, and has a compilation speed of 10,000 lpm.

Microsoft C 5.0 conforms to IBM System Application Architecture and supports the proposed ANSI C standard. Microsoft claims that applications developed under C 5.0 can be directly moved to MS OS/2. The price is \$450. MICROSOFT CORP., Redmond, Wash. CIRCLE 264



Keep your mainframe in touch: Send your remote PCs a card!

If a telephone line goes to wherever your remote PCs are, Sync-Up™ from UDS can now link them directly to your mainframe!

Sync-Up fits a complete synchronous modem and a protocol converter onto a single card; no other modules are required. Add appropriate UDS-supplied software, and you'll have a fast, reliable micro-to-mainframe link. If your system is already supporting 201C, 212A, 208A/B and/or 9600B modems, no modifications are required at the mainframe end.

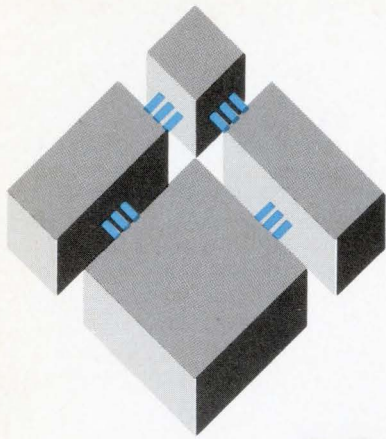
Sync-Up boards may be specified with software to support 2780/3780 or 3270 BSC, and 3270, 3770 or 5251 SNA or a variety of other protocols. For complete technical data and quantity prices, contact Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35805. Telephone 205/721-8000; Telex 752602 UDS HTV.

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PEOPLE

Walking Away, But Slowly

John Cullinane, regarded by his peers as a tough competitor and savvy business leader, leaves Cullinet a more relaxed and reticent man.

BY GARY McWILLIAMS

John J. Cullinane laughs softly when told a competitor wouldn't even consider doing what he now plans to do. He is, after all, leaving behind a company that represents a good part of his wealth and 19 years of his life's work.

"I suppose no one else would," says Cullinane, 53. "But then they're not me. I never viewed what I was doing as building monuments. I was building a corporation that turned out to be far more successful than I ever thought it would be."

In September, Cullinane will no longer be chairman of Cullinet Software Inc. In fact, he will no longer hold an executive post at the Westwood, Mass., company. There are plans for customer meetings, a long-term consulting contract, and an office. Reflecting the emotional distance he now seeks, the office will be at the company's customer education center, away from executive row.

He is a soft-spoken and, some say, a weary man now. The competitive fire that made him a major figure in the industry is largely absent; his aspirations are more subdued. For him, the software industry no longer holds fascination. "I've climbed all the mountains; I've solved all the same problems over again," he says.

A lanky and now graying Cullinane vows there will be no brash encores elsewhere. Aside from charity work and meetings with Cullinet customers, his goal is to take an advisory or investor's role in small companies. The only certainty is that such companies will be in a "more traditional" business. Whatever he does, Cullinane is determined that it will not be part of the software industry. "Software is esoteric . . . the results are not as tangible as the kinds of products a traditional company would manufacture," he explains. "I don't have the personal satisfaction of being involved in the product creation process. I would enjoy working at a company where you can see products being built; when all is finished you can touch them and feel them. . . ."

He shrugs off any longing to begin anew in the business he knows so well with a simple "I'm not that way." The

greatest satisfaction over the years has come from users' meetings, seeing hundreds of people in training seminars, socializing, and learning. Cullinane laughs at the notion that he has become an aesthete in a business suit. Nonetheless, he lends credence to the image by citing Rolls Royce Ltd. and piano maker Steinway & Co. as examples of businesses where he most would like to try his hand.

Such romantic longings for a genteel life paint a picture of two John Cullinanes. One is the man associates call a determined fighter, who devoted 19 years to building an enterprise in a business that was anything but genteel. The other dreams wistfully of a role in enhancing the luster of companies that have resisted modern influences. Such contradictions are a part of his life. Former coworkers and associates describe him as a loner who can be both tough and sensitive. There are other contradictions. Cullinane is an avid and politically

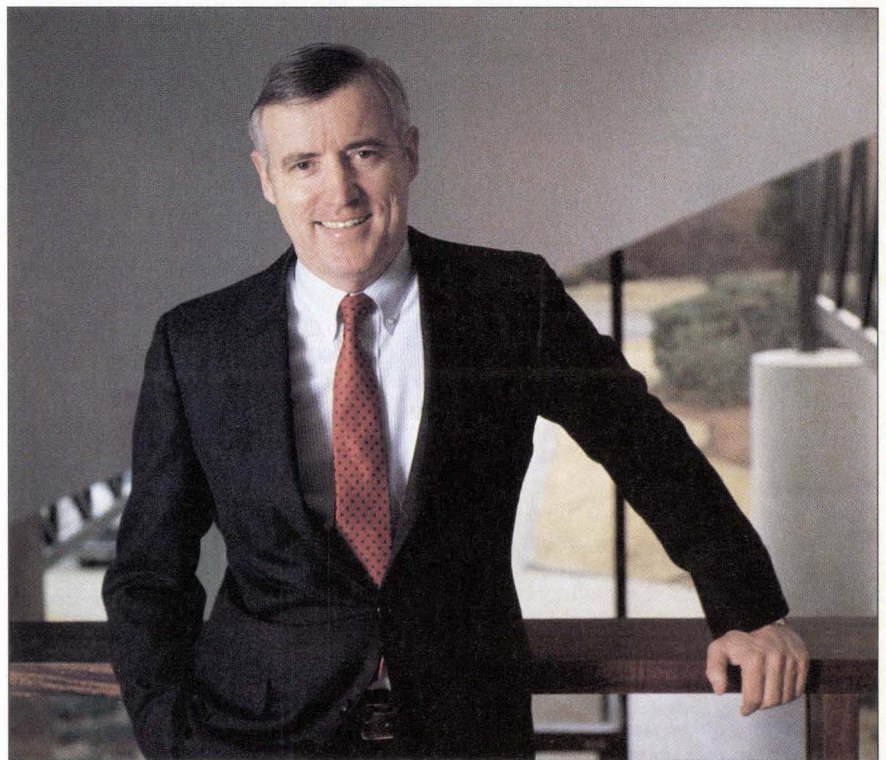
active Democrat; most of his peers are Republicans. He's shown humility in changing the company's name (from Cullinane Database Systems), but his photograph frequently graces Cullinet ads.

A Tough Guy Image

The rivalries were fierce on occasion, including a series of tussles with John Maguire, chairman of Software AG of Reston, Va., who, like Cullinane, is a son of poor Irish parents. "We had received a copy of a study that lambasted IDMS [a Cullinet database package] and [we] were giving out copies to sales prospects at NCC [National Computer Conference]," recalls Maguire. "He came up to me, stood nose to nose, and said if we didn't get rid of that study he'd throw his best troops in against us anytime we competed. Now, he may be a gentle guy down deep, but I backed off."

Other incidents, like one in which a Wall Street analyst who was being critical was tossed out of a Cullinet meeting, have honed Cullinane's tough guy image. A former executive says that toughness is expressed in other ways. Once an employee leaves, Cullinane's warm informality quickly becomes cold politeness, he says.

Yet, the image is one that Cullinane



CULLINANE: "I've climbed all the mountains; I've solved all the same problems over again."

Real Time

insists is undeserved. "What we have here is a tough competitor," he says. "Our competitors know when they come up against Cullinet Software."

Above all else, Cullinane is a private person who has shied away from industry associations, preferring to concentrate on his business. The results have been mixed. Cullinet's success is very much due to his hard work, and the accolades have been his. But he's had little to do with ADAPSO, the association that helps win recognition for software vendors like Cullinet.

"He's been in and out of ADAPSO," says Maguire. "He's a tremendous competitor but a sensitive guy with an enormous ego." That combination of egotism and sensitivity made it a struggle for Cullinane to get involved in ADAPSO, according to Maguire.

Now a wealthy man whose Cullinet stock is valued at more than \$25 million, Cullinane was born to an Irish immigrant family of modest means. While he talks freely and enthusiastically about Cullinet, he is more reluctant to discuss the private side. This much is gleaned: his father was a laborer who bequeathed a respect for hard work; his mother gave him a love for reading.

The middle child of five, he was raised in a middle-class Boston suburb. He says his background led him to build into Cullinet a respect for the importance of strong family ties. Executives who must travel for long periods are encouraged to take spouses, their way paid by the company.

His background also gave him a strong sense of order. The striking contrast of his strict Catholic grammar school training with the relative openness he experienced in public high school is still a vivid memory. "There was so much freedom I couldn't cope," he says of his high school days. "My academic record wasn't that great because I was having a great time."

It wasn't until two years after high school, when his companions were moving on, that he decided to attend college. His choice, a business college that alternated periods of schooling with periods of employment, enabled him to work his way through school. This experience provided him with his first brush with computers, at international consultancy Arthur D. Little Inc., Cambridge, Mass. The combination of business and computers was an eye-opener for him. "We were introducing computer technology

to a lot of companies that were experiencing it for the first time," he recalls. "There was a sense of what the major problems were and how to solve them."

In 1959, the same year other young men would found Control Data and Digital Equipment Corp., Cullinane was graduated with a business degree. He would always remain a businessman first, surrounded by technical people. While he held a series of jobs in companies that were involved with computers or dp services, he never held a technical role. His marketing orientation carried over to his own company, formed in 1968.

A Marketer at Heart

Today, that marketing savvy is heralded as part of Cullinane's unique contribution to the software industry. He says the industry lends itself to strict marketing interpretation. "The nature of the business is that software has to have a level, a volume; after a certain point most [revenues] fall to the bottom line." It's an approach that, like Cullinane, can be deceiving in its simplicity.

"Back in the '70s," says Software AG's Maguire, "there were a few of us trying to get people to view software as a genuine industry. For a long time our words fell on deaf ears. Cullinane is a real fighter. He fought for Cullinet, made it a player to be reckoned with by IBM."

Even when marketplace acceptance finally came, the business was never an easy one. The struggle shifted to heated competition among vendors, and Cullinane was always in the thick of it. Now, he looks for a more relaxed role.

Of the opportunity to indulge artistic leanings, he says, "I've never had the luxury, it's always been a matter of survival. In the first three or four years we were one of the few to survive out of 30,000 companies [that started]. Then when you become profitable, it's 'try to improve your results.' When you go public, there's always quarterly performance. You get on a treadmill and run, run, run."

In words that could ring equally true of himself, Cullinane says, "Cullinet Software has always tried to do things differently. They have a way of working out well."

Cullinane is seeking a different kind of life. But beyond the uniqueness of his choice, his departure signifies change of a broader order. The software business is no longer young, and its pioneers are becoming part of its history. ■

LETTERS

Not a Complaint

I am unable to resist grabbing five minutes from my own rush to deadline to write you a fan letter . . . er, note. Your May 15th editorial, "Not Unlike Non-Negatives," would make just about all editors—especially those of us in the high-tech trade press—weep with pleasure. It only happens once in a long while that any one of our genuine editorial concerns appears in a context that simultaneously addresses our readers' interests. Congratulations.

JANE STEIN
Editor
Data Training
Boston

More on Malfunction 54

I believe "Software Bugs: A Matter of Life and Liability" (May 15, p. 88) over-emphasizes the importance of software bugs in the cases in question, or that the lawyers for the unfortunate users of the Therac 25 are barking up the wrong tree if they are making this issue the heart of their case. Software bugs are only indirectly responsible for the tragedies that occurred. A computer circuit failure could have produced the same tragic results. The real negligence here appears to be the lack of adequate fail-safe facilities in the electromechanical design of the machine to protect the patient in the event of unforeseen control system failures.

The crucial question to be answered is this: How is it possible that *any* kind of computer failure, hardware or software, could allow the machine to be placed in—or to remain in—the X-ray beam mode when the X-ray target was not completely and securely in place? The installation of fail-safe interlocks on this machine is an absolute necessity and should be pursued vigorously.

F.J. ZAMPINO
Los Altos, California

After reading "Software Bugs: A Matter of Life and Liability," I couldn't help thinking that an investigation into the way AECL develops software might yield invaluable lessons for all software professionals. Often a software "bug" is merely a symptom of a much greater underlying problem.

ROBERT O. SCILLITOE
Program Engineer
Computer Applications
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Telecomp China '87.

Sept. 8-13, Beijing. Contact Kallman Associates, 5 Maple Ct., Ridgewood, NJ 07450-4431, (201) 652-7070.

Capital Microcomputer Users Forum.

Sept. 9-10, Washington, D.C. Contact National Trade Productions, 2111 Eisenhower Ave., Alexandria, VA 22314.

ABCD's Annual Breakaway Conference.

Sept. 13-16, Orlando, Fla. Contact ABCD: the Microcomputer Industry Association, Suite 430 O'Hare Plaza, 8725 W. Higgins Rd., Chicago, IL 60631-2702, (312) 693-2223.

The 1987 Electronic Printer and Publishing Conference.

Sept. 14-18, Miami. Contact Jean O'Toole, CAP International, 1 Snow Rd., Marshfield, MA 02050, (617) 837-1341.

CSM '87 (Conference on Software Maintenance).

Sept. 21-24, Austin, Texas. Contact the Computer Society of the IEEE, 1730 Massachusetts Ave. NW, Washington, DC 20036-1903, (800) 638-8510.

National Retail Merchants Association (NRMA) Conference.

Sept. 27-30, Chicago. Contact NRMA, 100 W. 31st St., New York, NY 10001, (212) 244-8780.

DGC '87 (Fifth Annual Conference and Exhibition on Computer Graphics in Defense and Government).

Sept. 29 - Oct. 1, Washington, D.C. Contact World Computer Graphics Association Inc., 2033 M St. NW, Suite 399, Washington, DC 20036, (202) 775-9556.

Federal Computer Conference.

Sept. 29 - Oct. 1, Washington, D.C. Contact Registration Director, Federal Computer Conference, P.O. Box N, Wayland, MA 01778, (800) 343-6944.

Info '87 (14th Annual Information Management Exposition & Conference).

Sept. 29 - Oct. 2, New York. Contact Info '87, 999 Summer St., Stamford, CT 06905, (203) 964-0000.

READERS' FORUM

The Next Generation

The rapid-fire change of the field that I'm in,

While welcome, still sometimes confuses.

When I'm just settled in, to my great chagrin,

Big Blue changes the words that it uses. These wondrous machines that we use every day

I call personal *computers*. Do you?

That word's had its day. It's clearly passé.

Now they're personal *systems* (slash two).

We've hoarded our data (much money we've spent)

Since Hollerith's days of the card file.

To tape it then went, on to floppies was sent,

Then to Winchester disk, now called *hard file*.

A new way of moving the cursor came through.

"A mouse!" we exclaimed. "Oh how nice!"

"But wait," said Big Blue. "A rodent won't do.

From now on, it's *pointing device*."

Think of the many fine dots on a screen.

They're pixels, we all know quite well.

Not so! Whether green, blue, or somewhere between,

From now on each one is a *pel*.

Oh tv celebs, since Korea unseen,

The whole truth tell, in plain English please:

That new on the scene is not merely machine

But the next generation in computerese!

TED HOLT

Director of Data Processing
Computer Center

William Carey College
Hattiesburg, Mississippi

A Disaster Recovery Parable, With Apologies to H.W. Longfellow

By the shores of Gothchur Data,
By the shining Big Computer,
At the doorway of his office,
Harry Waters stood and waited.
All the air was full of abends,
All the systems unresponsive.
And before him, through the hallway,
Westward, toward the boss's office,
Passed in hostile swarms the users,
Passed Payroll, the troublemakers,
Tramping, cursing through the hallways.
Level stood the door before him
From its entrance sprang a surgeon,
"With no system there's no billing."
Behind the doors the quiet computer,
Every Wait State light shown brightly,
All the vendors pointed fingers.
Sweat began to trickle freely,
From the brow of Harry Waters.
"Hot sites, backups, off-site storage,
I meant to do it all next Tuesday."
Through the door burst the operator,
Called by others the tape hanger,
"Our only backup tape got scratched."
Down the hallway came the boss,
Called by some the money giver.
With a look of resignation
stood and waited Harry Waters.

ROBERT D. HARGROVE
Security and Contingency Planner
Health Science Center
University of Texas
Houston

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 249 W. 17th St., New York, NY 10011. We welcome essays, poems, humorous pieces, or short stories.

Looking Back

TEN YEARS AGO IN DATAMATION: "Blackout price tag: a source close to the underwriting side of the insurance business estimates that claims filed as a result of dp-related damages—damaged disk drives, lost data, data that had to be reprocessed, added work shifts, work that had to be fielded out to service organizations—could easily run into the millions of dollars. And that doesn't take into account damages that users have not yet had time to fully assess, or business lost because systems were down, the source said. Wall Street alone was out a big bundle because of lost commissions resulting from missed trading time." (From "New York's Costly Blackout," Look Ahead, August 1977, p. 15.)

FIVE YEARS AGO IN DATAMATION: "Yes, indeed, computers are coming to the third world, slowly at first but inexorably. Underdeveloped nations . . . have begun to develop their own unique applications of computing equipment." (From "The Micro Comes to Pakistan," by David Kline, August 1982, p. 86.)